CA NGSS TIME

California Next Generation Science Standards Toolkit for Instructional Materials Evaluation

A Project of the CA NGSS Collaborative

Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

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Acknowledgments

The *California Next Generation Science Standards Toolkit for Instructional Materials Evaluation* (*CA NGSS TIME*) was adapted from the original work of K-12 Alliance @ WestEd, BSCS Science Learning, and Achieve, Inc.

The *CA NGSS TIME* was developed by the NGSS Collaborative with help from many contributing partners throughout California. The NGSS Collaborative consists of five organizations: The California County Superintendents Educational Services Association represented by the Curriculum Instruction Steering Committee, California Department of Education (CDE), California Science Project, California Science Teachers Association (CSTA), and K-12 Alliance at WestEd.

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Contents

Introduction

“It is critical that we shift our perspective from educators who disseminate information to master architects who build opportunities for student sense-making. Our world needs people who understand science. It influences our day-to-day decisions about our families’ health, the environment, and the many other scenarios that require the use of evidence-based decision-making. Our job is to teach *kids* (not standards)—to prepare them for the world *they* will live in, a world we can’t predict, and foster their ability to be scientifically literate. The NGSS were developed and California adopted them because it’s time to make some meaningful changes in science education that will shift the tide for students. The vision is to make science accessible to ALL and in doing so everyone is a part of the scientific enterprise.” Jill Grace, President, CSTA (2017–2019).

Recognizing that high-quality instructional materials are critical to achieving this vision, the California Next Generation Science Standards, Toolkit for Instructional Materials Evaluation (*CA NGSS TIME*) is an intentional, articulated, and comprehensive professional learning process. This is the result of the ongoing collaborative efforts of multiple partners including: Curriculum Instruction Steering Committee, California Department of Education, K-12 Alliance @ WestEd, California Science Project, and California Science Teachers Association.

The overarching goal of the *Science Framework for California Public Schools: Kindergarten Through Grade Twelve* (2016 edition) (*CA Science Framework*) echoes the National Research Council’s Framework for K-12 Science Education. The goal is to ensure that by the end of twelfth grade, *all* students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and engineering to engage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside school; and have the skills to enter careers of their choice, including careers in science, environmental protection, engineering, and technology.

It is imperative that teachers in California have the highest-quality science instructional materials aligned with the shifts in the CA NGSS. Selecting instructional materials that are phenomenon-based and incorporate three-dimensional learning requires that educators engage in a thoughtful, collaborative, and evidence-based process to ensure success for *all* California students.

Achieving this vision for *all* California students requires that they build toward science mastery through repeated opportunities for meaningful, engaging, and successful learning experiences. To provide those experiences, the CA NGSS lays out a coherent progression for K–12 science based on accumulated research about science learning. Science is more than a disconnected sequence of facts—it requires understanding of the process of science, the fundamental ideas within each discipline of science, and certain underlying themes that are common to all the sciences. The *CA Science Framework* identifies these components as three dimensions: 1) **Science and Engineering Practices (SEP)**, 2) **Crosscutting Concepts (CCC);** and 3) **Disciplinary Core Ideas (DCI)**. Figure 1.1 highlights how students must integrate these dimensions to understand them and solve problems to make that world better.

Figure 1.1. The NGSS Logo Illustrates the Three Dimensions of Science.

Science and Engineering Practices (SEPs)	Behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems.
Disciplinary Core Ideas (DCIs)	Key organizing concepts, problem solving tools, or underlying principles of a discipline.
Crosscutting Concepts (CCCs)	Underlying themes that have value in all disciplines of science.

Source: NGSS Lead States 2013a

Students achieve the vision of the CA NGSS when they live up to the statement placed at the beginning of the list of standards: *"Students who demonstrate understanding can…"* This statement requires that students know more than how to select the right answer. Instead, students are able to support their answer through the science and engineering practices or to apply their knowledge through those practices to new problem situations. To help students meet these expectations, progressive and coherent integration of the three dimensions of science learning needs to occur throughout curriculum design, instruction, and assessment of students (Figure 1.2).

Figure 1.2. Chapters in this Framework Describe How Effective Implementation of the CA NGSS Requires Many Elements

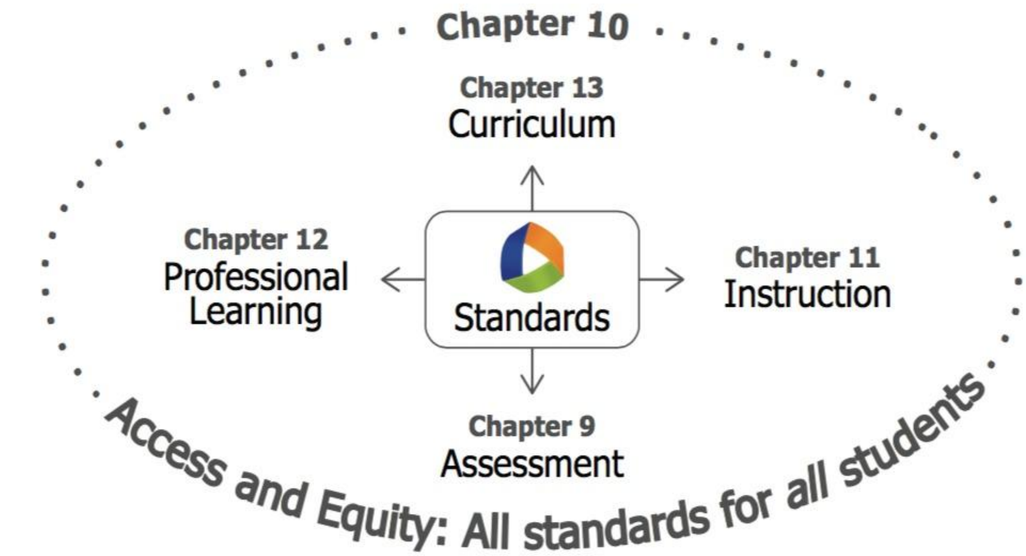


Diagram by M. d'Alessio

What is Three-Dimensional Science Learning?

Scientists have long recognized that building scientific knowledge is a multidimensional process. French philosopher Poincaré described this process by saying: "Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house." (Poincaré 1905, 140–159) While all analogies have limitations, Poincaré's house analogy can be extended to illustrate the three dimensions of science learning in the CA NGSS (figure 1.3).

Figure 1.3. Building a House as an Analogy for Three-Dimensional Learning

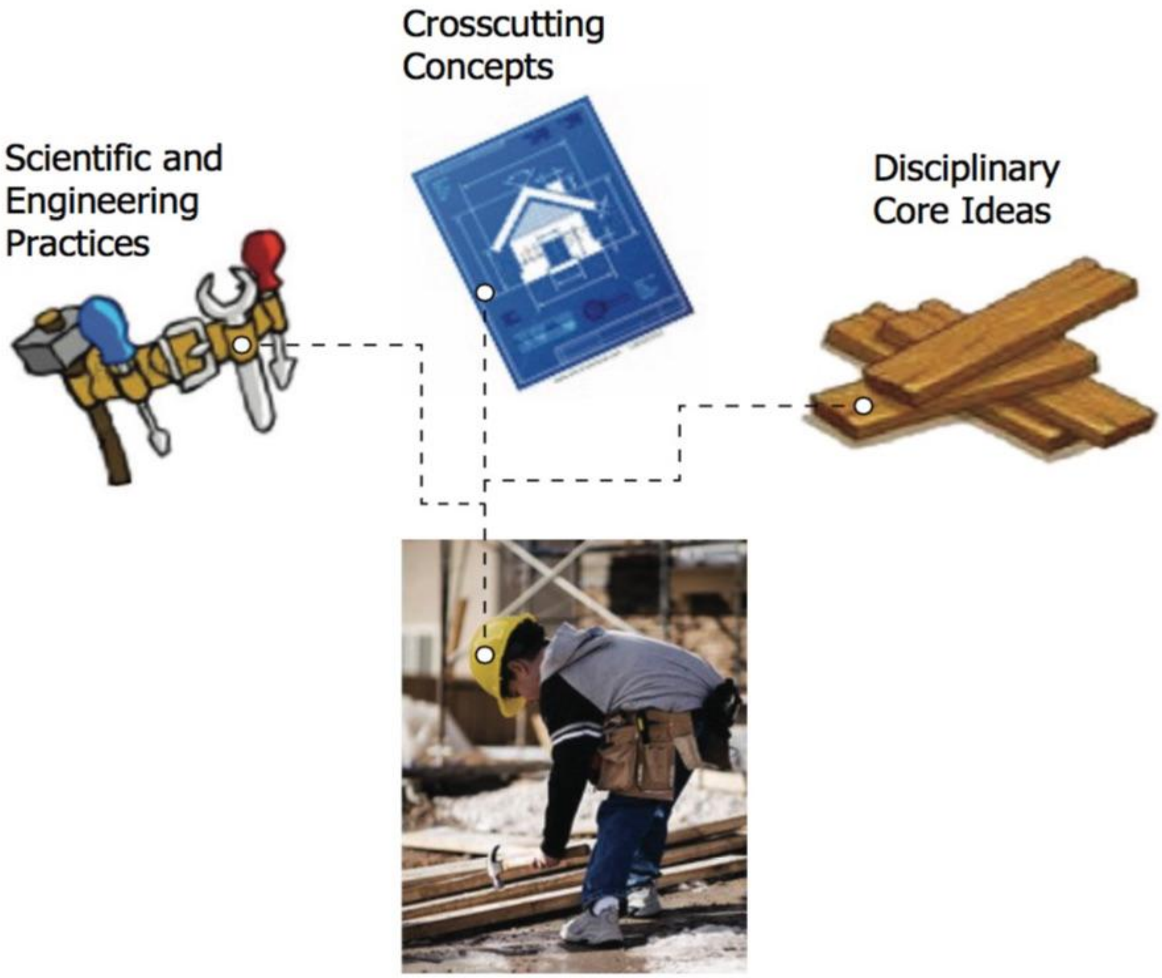


Diagram by M. Simani

DCIs are represented by planks and other building materials; students must be able to build upon their existing knowledge by connecting new ideas to this foundation. The SEPs are the tools (hammer, saw, measuring tape, etc.) needed to build the structure and the skills needed to use them effectively. Finally, the CCCs are the common elements shared by all structures that influence their design and construction. The builder relies on a vision, mental model, or concept of structures in general and multiple aspects of how they work in order to interpret the house blueprint plans, choose and use the materials appropriately, and do the work of building the house appropriately and efficiently. For example, builders recognize patterns in the way walls are constructed using horizontal and vertical support structures, are mindful about interactions between different subsystems in the home such as electrical and plumbing, and consider the scale of the project when deciding what equipment to use. These unconscious habits of mind might allow a builder to recognize an error in an architect's drawing in much the same way that the CCCs allow scientists to conduct inquiry effectively. Without all these three sets of components—building materials, building practices, and general concepts about homes, builders cannot construct a usable and durable structure. Any part of the building activity requires using all three components in their distinct but equally critical roles.

The CA NGSS are explicitly organized around both the tools (SEPs) and the overarching principles (CCCs) of science because of the overwhelming research on learning showing the importance of organizational structures for helping students progress to become experts. The benefit is not just theoretical: standards based on unifying ideas are common in other countries that produce significant scientific innovations and score highly on international benchmark tests (Achieve 2010). Students who develop a perception of science knowledge similar to that of scientists are more likely to persist in science learning and to study more science. To build such a conceptual structure of science knowledge, students need to develop capacity with all three dimensions of science learning.

The teacher’s role is to provide students with the materials (DCIs), the tools and how to use them (SEPs), and the vision of interconnectedness (CCCs). Over multiple years, students’ knowledge structures will need to be improved and even rebuilt as their experiences linking all three dimensions of the CA NGSS lead to a more realistic understanding of the work that scientists and engineers accomplish (table 1.1).

Table 1.1. The Three Dimensions of the CA NGSS

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
SEP-1. Asking Questions and Defining Problems SEP-2. Developing and Using Models SEP-3. Planning and Carrying Out Investigations SEP-4. Analyzing and Interpreting Data SEP-5. Using Mathematics and Computational Thinking SEP-6. Constructing Explanations (for science) and Designing Solutions (for engineering) SEP-7. Engaging in Argument from Evidence SEP-8. Obtaining, Evaluating, and Communicating Information	**Physical Science** PS1: Matter and Its Interactions PS2: Motion and Stability: Forces and Interactions PS3: Energy PS4: Waves and Their Applications in Technologies for Information Transfer **Life Science** LS1: From Molecules to Organisms: Structures and Processes LS2: Ecosystems: Interactions Energy, and Dynamics LS3: Heredity: Inheritance and Variation of Traits LS4: Biological Evolution: Unity and Diversity **Earth and Space Science** ESS1: Earth's Place in the Universe ESS2: Earth's Systems ESS3: Earth and Human Activity Engineering, Technology, and Applications of Science ETS1: Engineering Design ETS2: Links Among Engineering, Technology, Science, and Society	CCC-1. Patterns CCC-2. Cause and Effect: Mechanism and Explanation CCC-3. Scale, Proportion, and Quantity CCC-4. Systems and System Models CCC-5. Energy and Matter: Flows, Cycles, and Conservation CCC-6. Structure and Function CCC-7. Stability and Change

Teachers need to both monitor student progress using three-dimensional classroom assessments and provide students opportunities to explicitly reflect on their understanding of the relationship between these three dimensions. Through this process, students will master core ideas in science and also understand how that knowledge has been acquired and how they can apply it to new situations.

Explicit Focus on Environmental Principles and Concepts

A direct understanding of the connections between humans and the natural world prepares students to address the environmental challenges of today and of the future, to mitigate and prepare for natural hazards, and to interact in a responsible and sustainable manner with the natural systems that support all life. California has identified several critical understandings, called the Environmental Principles and Concepts (EP&Cs), that every student in the state should learn and be able to apply.

Phenomena-Driven Three-Dimensional Learning

A fundamental principle in CA NGSS is that students must use the three dimensions to understand specific phenomena, and that phenomena drive science learning. The word phenomenon (plural form is phenomena) in science means any observable event that occurs in a natural or a designed system. A ball bouncing is just as much a phenomenon as is a volcano erupting. CA NGSS instruction begins by introducing phenomena, and lessons progress as students apply each of the three dimensions to understand and explain the phenomena. In the process, students add to their library of what they *know* (DCIs), extend their ability to *do* science (SEPs), and broaden their way of *thinking* (CCCs).

Students are not expected to fully explain phenomena in a single class session or even a single grade level—this may be a major shift for many students. Students are, however, expected to make progress towards understanding a phenomenon by authentically engaging in all three dimensions of science. Progress in science includes everything from recognizing a pattern [CCC-1] and asking a new question [SEP-1] to developing a sophisticated model [SEP-3] that explains [SEP-6] a phenomenon and successfully predicts new ones. Even when students do explain a phenomenon at one level of sophistication, they often revisit the same phenomena at a later grade level and are then able to explain it at a deeper level.

Key Instructional Shifts for the CA NGSS

When teachers integrate all three dimensions of the CA NGSS, their classrooms look different. Table 1.2 shows a few examples of how the actions of both teachers and students change. These shifts occur because the CA NGSS instruction is:

- **Three-dimensional**. Students engage in scientific inquiry of phenomena using all three dimensions of the CA NGSS.
- **Coherent across the curriculum**. Learning builds upon itself from year to year and science integrates with other parts of the curriculum.
- **Relevant to local communities and student interests**. Content and skills build on students' existing experience to learn about and solve real-world problems.

Table 1.2. Instructional Shifts Required by the CA NGSS

MORE OF THIS…	LESS OF THIS…
Students engage in the CA NGSS practices to build deeper understanding of science and engineering contents and make sense of phenomena and design solutions.	Students study the meaning of science content that teachers explain to them. Students memorize definitions and rote procedures.
Students develop models of systems within the natural world and use them to explain phenomena or solve problems.	Teachers present models that describe phenomena in the natural world.
Students learn science as an iterative, dynamic, creative, and collaborative process similar to how real scientists and engineers do their work.	Students learn science as a collection of facts and learn that these facts were found using a singular and linear "scientific method," disconnected from how real scientists and engineers do their work.
Practices provide students with relevant, real-world learning in which they must investigate and problem-solve using critical thinking.	Students learn to conduct investigations following step-by-step instructions.
Students build science and engineering understanding using a variety of practices in investigations, experiments, and project-based experiences.	Student use one practice per investigation/experiment.
Science content and science practice are integrated.	Science content and practices are taught in isolation.
Student reasoning and argumentation play a central role in understanding labs and text.	Student thinking is limited by a "cookbook" approach to lab experiences and problems or end-of-the-chapter questions and test experiences.

MORE OF THIS…	LESS OF THIS…
Science and engineering notebooks reflect student thinking using the science and engineering practices to understand content and show development and revision of student's scientific models.	Science notebooks reflect only students' ability to take notes or copy teacher models.
Engineering is integrated into all science disciplines.	Engineering is treated as an add-on.
Engaging in science and engineering practices allows students to revise their thinking and understanding.	The science process is just something to learn/apply and "be done."
Crosscutting concepts build deeper and connected understanding of science as a whole.	No connection is developed among science content.
Connection of the practices to the goals of literacy in science (purposeful reading, writing, speaking, and listening to strengthen science understanding) is fostered.	Reading and writing are disconnected from the purpose of learning.
Student-to-student discourse is productive, using practices to explain phenomenon or solve problems.	Student-to-student discourse is limited due to activities that provide only one exact outcome.
Teacher questioning prompts and facilitates students' discourse and thinking.	Teacher questions students to seek a confirmatory right answer.

Both the National Research Council Framework and the CA NGSS highlight a vision for student learning centered on the development of practices and knowledge that will transfer beyond the classroom and beyond formal K–12 schooling. In particular, the aim is to prepare all students graduating from high school to be critical consumers of information and capable problem-solvers, and to engage in public discussion using evidence-based argumentation across a broad range of topics.

Transferable and deeper learning opportunities for students supported by instructional practices create a positive and engaged community both inside and outside of the classroom. In these contexts, students develop content knowledge while also assessing the development of their own communication, collaboration, and self-direction, also known as twenty-first century skills.

Implementation of Instructional Materials Not Adopted by California According to the California Department of Education

https://www.cde.ca.gov/ci/rl/im/implementofimsnotadopt.asp

Pursuant to California Education Code (EC) Section 60210, a school district may utilize instructional materials not adopted by the SBE, so long as the materials are aligned to state standards and a majority of the participants of any review process conducted by the district are classroom teachers who are assigned to the subject area or grade level of the materials being reviewed.

Additionally, the district must ensure that instructional materials comply with the state laws and regulations for social content. Instructional materials must meet EC Sections 60040–60045 as well as the SBE guidelines in the Standards for Evaluating Instructional Materials for Social Content. These laws and the SBE guidelines require that instructional materials used in California public schools reflect California's multicultural society, avoid stereotyping, and contribute to a positive learning environment. Instructional materials that are adopted by the SBE meet the social content requirements. If a district is not purchasing state-adopted instructional materials, the district must ensure that the review for social content review is done at the state or local level.

Instructional Materials Sufficiency According to the California Department of Education

https://www.cde.ca.gov/ci/rl/im/implementofimsnotadopt.asp

In selecting new instructional materials, a district must remain vigilant in its compliance with EC Section 60119, commonly known as Williams for instructional materials *sufficiency. This law in part requires that every pupil in the school district has sufficient textbooks or instructional materials, or both, that are consistent with the content and cycles of the curriculum framework and aligned to the SBE-adopted content standards. All students must have access to the materials both in the classroom and to take home.*

If using materials from more than one source to provide content aligned to the SBE-adopted standards, a district should develop a curriculum map to identify the materials that will provide complete coverage of the standards. Such documentation is important for determining whether or not the district is in compliance with EC Section 60119 by having actual instructional materials, print and or digital, and that they in fact are aligned to the content standards and consistent with the content and cycles of the curriculum framework adopted by the SBE.

For more information please visit the CDE Instructional Materials Frequently Asked Questions web page at https://www.cde.ca.gov/ci/cr/cf/imfrpfaq1.asp.

CA NGSS Toolkit for Instructional Materials Evaluation

During 2018, the state conducted a first-level review to determine which instructional resources align with the CA NGSS and the content of the *CA Science Framework*. In November 2018, the State Board of Education adopted programs found to have met the categories and criteria outlined in chapter 13 of the *CA Science Framework*. The State Board of Education's recommended list provides programs for K–8. Districts will need to conduct their own standards and framework alignment adoption process for grades 9–12. The CA NGSS TIME is designed to assist local educational agencies and teachers to analyze and select high-quality instructional materials and resources. Using the toolkit provides an important opportunity for professional learning and meaningful, rich conversations to deepen the understanding of the CA NGSS.

Overview of the CA NGSS TIME Sections

The implementation of the CA NGSS TIME is an iterative process and requires multiple perspectives and lenses. The process is divided into six sections.

Introduction. The introduction provides the purpose and rationale for using the *CA NGSS TIME* and includes short excerpts from the CA Science Framework that introduce users to CA NGSS terminology and reinforce the instructional shifts for the CA NGSS.

Section 1: Develop District Lens. Time: approximately 3–4 Hours

Preparing the team to evaluate instructional materials based on the district's unique needs is an important part of the adoption process because it can assist adoption committees in selecting the best possible programs for their particular student population. Section 1 provides support for forming a district adoption committee and establishing a profile of the district's needs and resources. The District Lens can serve as a guide that will lead to an informed perspective regarding the needs of students and teachers in this adoption cycle. *This Section needs to be completed by each district and should be led by the district adoption committee chair.*

Section 2: Prescreen. Time: approximately 16 Hours (CA NGSS TIME professional learning and 6-8 Hours)
The Prescreen process narrows the field of programs to the most promising options. The Prescreen process does not provide a thorough vetting of resources and is not sufficient to support claims of being designed for the NGSS. Section 2 begins broadly in scope and moves toward a more targeted examination of CA NGSS alignment. The tasks in section 2 include a broad look at each program to help districts determine which programs move forward in the adoption process. It is recommended that a small subgroup of the district adoption committee completes the Prescreen process. Prior to the activities in section 2, the district needs to obtain copies of instructional materials. An essential component of Section 2 is a professional learning session that calibrates teams and models the Prescreen process to be used for instructional materials under consideration. These professional learning sessions will be led by county partnership teams. Districts should plan to attend a CA NGSS TIME professional learning session prior to completing the Prescreen process. *A facilitator script and presentation are included in CA NGSS TIME for adoption committees that do not attend.*

Section 3: Paper Screen. Time: approximately 28 Hours (CA NGSS TIME professional learning and approximately 6 Hours per program under consideration)

- Overview
- Rubric 1 – Foundations
- Rubric 2 – Student Learning
- Rubric 3 – Monitoring Student Progress
- Rubric 4 – Teacher Support
- Rubric 5 – Program Evaluation (Optional)

The Paper Screen process gives the adoption committee an opportunity to examine instructional materials prior to piloting programs. The whole committee uses rubrics to conduct a deeper, more thorough investigation of each of the programs selected in section 2: Prescreen. An essential component of section 3: Paper Screen is for the adoption committee to engage in a shared professional learning experience in order to calibrate themselves using resources not under review. This essential component of section 3: Paper Screen should not be skipped. Using evidence and rubrics, this deeper dive leads districts through the process they will use for determining which programs to pilot. These professional learning sessions will be led by county partnership teams. Districts should plan to attend a CA NGSS TIME professional learning session prior to completing the Paper Screen process. *Facilitator scripts and presentations are included in CA NGSS TIME for adoption committees that do not attend.*

Section 4: Pilot Materials. Time: will vary
The Pilot Materials process allows for analyzing instructional materials while using them in classrooms. The instructional materials used in this process are chosen based on section 3: Paper Screen. This gives a more thorough analysis of each program under review and allows for additional evidence from teachers and students to be used in section 5: Select and Recommend.

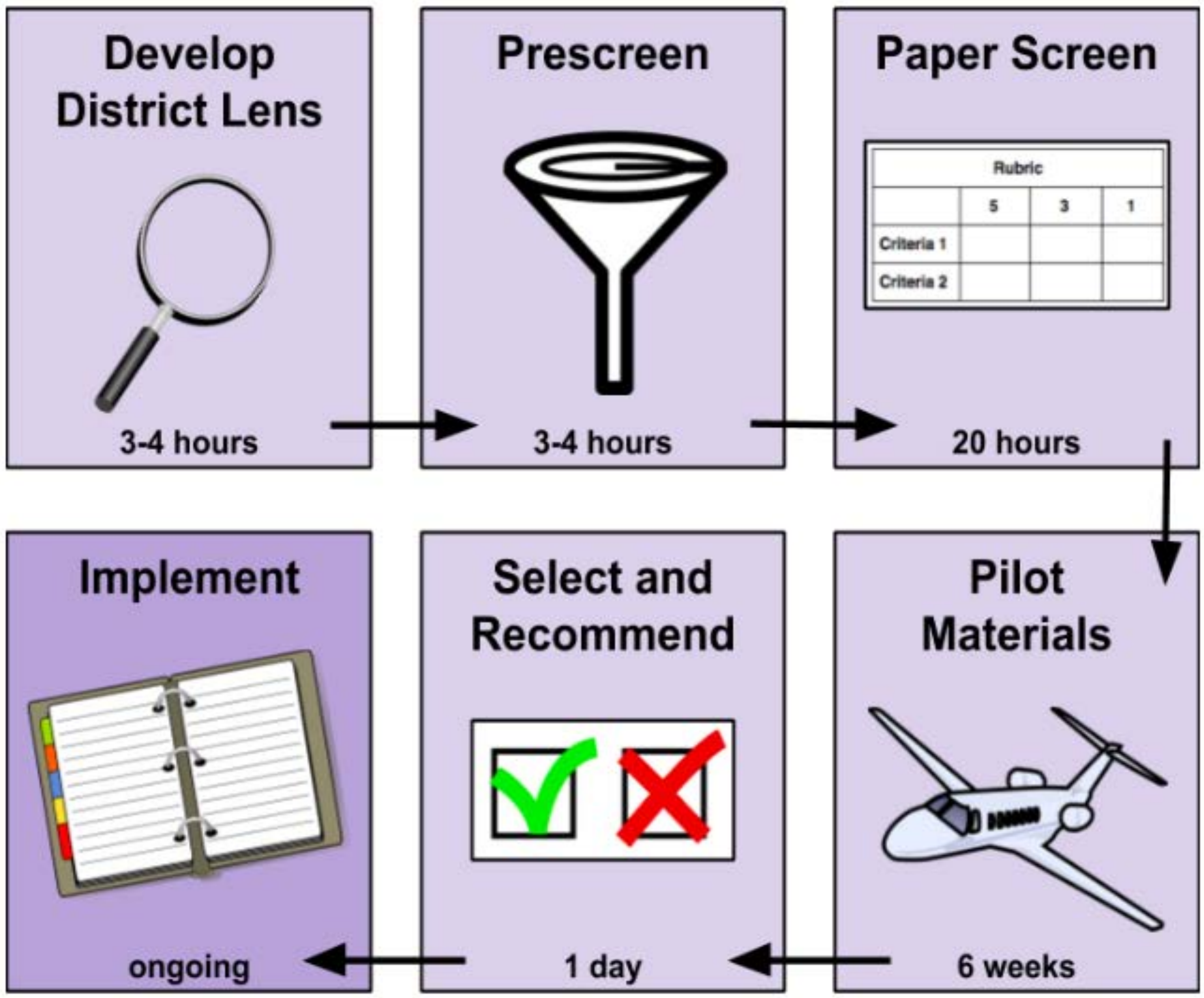
Section 5: Select and Recommend. Time: will vary
The Select and Recommend process provides a decision-making framework to support the adoption committee in coming to consensus about the instructional materials to be adopted. Evidence and data from sections 1–4 is used as support for selections.

Section 6: Implement. Time: Length of adoption

The Implement section provides tools to support planning and monitoring the ongoing implementation of adopted instructional materials.

The following graphics represent the six sections of the *CA NGSS TIME*.

Figure 1.4. Six Sections of the *CA NGSS TIME*



Things to consider before starting the adoption process

- Establish adoption timeline
- Determine who will be involved in each step of the adoption process
- Set dates and times for *CA NGSS TIME* meetings
- Establish platform (e.g., Google Docs, Dropbox) to house relevant resources (e.g., *CA Science Framework*, *CA NGSS TIME*, district data, completed charts, meeting notes)
- Determine how the committee chair/facilitator will collect and archive all completed tools

Using the CA NGSS Toolkit for Instructional Materials Evaluation (TIME)

Implementation Scenarios

The following guide ensures the quality, intent, professional learning, and fidelity of the implementation of the *CA NGSS TIME* to support the appropriate selection of science instructional materials.

Scenario	Develop the District Lens	Prescreen	Paper Screen	Pilot Materials	Select and Recommend	Implement
A Full Days	One day	Half to full day depending on number of programs to prescreen	Four days	One to two months depending on length of pilot unit One day for summarize pilot	Half day	Ongoing based on comprehensiveness of the plan
B Multiple Sessions: One to three hours per session	Two to three hours per session	One to two three-hour sessions	Eight three-hour sessions	N/A for actual pilot One three-hour session and one two-hour session to summarize pilot	One three-to four-hour session	Based on plan
C Local model	Plan developed by the district that honors adequate amount of time, intent, and fidelity of the toolkit including the implementation of each section to support the professional learning and selection of appropriate science instructional materials. Amount of time is based on the local district model; taking into account the time frames listed above.					

Section 1: Develop District Lens

Overview

Preparing the team to evaluate instructional materials based on the district's unique needs is an important part of the adoption process because it assists adoption committees in selecting the best possible programs for their particular student populations. Establishing a profile of the district's needs and resources creates this lens. The district lens serves as a guide that leads to an informed perspective regarding the needs of students and teachers in the adoption cycle.

The tasks in this section help districts identify essential features in the materials being reviewed.

Time: 3–4 Hours

Develop District Lens – At a Glance

Advance Preparation

Prior to starting section 1, the district needs to select members for their adoption committee by completing task 1.1a. The district needs to collect information and data for tasks 1.2a, 1.2b, and 1.4b–1.4g. Access to the district's LCAP (digital or paper) is required to complete task 1.4a. Prior to convening your science adoption committee, selected members need to have a deep understanding of the CA NGSS, *CA Science Framework*, and related research. If members of your adoption committee have not participated in CA NGSS-focused professional learning, the district should identify how to provide opportunities for developing a deep understanding of the CA NGSS for committee members. These opportunities could include participation in workshops or trainings offered by CA NGSS professional learning providers. The knowledge and expertise of the members are important for selecting instructional materials that represent the three-dimensionality of CA NGSS.

Action Steps	**Tasks**	**Materials**
1.1: Science Adoption Team and Timeline*	1.1a: Identify the district science adoption team and timeline	Task 1.1a

Action Steps	Tasks	Materials
1.2: District Vision and Mission*	1.2a: Identify the district vision and mission 1.2b: Identify the district science vision and mission	Task 1.2a Task 1.2b
1.3: Understanding of the *CA Science Framework* and NGSS Instructional Shifts (Optional)*	1.3a: Optional Activities	
1.4: Examine the Current District Data*	1.4a: Review LCAP Goals 1.4b: Review District Demographic Data 1.4c: Review State and District Data: Science 1.4d: Review State and District Data: ELA/Literacy 1.4e: Review State and District Data: ELD 1.4f: Review State and District Data: Primary Language Literacy 1.4g: District Assessment Data Implications	Task 1.4a Task 1.4b Task 1.4c Task 1.4d Task 1.4e Task 1.4f Task 1.4g
1.5: Examine the Local District Context	1.5a: Review Local District Context: Elementary (K–5/K–6) 1.5b: Review Local District Context: Middle School (6–8/7–8) 1.5c: Review Local District Context: High School (9–12)	Task 1.5a Task 1.5b Task 1.5c
1.6: Examine Current Reality of District Science Instructional Resources	1.6a: Determine Current Status of District Science Instructional Resources	Task 1.6a
1.7: Examine Key Findings & Adoption Considerations	1.7a: List and Discuss Key Findings and Considerations	Task 1.7a

*Requires Advance Preparation

1.1: Science Adoption Team and Timeline

District teams should include the following:

1. Adoption committee facilitator
2. Committee members who have knowledge and expertise in the CA NGSS, *CA Science Framework*, and related research
3. Committee members should fully participate

It is suggested that the district adoption committee include representation from the following:

- Teachers
- Administrators
- Parents
- Balance of representation from school sites

It is suggested that the district adoption committee include expertise from the following:

- Grade-spans: K–2, 3–5, 6–8, 9–12 (as appropriate)
- CA NGSS expertise
- CA Environmental Principles and Concepts and environmental literacy
- ELA/Literacy
- ELD
- Assessment
- Instructional technology
- Students with Disabilities

Task 1.1a: Science Adoption Team

The adoption committee will work in grade-span teams to examine program materials. Use this tool to identify your teams that includes at least one grade-level member and specific expertise vital to the district's student population.

Team Members				
K–2	**3–5**	**6–8**	**9–12**	***District appropriate configuration**

*District-appropriate configurations are identified when expertise in all of the above grade levels is not possible.

Task 1.2: District Vision and Mission

Task 1.2a: Identify District Vision and Mission

Identify the district vision and mission. Discuss how the district's vision and mission inform the selection criteria of science instructional materials.

District Vision and Mission
Implications for Instructional Materials

Task 1.2b: Identify District Science Vision and Mission

Identify the district's ***science*** vision and mission. Discuss how the district's science vision and mission inform the selection criteria of science instructional materials. If the district does not currently have a written science vision and mission, the committee should discuss how science can support the overall district vision and mission.

District Science Vision and Mission
Implications for Instructional Materials

Task 1.3: Understanding of the *CA Science Framework* and NGSS Instructional Shifts (Optional)

It is important that the adoption committee has an understanding of the CA NGSS and instructional shifts. If your adoption committee has participated in previous professional learning opportunities and understands the content of the *CA Science Framework* and CA NGSS instructional shifts then you are able to move on to Task 1.4: Examine the Current Data in Science.

If your adoption committee is unfamiliar or there is varied levels of understanding it will be critical to provide professional learning on the *CA Science Framework*. The following activities will deepen your committee's understanding of the *CA Science Framework*:

Activity 1: Attend a CA NGSS Professional Learning Session

- Contact your local CA NGSS provider for information on upcoming trainings.
- Register committee members who have not attended previous CA NGSS professional learning sessions.

Activity 2: Jigsaw Activity

- Assign each of your committee members a section from the *CA Science Framework*:
    - Chapter 1: Overview Chapter
    - Chapter 9: Assessment
    - Chapter 10: Access and Equity
    - Chapter 11: Instructional Strategies
- Assign members to groups. Grouping depends on the number of committee members: this activity may also be done as a group activity with larger chunks of the chapters.
- Have each person or group create a chart to illustrate the content of their portion of the chapters.
- Have each person or group report out in the order of the chapters.

Activity 3: Snapshots & Vignettes

- Have committee members read chapter 1 of the *CA Science Framework* prior to attending the first meeting.
- Identify a relevant snapshot or vignette from the grade level chapters of the *CA Science Framework*.
- Provide copies of the chosen snapshot or vignette at the first meeting, and have each committee member read through the snapshot or vignette.
- Have a small group discussion on the content of the snapshot or vignette using the following guiding questions:
    - Where in the vignette or snapshot do you see evidence of three-dimensional learning?
    - What is unique or innovative about the snapshot or vignette that represents the instructional shifts of CA NGSS?
- Conduct a whole group share-out regarding their answers to the guiding questions.

Task 1.4: Examine the Current District Data

Data should be collected by the facilitator prior to this meeting and displayed or distributed in a user-friendly way. Committee members should analyze the data to develop an accurate picture of the district data.

Task 1.4a: Review Local Control and Accountability Plan (LCAP) Goals

Use the tool below to review your LCAP goals relevant to the state priorities, including the Implementation of State Standards (Priority 2). This includes the *CA Science Framework*, which addresses the CA NGSS, *Common Core State Standards for English Language Arts and Literacy in History/Social Studies*, Science, and Technical Subjects, the *California English Language Development Standards*, and the *English Language Arts/English Language Development Framework* (*ELA/ELD Framework*). Science instruction is also linked to the LCAP within Pupil Achievement (Priority 4), Pupil Engagement (Priority 5), and School Climate (Priority 6). Schools must provide all students with Course Access (Priority 7) and Improve Other Pupil Outcomes (Priority 8).

LCAP	
LCAP Goal(s) and Action/Services Related to NGSS	**Implications for New Adoption**
*	
*	
What are the overall implications of your LCAP goals and/or Action/Services for your instructional materials selection?	

* Add rows as needed.

Task 1.4b: Review District Demographic Data

Use the tool below to review your demographic data.

District Demographic Data		
Subgroups	**% of District Populati on**	**Site-Specific Notes**
Sample: English Learners	12%	52% at School A
Black or African American		
Asian		
Filipino		
Hispanic or Latino		
Native Hawaiian or Pacific Islander		
White		
Two or More Races		
Socioeconomically Disadvantaged Students		
English Learners: All		
English Learners: Newcomers		

District Demographic Data		
Subgroups	**% of District Populati on**	**Site-Specific Notes**
English Learners: Long-Term		
Students with Disabilities		
Foster Youth		
Homeless		
Other Subgroups Based on District Demographics		
What are the overall implications of your demographic data for your instructional materials selection?		

Task 1.4c: Review State and District Science Data

CA Science Test (CAST) results (2019 and beyond). Optional data may include, but is not limited to, benchmark assessments, unit assessments, diagnostic assessments, and district-created assessments.

Use the tool below to review your science assessment data.

Science Assessment Data				
Grade	**# of Students Tested**	**% Met or Exceeded Standards**		
		Local District/ Site Assessment:	**Local District/ Site Assessment:**	**Local District/ Site Assessment:**
TK				
K				
1				
2				
3				
4				
5				

Science Assessment Data				
Grade	# of Students Tested	% Met or Exceeded Standards		
		Local District/ Site Assessment:	Local District/ Site Assessment:	Local District/ Site Assessment:
6				
7				
8				
9				
10				
11				
12				

Task 1.4d: Review State and District Data: ELA/Literacy

Use the tool below to review your California Assessment of Student Performance and Progress (CAASPP) data, including Smarter Balanced Assessment Consortium (SBAC) data and other English Language Arts/Literacy data. This will assist your adoption committee as they consider the resources that might be available in each program to support access to content and literacy development.

SBAC: Overall Claim Level Data										
Grade	**# of Students Tested**	**2014–15**			**2015–16**			**2016–17**		
		Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard
3										
4										
5										
6										
7										
8										
11										

SBAC: Claim Level Data – Reading										
Grade	**# of Students Tested**	**2014–15**			**2015–16**			**2016–17**		
		Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard
3										
4										
5										
6										
7										
8										
11										

SBAC: Claim Level Data – Writing										
Grade	**# of Students Tested**	**2014–15**			**2015–16**			**2016–17**		
		Met/ Exceeded Standard	Nearly Met Standard	Did Not Meet Standard	Met/ Exceeded Standard	Nearly Met Standard	Did Not Meet Standard	Met/ Exceeded Standard	Nearly Met Standard	Did Not Meet Standard
3										
4										
5										
6										
7										
8										
11										

SBAC: Claim Level Data - Listening										
Grade	**# of Students Tested**	**2014–15**			**2015–16**			**2016–17**		
		Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard
3										
4										
5										
6										
7										
8										
11										

SBAC: Claim Level Data – Research/Inquiry										
Grade	**# of Students Tested**	**2014–15**			**2015–16**			**2016–17**		
		Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard
3										
4										
5										
6										
7										
8										
11										

SBAC: Subgroup* ______________________________										
Grade	# of Students Tested	2014–15			2015–16			2016–17		
		Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard	Above Standard	At/Near Standard	Below Standard
3										
4										
5										
6										
7										
8										
11										

**Complete this chart for all significant subgroups*

Task 1.4e: Review State and District Data: ELD

Use the tool below to review your English Language Development data.

English Language Proficiency Assessments for California (ELPAC) Data							
Grade	# of Students Tested	Emerging		Expanding		Bridging	
		#	%	#	%	#	%
TK							
K							
1							
2							
3							
4							
5							

English Language Proficiency Assessments for California (ELPAC) Data							
Grade	# of Students Tested	Emerging		Expanding		Bridging	
		#	%	#	%	#	%
6							
7							
8							
9							
10							
11							
12							

CALPADS Data: Long-Term English Learners (LTELs)*			
Grade	**# of English Learners**	**# of English Language designated as Long-Term**	**% of English Learners designated as Long-Term from total EL Population**
5			
6			
7			
8			

A LTEL is defined [EC 313(a)] as an EL who is enrolled in any of grades six through twelve, inclusive, has been enrolled in schools in the United States (U.S.) for more than six years, has remained at the same English language proficiency level for two or more consecutive years as determined by the English language development tests or development pursuant to EC Section 60810, or any successor test, and scores far below basic on the English-language arts (ELA) standards-based achievement test administered pursuant to EC Section 60640, or any successor test ("Notification of 2013–14 Long-term English Learner and At-risk of Becoming Long-term English Learner Data File" CDE, 2014)

CALPADS Data: Long-Term English Learners (LTELs)*			
Grade	**# of English Learners**	**# of English Language designated as Long-Term**	**% of English Learners designated as Long-Term from total EL Population**
9			
10			
11			
12			

A LTEL is defined [EC 313(a)] as an EL who is enrolled in any of grades six through twelve, inclusive, has been enrolled in schools in the United States (U.S.) for more than six years, has remained at the same English language proficiency level for two or more consecutive years as determined by the English language development tests or development pursuant to EC Section 60810, or any successor test, and scores far below basic on the English-language arts (ELA) standards-based achievement test administered pursuant to EC Section 60640, or any successor test ("Notification of 2013–14 Long-term English Learner and At-risk of Becoming Long-term English Learner Data File" CDE, 2014)

Other ELD Assessment Data (Optional data may include, but is not limited to, ELD Report Card, ELD Assessments, ADEPT, LAS Links, SOLOM)				
Grade	**# of Students Tested**	**% Met or Exceeded Standards**		
		Local District Assessment	**Local District Assessment**	**Local District Assessment**
TK				
K				
1				
2				
3				
4				
5				

Other ELD Assessment Data (Optional data may include, but is not limited to, ELD Report Card, ELD Assessments, ADEPT, LAS Links, SOLOM)				
Grade	**# of Students Tested**	**% Met or Exceeded Standards**		
		Local District Assessment	**Local District Assessment**	**Local District Assessment**
6				
7				
8				
9				
10				
11				
12				

Task 1.4f: Review State and District Data: Primary Language Literacy

Use the tool below to review your Primary Language Literacy data.

Primary Language Assessments				
Grade	# of Students Tested	% Met or Exceeded Standards		
		Local District Assessment	Local District Assessment	Local District Assessment
TK				
K				
1				
2				
3				
4				
5				

Primary Language Assessments				
Grade	# of Students Tested	% Met or Exceeded Standards		
		Local District Assessment	Local District Assessment	Local District Assessment
6				
7				
8				
9				
10				
11				
12				

Task 1.4g: District Assessment Data Implications

Use this reflection tool to summarize your analysis of your district data and discussion.

District Assessment Data Implications
How does your district assessment data inform your thinking and identify considerations for your science instructional materials adoption?

Task 1.5: Examine the Local District Context

Context data should be collected prior to this meeting by the facilitator and displayed or distributed in a user friendly way. Committee members should analyze the data to identify how current structures support science instruction in the district.

Task 1.5a: Review Local District Context: Elementary (K–5/K–6)

Use this tool to review and summarize the Elementary context of your district.

District Program View: Elementary (K–5/K–6)	Data	Implication for Adoption
How many elementary school sites exist in your district?		
How many science specialists (TOSA) exist at each elementary school site? District-level?		
Who teaches science in elementary classrooms (classroom teachers and/or science specialists)?		
How often is science taught in the day/week/month? For how many minutes?		

District Program View: Elementary (K–5/K–6)	Data	Implication for Adoption
Are all students receiving equal amounts of science instruction across grade levels and in all classrooms?		
Do any school sites have a Science, STEM, STEAM, or Environmental focus? If so, how many?		
What facilities exist for implementing science (e.g. lab space in classrooms, designated lab room, outdoor learning facilities)?		
What are the overall implications of your local district context for your instructional materials selection?		

Task 1.5b: Review Local District Context: Middle School (6–8/7–8)

Use this tool to review and summarize the Middle School context of your district.

District Program View: Middle School	Data	Implication for Adoption
How many middle school sites exist in your district?		
How many science specialists (TOSA) exist at each school site? District-level?		
Which CA middle school course model has been selected and/or implemented (preferred integrated or domain-specific) by the district/sites? How are the standards organized in the course model?		
Do all students have access to daily science instruction? For how many minutes?		
What facilities exist for implementing science (e.g. lab space in classrooms, designated lab room, outdoor learning facilities)?		

District Program View: Middle School	Data	Implication for Adoption
What credentials do science teachers have (what are they qualified to teach)?		
What science electives exist at your middle school sites in addition to core science courses (e.g. CTE, Career Pathways)?		
What courses exist at articulating high schools that impact middle school students (e.g. AP/IB, CTE, Academies, Environmental, AG, Elective)?		
What are the overall implications of your local district context for your instructional materials selection?		

Task 1.5c: Local District Context: High School (9–12)

Use this tool to review and summarize the High School context of your district.

District Program View: High School	Data/Reflection	Implication for Adoption
How many high school sites exist in your district?		
How many science specialists (TOSA) exist at each school site? District-level?		
What facilities exist for implementing science (e.g. lab space in classrooms, designated lab room, outdoor learning facilities)?		
What course model(s) have been selected (e.g. three-course, four-course) by the district/site?		
What other D-level science courses are offered beyond the selected course model (e.g. AP, IB, CTE, Pathways, Academies)?		

District Program View: High School	Data/Reflection	Implication for Adoption
What G-level science elective courses are offered?		
What credentials do science teachers have (what are they qualified to teach)?		
What are the overall implications of your local district context for your instructional materials selection?		

Task 1.6: Examine Current Reality of District Science Instructional Resources

Use the tool below in conjunction with chapter 13 of the *CA Science Framework* to rate the instructional materials currently being used that may include publisher materials, supplemental materials, and teacher-created units of study in science. Chapter 10 of the *CA Science Framework* should also be consulted for universal access and equity considerations.

Task 1.6a: Determine Current Status of District Science Instructional Resources

Use this tool to identify the gaps that exist between your current instructional resources and the expectations of CA NGSS. Complete the applicable Rating Scale items for each of your current Science Instructional Programs. Categories from chapter 13 of the *CA Science Framework* include:

Category 1: Science Content/Alignment with Standards

Category 2: Program Organization

Category 3: Assessment

Category 4: Access and Equity

Category 5: Instructional Planning and Support

Categories	Likert Scale
Category 1: Science Content/Alignment with Standards Instructional resources that introduce real-world phenomena and systems that students can investigate, model, and explain using the targeted DCIs and CCCs.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 1: Science Content/Alignment with Standards Instructional resources reflect the full content of the *CA Science Framework* allowing teachers to engage students in using each of the SEPs in multiple contexts and to use and apply the CCCs to connect ideas across science topics.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 1: Science Content/Alignment with Standards Instructional resources provide opportunities for connecting students to the CA Environmental Principles and Concepts.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 1: Science Content/Alignment with Standards Instructional resources progressively build students' abilities to meet all grade-level Performance Expectations (PEs) through a three-dimensional instructional sequence	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 2: Program Organization Instructional resources support instruction and learning of the CA NGSS and include such features as the organization, coherence, and design of the program; chapter, unit, and lesson overviews; and glossaries.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 3: Assessment Instructional resources include multiple models of formative assessment tasks for measuring what students know and are able to do and provide guidance for teachers on how to use scoring rubrics and interpret assessment results to guide instruction.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5

Categories	Likert Scale
Category 3: Assessment Instructional resources include multiple models of summative assessment tasks for measuring what students know and are able to do and provide guidance for teachers on how to use scoring rubrics and interpret assessment results to guide instruction.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 4: Access and Equity Instructional resources should include suggestions for teachers on how to differentiate instruction to meet the needs of all students. Refer to Chapter 10 of the *CA Science Framework* for more specific details.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
Category 5: Instructional Planning and Support Information and resources suggest coherent guidelines for teachers to follow when planning three-dimensional instruction and are designed to help teachers provide effective standards-based instruction.	Not Evident .... Strongly Evident ❍ 1 ❍ 2 ❍ 3 ❍ 4 ❍ 5
What gaps exist in your current instructional materials?	
How will your district address these gaps with the selection of new materials?	

Task 1.7: Examine Key Findings & Adoption Considerations

Task 1.7a: Discuss and List Key Findings and Considerations

Use the tool below to discuss and list key findings from Action Steps 1.2–1.6 to develop the district lens. Discuss key findings and determine considerations for the adoption of science resources. Chart top considerations for new adoption and display during the Prescreen and Paper Screen steps.

Be sure to discuss the importance of instructional materials containing learning goals that align to CA NGSS grade level expectations and the extent to which surpassing the grade level standards is or is not appropriate in your context. Remind committee members that students build full understanding of DCI's in the 9-12 grade band, and that elementary and middle school grade bands include developmentally appropriate assessment boundaries (and thus, instructional targets) that were identified based on students' ability to conceptually understand abstract ideas grows across grade-bands, increasing as students get older. If your district has selected the Preferred Integrated Course Model for middle school, be sure to discuss what level of integration across and between the science domains of Earth and Space Science (ESS), Life Science (LS), Physical Science (PS), and Engineering and Technical Applications of Science (ETS) you expect to see in high-quality instructional materials. If your district includes elementary school, discussing the importance of an integrated approach is also important. Looking at the integration of Earth and Space Science throughout courses is needed for secondary districts that have selected the High School Three Course Model. This will help you be more aware of what you expect and desire to see when reviewing materials.

Key Findings and Considerations		
Action Steps	**Key Findings from each Action Step**	**Considerations for Materials Adoption**
1.2: District Vision and Mission		
1.3: Understanding of the *CA Science Framework* and NGSS Instructional Shifts		
1.4: Examine the Current District Data		
1.5: Examine the Local District Context		
1.6: Examine Current Reality of District Science Instructional Resources		

Following section 1: Develop District Lens, visit the Learning Resource Display Center (LRDC) in your region or contact publishers of all programs to be reviewed during section 2: Prescreen. When contacting publishers, include requests for teacher editions, student editions, and all ancillary materials. Ascertain the exact materials that will be included in each package.

Section 2: Prescreen

Section 2: Prescreen and section 3: Paper Screen are to be presented by the adoption committee chair or adoption committee facilitator. Section 2: Prescreen should be presented to a small (3–8 people) leadership team and section 3: Paper Screen is intended for the entire adoption committee.

Overview

The Prescreen process gives a subset of the adoption committee an opportunity to examine publisher programs, supplemental materials, and teacher-created units of study for each grade span, keeping in mind the priorities established in section 1: Develop District Lens. Based on the number of materials to be reviewed and the availability of resources, it is strongly recommended that section 2: Prescreen be conducted by a small (3–8 people) leadership team who has a solid understanding of the *CA Science Framework* adopted by the State Board of Education on November 3, 2016, and the CA NGSS. The Prescreen results in an evidence-based decision as to whether the materials merit further review. The process involves each individual reading and recording criterion-based evidence. Then with team members, individuals discuss their analysis and evidence, and as a team reach a consensus about conducting deeper analyses of the materials. Once a smaller set of programs are identified, a larger group of educators can then be involved in the remaining sections of the CA NGSS TIME involving the analysis, evaluation, selection, and implementation of CA NGSS-aligned materials. Section 2: Prescreen will begin broadly in scope and move toward a more targeted examination of integration and alignment. The list of prospective publishers will be pared down to the most promising options as a result of the committee's work in this section. The tasks in section 2: Prescreen include a broad look at each program using guiding statements followed by a standards and skill-tracing activity to help districts determine which programs will move forward in the next step of adoption process, section 3: Paper Screen.

An essential component of section 2: Prescreen is for the small leadership team to calibrate using resources not under review. The facilitation guide and presentation in this section provide this experience and include resources not under review. This essential component of section 2: Prescreen should not be skipped.

Time

The timeline will vary for this section according to how many programs and grade levels the district is reviewing. It is anticipated that section 2: Prescreen can be completed in 6–8 hours.

Prescreen – At a Glance

Advance Preparation

Prior to the tasks in section 2: Prescreen, the district will need to schedule time at a Learning Resource Display Center (LRDC) in their region or obtain copies of the instructional materials under consideration for each grade level directly from publishers. A list of materials approved for adoption by the State Board of Education (SBE) can be found on the California Department of Education (CDE) website at www.cde.ca.gov. The SBE reviews and suggests material for adoption for grades K–8 only. Supplemental materials and materials for use in grades 9–12 must be comprehensively reviewed comparable to the process conducted by the CDE.

Charts, templates, and data from section 1: Develop District Lens, should be used to help committee members maintain the district priorities as they complete the activities in section 2: Prescreen.

To complete the Lesson X and Lesson Y activities, committee members will need access to the CA NGSS and the *CA Science Framework*.

Action Steps	Tasks	Materials
2.1 – Introduction and Overview	2.1a: Review the purpose of the Prescreen	
2.2 – Practice with Lesson X and Y	2.2a: Practice using the Prescreen tool with Lesson X 2.2b: Reach Consensus with Lesson X 2.2c: Practice using the Prescreen tool and Reach Consensus with Lesson Y 2.2d: Compare Lesson X and Lesson Y	Prescreen Tool

Action Steps	Tasks	Materials
2.3 – Conduct the Prescreen	2.3a: Conduct the Prescreen process for each instructional material under consideration	Prescreen Tool Prescreen Summary Score Sheet

Action Step 2.1 – Introduction and Overview

Task 2.1a: Review the Purpose of the Prescreen

The Prescreen is a “quick look” tool and process to determine if a given set of instructional materials has the potential to be designed for the CA NGSS and warrants further review. Applying the Prescreen is not a thorough vetting of a resource and is not sufficient to support claims of being designed for the CA NGSS.

Action Step 2.2 – Practice with Lesson X and Y

Task 2.2a: Practice using the Prescreen tool with Lesson X

Review the “front matter” of the instructional material under review to determine how these materials are organized. Read the learning sequence to understand the flow of student understanding of the phenomenon/problem, and how the instructional material incorporates students’ prior knowledge and reveals understanding. Reread the learning sequence and use the Prescreen tool to gather evidence for how the instructional materials address each criterion. Provide each committee member with a set of handouts for section 2: Prescreen. Each reviewer will need to fill in the program information and their name at the top of each handout. Ensure each committee member assigns the same Program # to each program under review.

Use the following rating scale to record your first impression of each program based on the Prescreen process. Record your evidence on **H2 CA NGSS Prescreen Tool**.

3 = Strong evidence

2 = Adequate evidence

1 = Limited/No evidence

Name of Instructional Materials ________________________ Grade Level/Course _______
Lesson/Instructional Sequence Title ____________________________ Program # _______
Reviewer Name ___________________________

Section 2: Prescreen – **H2**

CA NGSS TIME Prescreen Tool

3 = Strong evidence **2** = Adequate evidence **1** = Limited/No evidence

Criteria	**Evidence:** What was in the materials? Where was it? Why is this evidence?	**Shows Promise/ Score**
Use Phenomena/Problems. Materials provide relevant and authentic learning contexts through which students: • engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources; and • have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.*		
Presence of Logical Sequence. Student learning across the three dimensions is: • arranged in a logical sequence; and • sufficient and appropriate for students to figure out the phenomena or problems.*		
Students are Figuring Out. Materials position students to make sense of phenomena and design solutions to problems by*: • asking and answering questions that link learning over time; and • using the three dimensions to link prior knowledge and negotiate new understandings and abilities.		
Three-dimensional Performances. Materials include assessments designed to: • match the targeted learning goals; and • elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems.*		
Insert district-specific criteria as needed. Materials include features that are considered important for the learning outcomes of the student population in the district (see District Lens).		

*To the extent possible when reviewing a limited portion of the instructional materials.

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Task 2.2b: Reach Consensus with Lesson X

Participants share evidence for each criterion and discuss if there is enough evidence to check the “Shows Promise” box for this criteria and assign a score.

Remember that this is a Prescreen and not the full evaluation. It is not necessary to find every piece of evidence in the program. It is ok if there are some “1” scores.

For the Consensus score, remind participants that materials that show promise for being designed for the CA NGSS should have evidence for each of these components. If some boxes are not scored, participants need to be aware that these materials will require more time, effort, and energy in the full review process.

Participants score the materials using the **H3a Prescreen Summary Score Sheet**, and write a brief summary of the lesson and the evidence for the decision on **H3b Prescreen Summary of Evidence**.

Section 2: Prescreen – **H3a**

CA NGSS TIME Prescreen Summary Score Sheet

Use the following rating scale to record your first impression of each program based on the Prescreen process.

3 = Strong evidence **2** = Adequate evidence **1** = Limited/No evidence

Big Picture Review					
Criteria	**Program Name:** ______	**Program Name:** ______	**Program Name:** ______	**Program Name:** ______	**Program Name:** ______
Use Phenomena/Problems. Materials provide relevant and authentic learning contexts through which students: • engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources. • have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.					
Presence of Logical Sequence. Student learning across the three dimensions is: • arranged in a logical sequence. • sufficient and appropriate for students to figure out the phenomena or problems.					

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Section 2: Prescreen – **H3b**

CA NGSS TIME Prescreen Tool: Summary of Evidence

Name of Instructional Material ____________________ Lesson(s) Title ________________
Grade level/Course __________________________

Prescreen Consensus Score Total _____________

Use the following questions to create a summary of the evidence to support the consensus score for this instructional material program:

- How does a phenomenon/problem organize the learning?
- How are learning opportunities sequenced to enable students to make sense of the phenomena or problems?
- What is the path of student thinking from their prior knowledge to the expected three-dimensional learning outcomes?
- How do students show/demonstrate their three-dimensional understanding of the phenomenon?

Summary Recommendation:

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Task 2.2c: Practice using the Prescreen tool and the process with Lesson Y

Repeat the process for evidence gathering and consensus scoring used for the Prescreen of Lesson X with Lesson Y. Use the Prescreen tool as needed.

Task 2.2d: Compare Lesson X and Lesson Y

Compare the results from Lesson X and Y. Discuss as a group. How were different components represented? What evidence was most convincing? What do you want to remember when conducting the Prescreen?

Action Step 2.3 – Conduct the Prescreen

Task 2.3a: Conduct the Prescreen process for each Instructional Material under consideration

Divide participants as needed to conduct the Prescreen on the set of instructional materials under consideration for use. Participants should read each of the instructional materials selected for Prescreen and record evidence using the Prescreen tool, reach consensus, and record scores and evidence on the Prescreen Summary Score Sheet and Summary of Evidence. After the team has completed this process, create a list of the instructional materials that will continue on to section 3: Paper Screen.

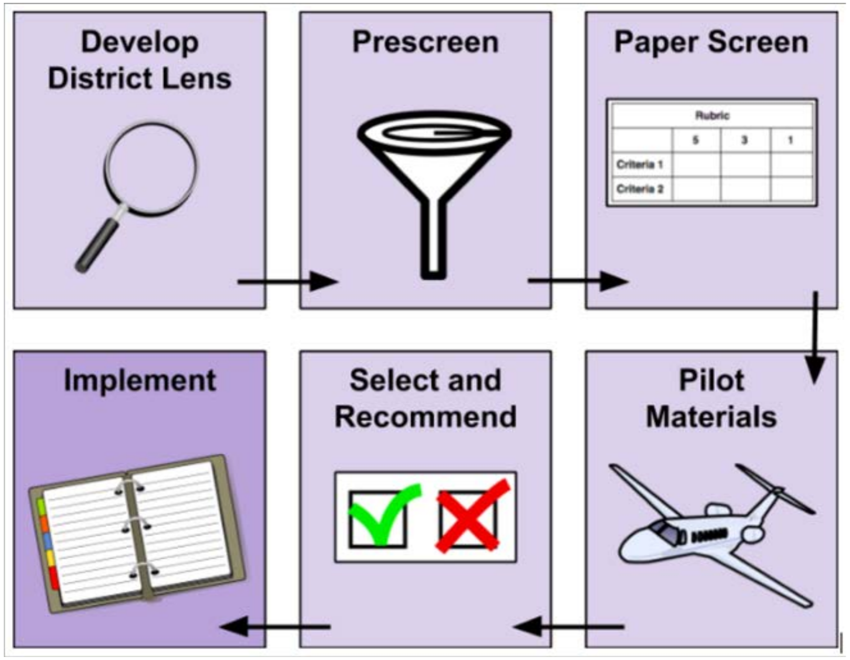
CA NGSS TIME

California Next Generation Science Standards
Toolkit for Instructional Materials Evaluation

Section 2: Prescreen
Quick analysis of programs under consideration for adoption

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

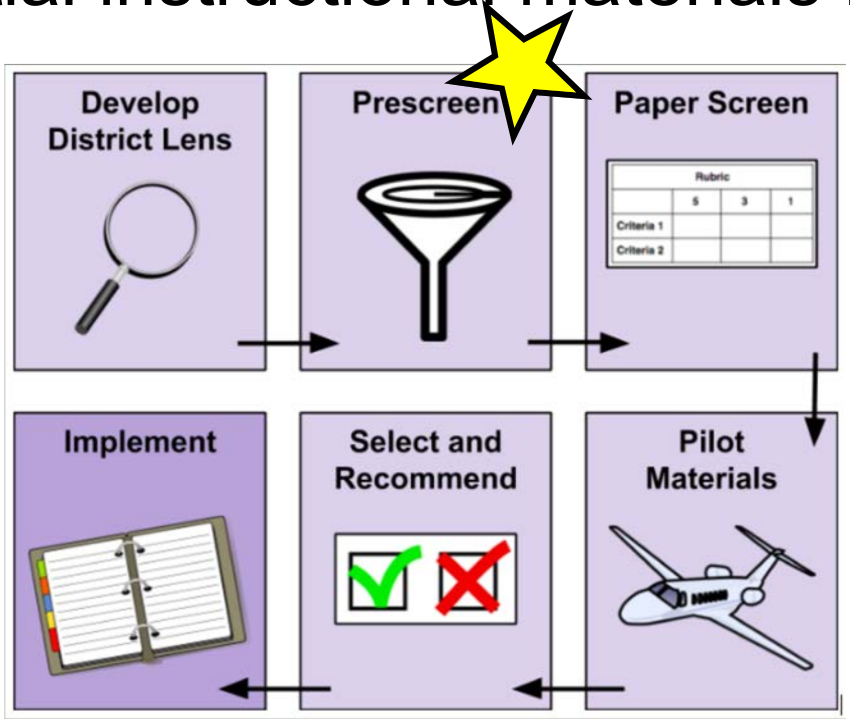
CA NGSS TIME



- Is…
  - a suite of tools and processes.
  - collaborative and evidence-based from start to finish.
  - an investment in curriculum-based professional learning.
- Is not…
  - a thumb-test.
  - just about selecting instructional materials.

Prescreen Purpose & Outcomes

- Learn and apply a process for winnowing a list of potential instructional materials for the paper screen.



Prescreen Process

- Individual analysis
- Group analysis
- Consensus Score
- Create list for further in-depth, paper screen review

Less of This… More of This… - H1

- With a partner, read each chart and discuss what the categories represent
- Be prepared to share with the whole group

Prescreen Tool – H2

- Use of Phenomena/Problems
- Logical Sequence
- Students Figuring Out
- Three-Dimensional Performance

CA NGSS TIME - Prescreen Tool

3 = Strong evidence **2** = Adequate evidence **1** = Limited/No evidence

Criteria	**Evidence:** What was in the materials, where was it, and why is this evidence?	**Shows Promise Score**
Use Phenomena/Problems. Materials provide relevant and authentic learning contexts through which students: • engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources. • have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.*		
Presence of Logical Sequence. Student learning across the 3 dimensions is: • arranged in a logical sequence • sufficient and appropriate for students to figure out the phenomena or problems*		
Students are Figuring Out. Materials position students to make sense of phenomena and design solutions to problems by* : • asking and answering questions that link learning over time. • using the three dimensions to link prior knowledge and negotiate new understandings and abilities		
Three-dimensional Performances. Materials include assessments designed to: • match the targeted learning goals; and, • elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems.*		
Insert district-specific criteria as needed. Materials include features that are considered important for the learning outcomes of the student population in the district (see District Lens documents).		

Lesson X: Evidence

- With a partner, read front matter to see how materials are organized
- Individually and holistically read the sequence
- Individually, reread the sequence for each component and gather evidence
- Use the “Less of…More of…” charts as needed

Lesson X: Consensus – H3

- As a group share evidence for each of the criteria listed on the Prescreen Tool. Is the evidence strong enough to show promise?
- Look across the criteria: How many boxes are checked for promise? What does that mean for further review?
- Record consensus scores on H3a and complete the Summary of Evidence, H3b.

Lesson Y

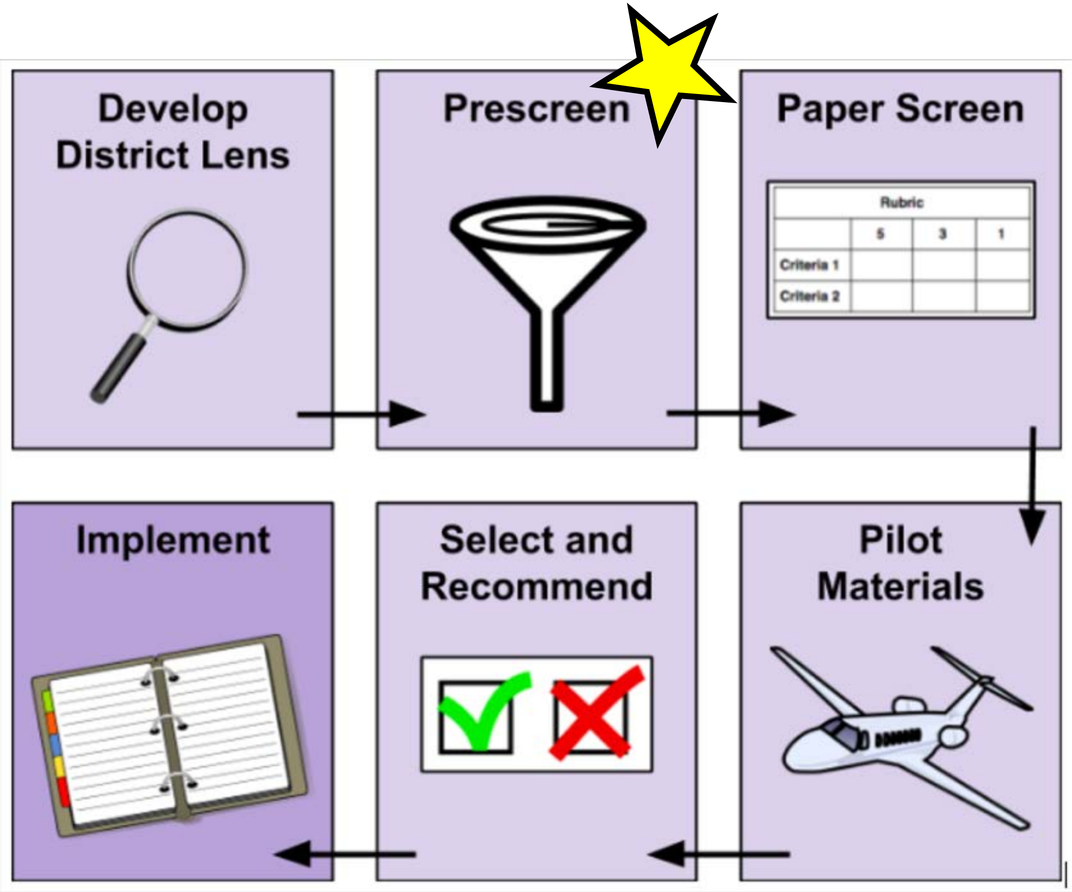
- Repeat the Prescreen process for Lesson Y

Ahas

- Compare results from Lesson X and Y
  -how were different components represented?
  -what evidence was most convincing?
  -other?

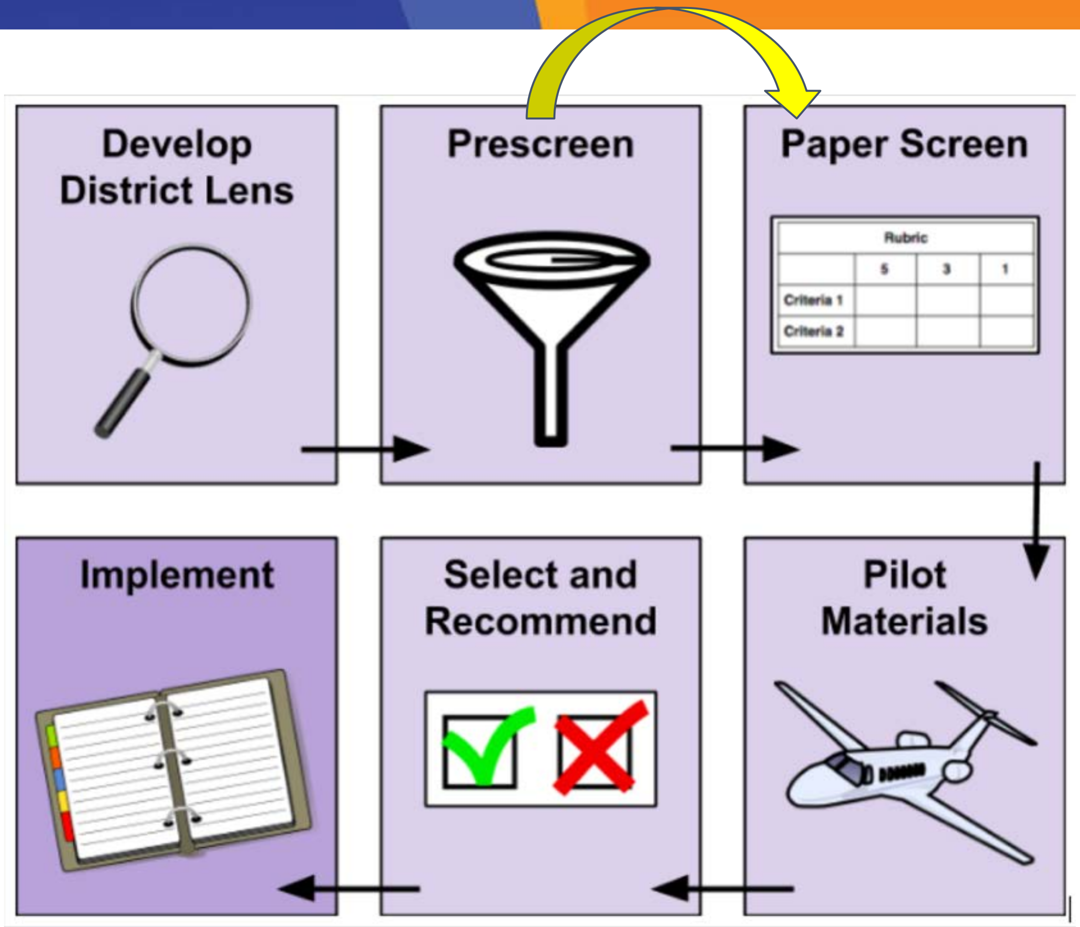
- What do you want to remember when conducting the Prescreen?

Conduct the Prescreen



- Read each of the Instructional Materials (IM) selected for Prescreen and record evidence using the Prescreen Tool
- Reach Consensus using the Prescreen Summary Score Sheet
- Complete the Summary of Evidence for each IM selected for Prescreen
- Create a list of materials to continue to the Paper Screen Review

What's Next?



The narrowed down list of Instructional Materials gets a more in-depth review via the Paper Screen process.

Only the strongest Instructional Materials will make it to the Pilot Materials phase.

Section 2: Prescreen Script (Facilitator Guide)

Purpose

The purpose of this section is to assist districts in winnowing the number of instructional materials that will be paper screened. The Prescreen process is not a thorough vetting of a resource and is not sufficient to support claims of being designed for the CA NGSS.

Facilitator Note: Based on the number of materials to be reviewed and the availability of resources, it is strongly recommended that the Prescreen be conducted by a small (approximately 3-8 people) leadership team who has a deeper understanding of the CA Science Framework and the CA NGSS. Once a smaller set of programs have been identified, a larger group of educators can then be involved in the remaining phases of Paper Screen, Pilot Materials, Select and Recommend, and Implement.

Time

Two hours for 2.1 and 2.2 (includes a 15-minute break); 40 minutes per Instructional Material (IM) being screened for 2.3

2.1	Introduction and Overview	10 minutes
2.2	Comparing Lesson X and Y to practice the tool and the process	110 minutes
2.3	Conducting the Prescreen	Depends on number to be screened (approximately 40 minutes per IM)
Total		varies

Materials

Slides

S1 Title
S2 CA NGSS TIME
S3 Prescreen Purpose and Outcomes
S4 Process for Prescreen

S5	Less of This…More of This – H1
S6	Prescreen Tool – H2
S7	Lesson X: Evidence
S8	Lesson X: Consensus – H3
S9	Lesson Y
S10	Ahas
S11	Conduct the Prescreen
S12	What's next?

Handouts

H1a-c	Less of This…More of This…
H2	Prescreen Tool (need multiple copies per person—based on number of materials to be prescreened)
H3a-b	Prescreen Summary Score Sheets (need 1-2 copies per room of H3a based on the number of programs to be prescreened; need multiple copies of H3b based on the number of materials to be prescreened)

Resources

R1	Lesson X
R2	Lesson Y

Other

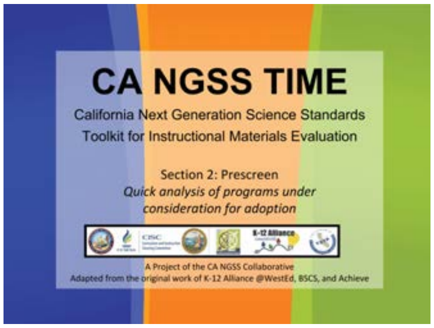
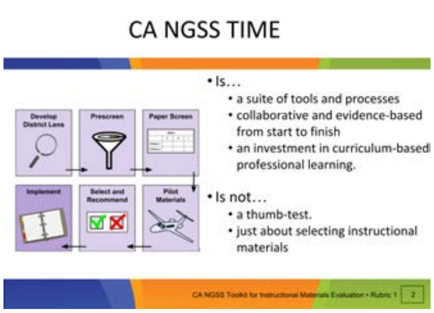
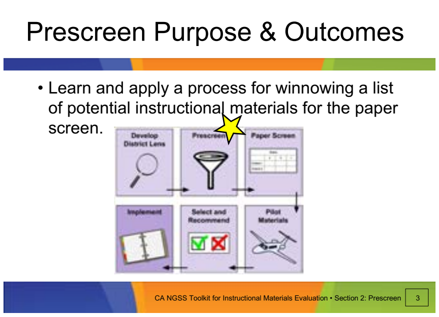
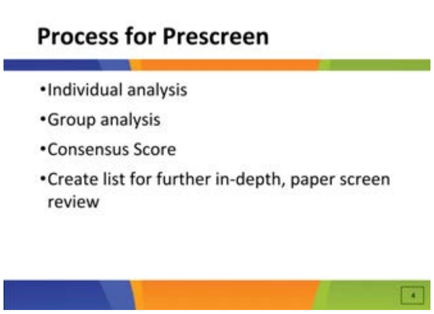
- Chart Paper and markers
- Sticky Notes
- Sets of instructional materials (TE & SE)

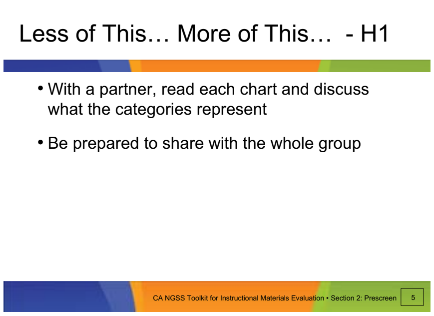
Advance Preparation

1. Identify the number of instructional materials to be reviewed.
2. Identify a topic that is consistent across the instructional materials. For example, each set of materials addresses interrelationships among living and non-living things in ecosystems.
3. Identify a learning sequence (approximately five -ten days of instruction) that is necessary to build student three-dimensional understanding of the phenomenon/problem.

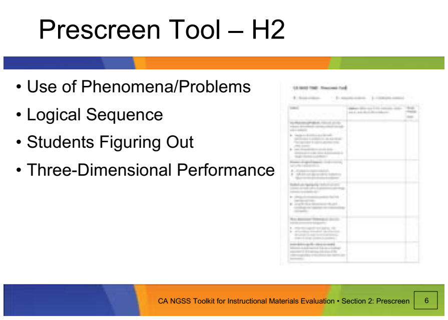
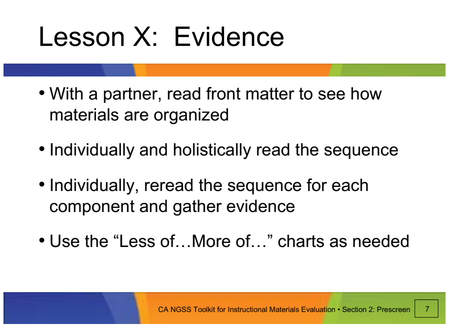
4. Identify which parts of the front matter are needed to understand the organization of the materials.
5. Duplicate H1a-c for each participant.
6. Duplicate multiple copies of handout H2 and H3b to match the number of instructional materials to be reviewed.
7. Duplicate H3a as a single copy to record scores for up to five programs. If there are additional instructional materials to prescreen, make multiple copies of H3a to accommodate the number of programs under review.

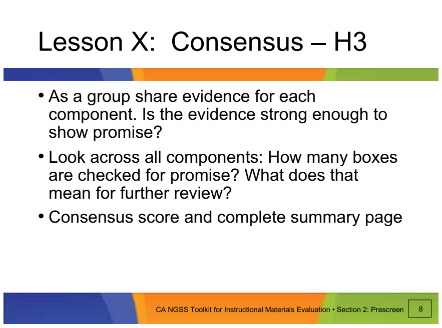
Part 1 –Introduction and Overview (15 minutes)

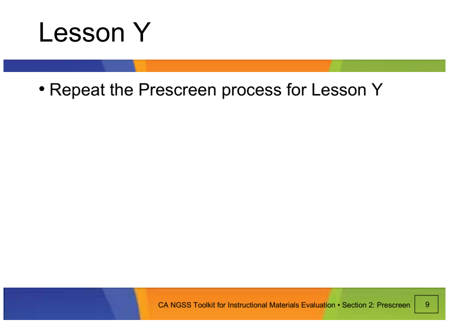
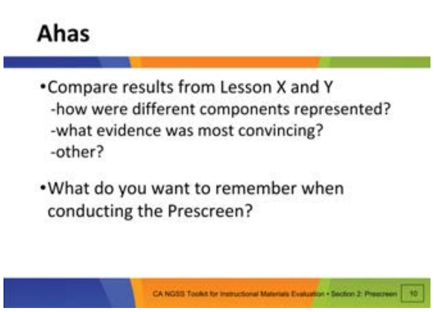
Slide	Slide Title and Facilitation Notes
	**Slide 1: Title (0 minutes)** Welcome participants to the session.
	**Slide 2: CA NGSS TIME (3 minutes)** Briefly review the overview of the CA NGSS TIME tools and processes.
	**Slide 3: Prescreen: Purpose and Outcomes (3 minutes)** Review the goals for this session. The Prescreen is a "quick look" tool and process to determine if a given set of instructional materials has the potential to be designed for the CA NGSS and warrants further review. If the evidence for moving a set of materials forward for further review is not clear and compelling, the materials are likely not worth the time and capacity necessary to fully evaluate the degree to which the programs are designed for the CA NGSS. Applying the Prescreen is not a thorough vetting of a resource and is not sufficient to support claims of being designed for the CA NGSS.
	**Slide 4: Process for Prescreen (4 minutes)** Explain the basic process: the Prescreen results in an evidence-based decision as to whether the materials merit further review. The process involves each individual reading and recording criterion-based evidence. Then with team members, individuals discuss their analysis and evidence, and as a team reach a consensus decision about conducting a deeper analysis of the materials.

Slide	Slide Title and Facilitation Notes
	Facilitator Note: It is very important that participants honor the individual analysis time and do not start talking to each other. If participants start talking direct them to record their thoughts on their Prescreen Tool.
	**Slide 5: Less of This…More of This... (20 minutes)** Distribute **H1a–c: References to Build Common Understanding**. Explain that these tables help define what these shifts might look like in instructional materials. With a partner, ask the participants to read H1a, the “Less of this…More of this…” table for Use Phenomena/Solve Problems. Briefly discuss and make sure that there is a common understanding across the team of what to look for as evidence. To survey common understanding, invite participants to share some practical classroom example of “Less of this…More of this…”. Once one person shares, ask others to comment if this is a good representation and/or to add to it. Continue the process with **H1b** and **H1c**. Remind participants that they can refer to these charts as they analyze the materials. *Facilitator Note: Possible evidence for H1a, presence of opportunities for student to engage in the exploration and explanation of relevant phenomena through the use of the three dimensions. Possible evidence for H1b, students use the three dimensions of CA NGSS to make sense of phenomena and/or solve problems. Learning is sequenced to provide students the opportunity to revise and refine their thinking over time. Possible evidence for H1c, assessment types vary and provide students choice in how they show their understanding. Formative assessments address all three dimensions of CA NGSS and can be used to inform instruction.*

Part II – Comparing Lessons X and Y (110 minutes)

Slide	Slide Title, Time, and Facilitation Notes
	**Slide 6: Prescreen Tool (5 minutes)** a. Distribute **H2: Prescreen Tool** and explain that the Prescreen Tool looks at these four components/criteria that represent major CA NGSS shifts. *Facilitator Note: The criteria in the Prescreen Tool correspond to the CA NGSS Shifts highlighted in H1a-c. H1a corresponds to the first criteria, H1b corresponds to the second and third criteria, and H1c corresponds to the fourth criteria.* b. With a partner ask participants to scan each of the listed criteria to better understand what the abbreviated titles on the slide encompass. c. Point out that these components/criteria are the ones participants just reviewed on H1. Explain that these components/criteria and others are used in Section 3: Paper Screen for a more in-depth analysis of the instructional materials.
	**Slide 7: Lesson X: Evidence (20 minutes)** *Facilitator Note: Explain that participants use the Prescreen Tool using R1: Lesson X and R2: Lesson Y. For this calibration process, there is not a front section to read associated with these instructional materials. These resources are a few pages from the student edition of instructional materials. Point out that they WILL look at the front matter when prescreening materials under consideration. Have teams analyze both lessons to compare their evidence, analysis, and decision making. The comparison between the two lessons is quite obvious: one is aligned to NGSS and the other is not.* *Hold participants to the individual review. Talking during this time does not allow for all voices to be equally heard. If participants begin talking before prompted, ask them to record their thoughts on their Prescreen Tool.* a. Explain to participants that they will review two different lessons to compare and contrast how they show promise for being aligned to the CA NGSS. b. Distribute **R1: Lesson X** to the participants. Explain that in a normal prescreen, participants would partner with each other to

Slide	Slide Title, Time, and Facilitation Notes
	read the front matter to gain insight into how the materials are organized. Since there is no front matter for this lesson, participants will begin at bullet 2. c. Ask participants to INDIVIDUALLY read the learning sequence in the lesson holistically to understand the flow of student understanding of the phenomenon/problem that incorporates their prior knowledge and reveals their negotiated understanding at the end of the sequence. d. Ask participants to reread the learning sequence and INDIVIDUALLY use **H2 – Prescreen Tool** to gather evidence for how the materials address EACH criterion.
	**Slide 8: Lesson X: Consensus** (**20 minutes)** a. Explain that as a group, participants will consensus score each of the criteria and write a summary of evidence for the score. b. Remind participants that this is a Prescreen and not the full evaluation. It is not necessary to find every piece of evidence in the program. It is ok if there are some “1” scores. c. Begin with the first criteria (use of phenomena/problems) and, ask participants to share evidence for this criterion. Discuss if there is enough evidence to check in H2 the “shows promise” box for this criterion and determine a consensus score. (**3** = Strong evidence; **2** = Adequate evidence; **1** = Limited/No evidence) d. Enter the Consensus score on H3a. *Facilitator Note: Participants come to understand what it means to reach consensus during Section 3: Paper Screen. They experience reaching consensus multiple times for each rubric during the Paper Screen process. If participants have experienced the professional learning sessions for Section 3 prior to this session, they will know how to consensus score. If you are facilitating this session prior to the professional learning sessions for Section 3, use Slides 24 & 25 of Section 3: Paper Screen Rubric 1: Designed for CA NGSS: Foundations to establish an understanding of reaching consensus and support on using the Fist of 5 strategy throughout the process.* e. Repeat this process for the other three components. f. After all components have been consensus scored, ask the participants to think about these components as a “whole.” Remind participants that materials that show promise for being designed for the CA NGSS should have evidence for each of these components. If some components are lacking,

Slide	Slide Title, Time, and Facilitation Notes
	participants need to be aware that these materials will require more time, effort and energy in the full review process. g. Conduct a discussion about the potential quality of all of the components and reach a consensus score for the program moving onto a full review. Enter that score on H3b and ask the group to write a brief summary of the lesson and the evidence for the decision.
	**Slide 9: Lesson Y (40 minutes)** Distribute a new **H2: Prescreen Tool** and repeat the process for evidence gathering and consensus scoring using **R2: Lesson Y** from a different program. Use the reference tables in **H1a-c** as needed. Score the evidence in the program using **H2**, and summarize the score for Lesson Y in **H3a** and **H3b.** *Facilitator Note: Display slides 7 (Lesson X: Evidence) and 8 (Lesson X: Consensus) if participants need to see the steps again.*
	**Slide 10: Ahas (10 minutes)** Ask participants to debrief their learning from the comparison of Lesson X and Y using **H2** and **H3a-b**. What are the ideas they want to remember while conducting their Prescreen?

Part 3 – Conducting the Prescreen

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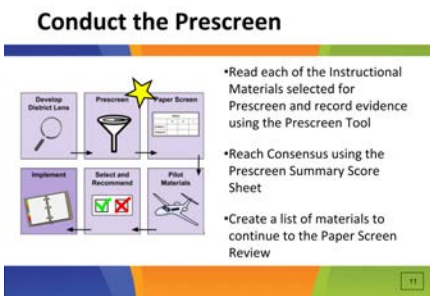

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Slide 11: Conduct the Prescreen (varies, approximately 40 minutes per instructional material)

Facilitator Note: During this portion, the instructional materials being considered for district review are analyzed. This list may be based on the approved list from CDE or other qualified materials identified by the district.

Divide participants as needed to conduct the Prescreen on the set of instructional materials considered for review by the district. At this point, participants are calibrated and each participant does not have to review all of the instructional materials. Participants should record evidence on **H2** and the final scores and summary statements on **H3a-b**.

After the team has completed this process, use **H3a-b** to construct a list of the instructional materials that will be forwarded to the Paper Screen process.

Include all **H2** sheets and the **H3a-b** score sheet among the materials to be collected by the chair of the district adoption committee. These records are helpful in documenting the process to collect evidence to support the selection decision.

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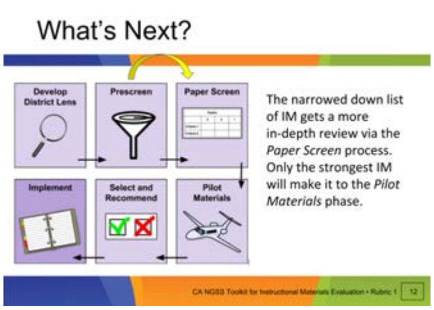

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Slide 12 What's Next? (approximately 5 minutes)

a. Share where the team is in the full instructional materials review process. The Prescreen was completed by a smaller team, while the Paper Screen phase will be more in-depth and include a larger team. The purpose of this portion was to narrow down the number of instructional materials so that only the ones with the most promise for CA NGSS and the district move forward for a full review.

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References to Build Common Understanding

Instructional materials designed for the CA NGSS include:

Use Phenomena/Solve Problems	
Less of this…	**More of this….**
Making sense of phenomena and designing solutions to problems may be used occasionally as engagement strategies but are not a central part of student learning.	Phenomena and designing solutions to problems are central to student learning and require the application and understanding of grade-appropriate SEPs, CCCs, DCIs, and EP&Cs for sense-making.
Topics, rather, than phenomena are used to direct student learning experiences and are not necessarily designed to answer student questions.	Phenomena are relevant and engaging to student learning and cause students to ask questions that they want to answer.
Only talking or reading about phenomena or how other scientists and engineers engaged with phenomena and problems.	Students experiencing phenomena directly or through rich multimedia.

Presence of Logical Sequence and Students Figuring Out Phenomena or Solving Problems	
Less of this…	**More of this….**
Learning science that may be relevant to adults and may be useful to students someday in their lives.*	Learning science that is personally relevant to student lives.*
Using science practices and crosscutting concepts only to serve the purpose of students acquiring more DCI information.	Careful design to build student proficiency in all three dimensions of the standards.
Learning experiences are 1-2 dimensional, or marginally connected to one another and provide limited opportunities to use the dimensions together to make sense of phenomenon or solve problems.	Multiple opportunities, experienced in a logical sequence, to use the three dimensions to make sense of phenomena or solve problems.
Learning experiences are designed for the “right answer.”	Learning experiences are designed so that initial explanations for phenomena are negotiated and revised over time as understanding increases in complexity.*
Rote memorization of facts and terminology; providing discrete facts and concepts in science disciplines, with limited application of practice or the interconnected nature of the disciplines.	Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning.

Three-Dimensional Performance	
Less of this...	**More of this...**
Teachers only posing questions that have one correct answer and/or measure understanding in one moment in time.	Teachers posing questions that elicit the range of student understanding and capture student thinking over time.
Only providing summative assessments that measure the endpoint of student understanding.	Formative assessment processes embedded into instruction to provide feedback data to adjust instruction as well as inform students of their progress.
Assessments that focus on one dimension at a time and are mostly concerned with measuring students' ability to remember information.	Assessments reflect each of the three distinct dimensions of science, their interconnectedness and their use by students to figure out phenomenon or solve problems.
Assessed on core ideas of science.*	Their increasing grasp of science and engineering practices helps them to develop understanding of the core ideas and crosscutting concepts.*
Students are assessed in the same way to reveal the achievement gaps.*	Student experience multiple measures and types of assessment to show the range of understanding about something being learned.*

*Statements adapted from ACESSE Survey

Name of Instructional Materials ____________________________ Grade Level/Course ________
Lesson/Instructional Sequence Title _________________________________ Program # ________
Reviewer Name ________________________________

CA NGSS TIME Prescreen Tool

3 = Strong evidence **2** = Adequate evidence **1** = Limited/No evidence

Criteria	**Evidence:** What was in the materials? Where was it? Why is this evidence?	Shows Promise/ Score
Use Phenomena/Problems. Materials provide relevant and authentic learning contexts through which students: • engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources; and • have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.*		
Presence of Logical Sequence. Student learning across the three dimensions is: • arranged in a logical sequence; and • sufficient and appropriate for students to figure out the phenomena or problems.*		
Students are Figuring Out. Materials position students to make sense of phenomena and design solutions to problems by*: • asking and answering questions that link learning over time; and • using the three dimensions to link prior knowledge and negotiate new understandings and abilities.		
Three-dimensional Performances. Materials include assessments designed to: • match the targeted learning goals; and • elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems.*		
Insert district-specific criteria as needed. Materials include features that are considered important for the learning outcomes of the student population in the district (see District Lens).		

*To the extent possible when reviewing a limited portion of the instructional materials.

CA NGSS TIME Prescreen Summary Score Sheet

Use the following rating scale to record your first impression of each program based on the Prescreen process.

3 = Strong evidence **2** = Adequate evidence **1** = Limited/No evidence

Big Picture Review					
Criteria	**Program Name:** ______________	**Program Name:** ______________	**Program Name:** ______________	**Program Name:** ______________	**Program Name:** ______________
Use Phenomena/Problems. Materials provide relevant and authentic learning contexts through which students: ● engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources. ● have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.					
Presence of Logical Sequence. Student learning across the three dimensions is: ● arranged in a logical sequence. ● sufficient and appropriate for students to figure out the phenomena or problems.					

Big Picture Review					
Criteria	**Program Name:** ____________	**Program Name:** ____________	**Program Name:** ____________	**Program Name:** ____________	**Program Name:** ____________
Students are Figuring Out. Materials position students to make sense of phenomena and design solutions to problems by: ● asking and answering questions that link learning over time. ● using the three dimensions to link prior knowledge and negotiate new understandings and abilities.					
Three-dimensional Performances. Materials include assessments designed to: ● match the targeted learning goals. ● elicit evidence of students' use of the three dimensions to make sense of phenomena and/or to design solutions to problems.					
Insert district-specific criteria as needed. Materials include features that are considered important for the learning outcomes of the student population in the district (see District Lens documents).					
Prescreen Consensus Score Total:					

CA NGSS TIME Prescreen Tool: Summary of Evidence

Name of Instructional Material ______________________ Lesson(s) Title __________________
Grade level/Course ______________________________

Prescreen Consensus Score Total _______________

Use the following questions to create a summary of the evidence to support the consensus score for this instructional material program:

- How does a phenomenon/problem organize the learning?
- How are learning opportunities sequenced to enable students to make sense of the phenomena or problems?
- What is the path of student thinking from their prior knowledge to the expected three-dimensional learning outcomes?
- How do students show/demonstrate their three-dimensional understanding of the phenomenon?

Summary Recommendation:

Figure 1.4

What role do fungi play in a food web?

1.2 Plants, Animals, and Other Organisms Make Up a Food Chain

Organisms play various roles in the web of life. The green plants use light energy to make food. Because they make their own food, they are called **producers**. Animals cannot make their own food, so they eat plants or other animals or both. Organisms that are unable to make their own food are called **consumers**. During the process of decay, consumers that break down the bodies of dead plants and animals are called **decomposers**. Bacteria and fungi, such as those shown in Figure 1.4, are examples of decomposers. The producers, consumers, and decomposers that live and interact in one area form a **community**.

Let's see how a community works. Not far from the spider's web discussed in Section 1.1 is a raspberry bush. Underneath the bush, a rabbit (see Figure 1.5) finds shelter and a place to hide from animals that may kill it. The bush is an ideal place to hide because its thorns can dig into the flesh of larger animals, and its low-hanging red fruit provides the rabbit with food. A small bird feasts on insects that hover near the top of the bush. Because rabbits usually do not eat raspberry leaves, the rabbit ventures out to look for grasses to eat once the berries are gone. Its movement is spotted by a hungry fox, which slinks forward and suddenly makes a leap for the rabbit. The rabbit looks up just in time, and a wild chase begins. This time, the rabbit reaches safety in another raspberry bush.

Not far from the rabbit's bush is the fox's den (see Figure 1.6). The fox had carried last week's rabbit to the den and eaten most of it. What he did not eat, he buried. **Microorganisms** (organisms too small to be seen with the unaided eye, such as bacteria) began to break down the remains, causing them to decay.

The raspberry bush, the rabbit, the fox, and the microorganisms can be connected in a **food chain**, a pathway that tells what eats what. Several food chains are shown in Figure 1.7. We might look at the food chain labeled path a: the fox eats the rabbit, and the rabbit eats the berries from the bush. Path b illustrates another food chain: the bird eats insects that

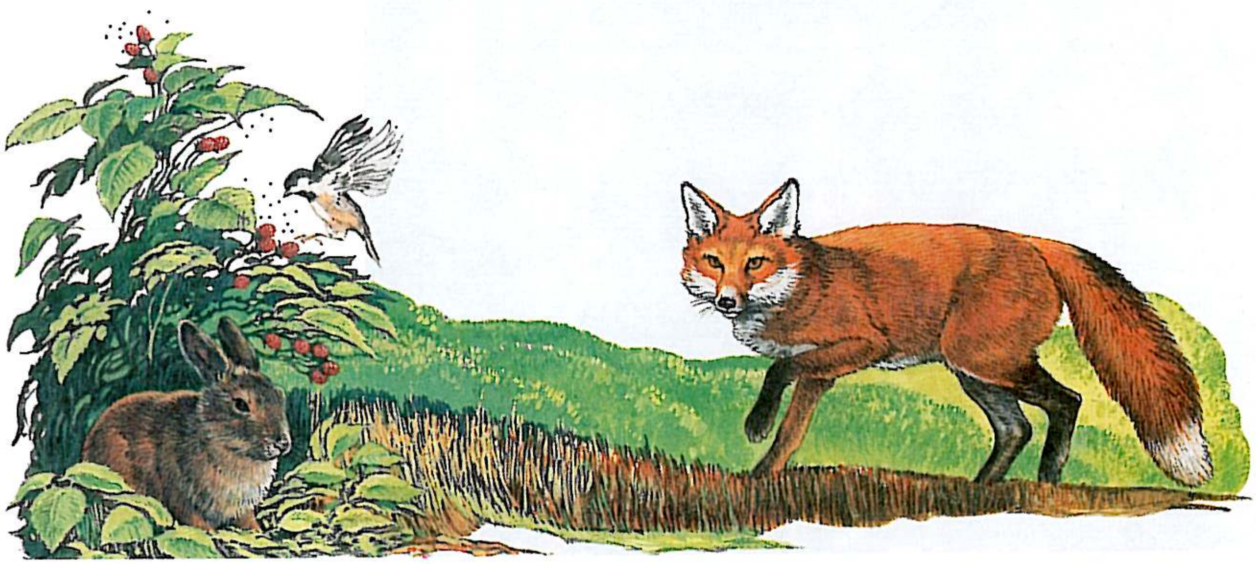


Figure 1.5

Describe all the relationships you see among the plants and animals and their environment.

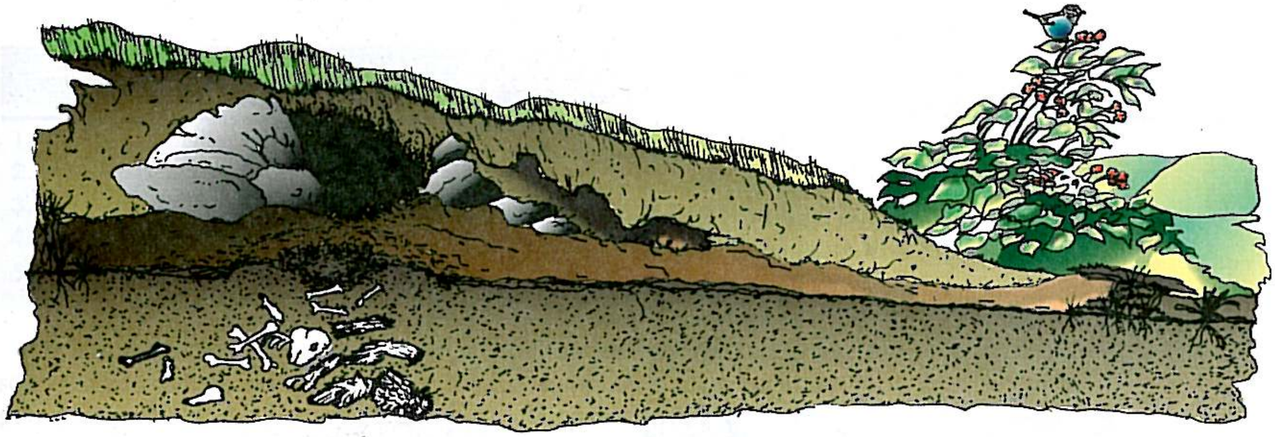


Figure 1.6 △

What role do decomposers play in the food web?

hover over the raspberry bush. These two food chains are connected by the raspberry bush. Section 1.1 described a food chain in which a spider ate a grasshopper that ate a plant (path c). When the bird eats the spider, two food chains are connected (path d). Figure 1.7 does not include all the plants a rabbit might eat, all the animals that might eat a rabbit, or any decomposers.

Topic: food chain/food web
Go To: www.scilinks.org
Keyword: GV10E9

When all the food chains in a community are connected to each other, a **food web** is formed. What would the web look like if there were two

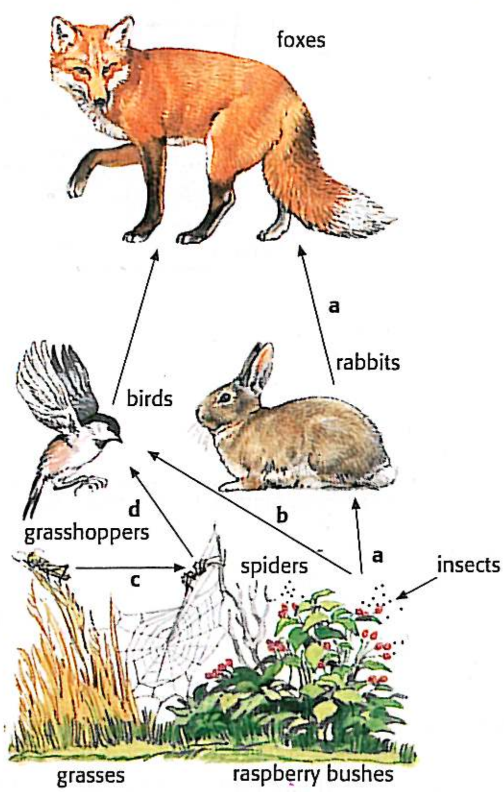


Figure 1.7 △

There is more than one food chain here. How many can you find?

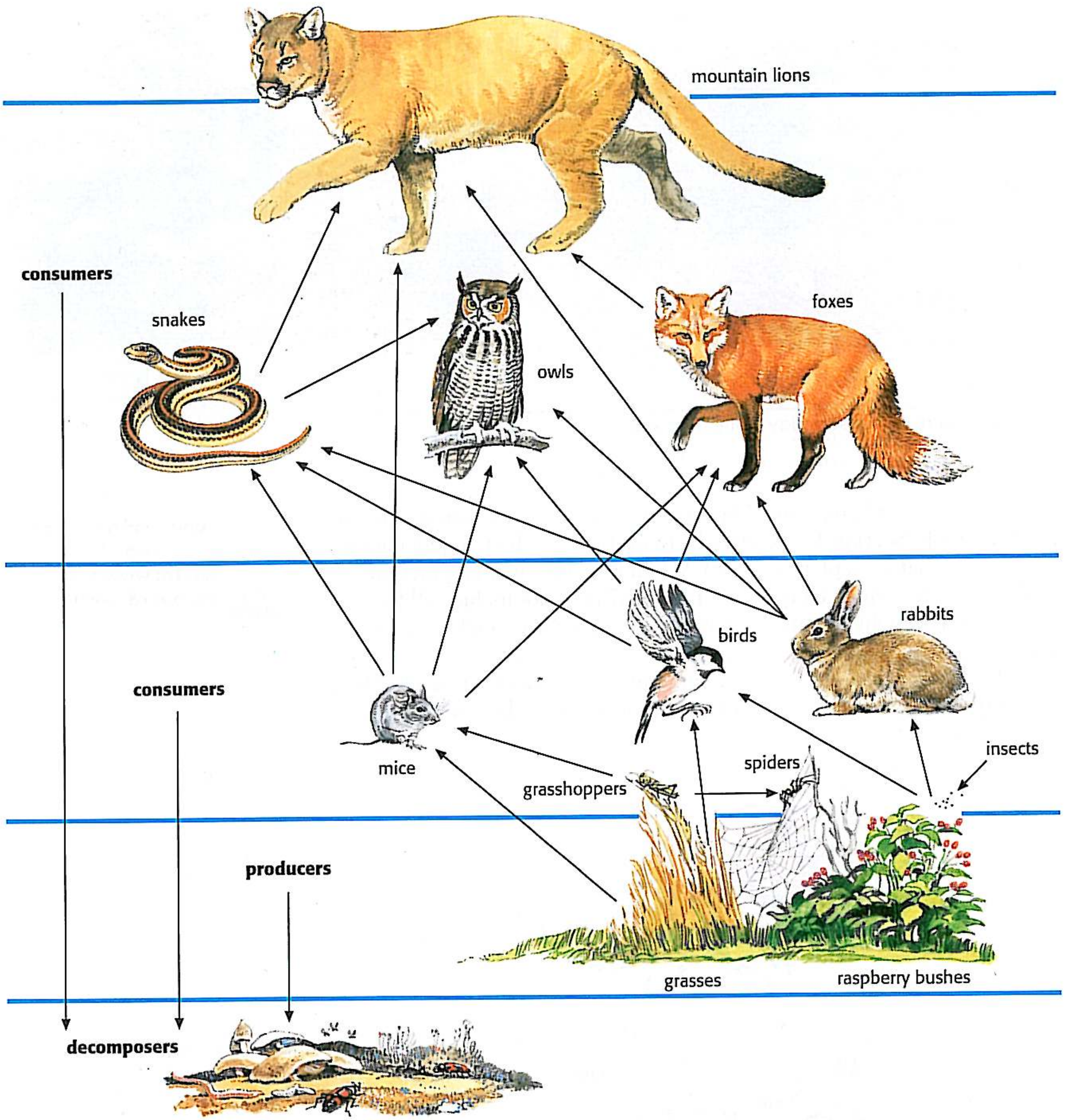


Figure 1.8

This complex food web expands the community shown in Figure 1.7. What other relationships can you find?

spiders instead of just one? Figure 1.8 shows a larger food web that includes the organisms discussed in this chapter. You can see that a food web can be large and complex.

Food webs and food chains tend to keep the numbers of living organisms in balance. The rabbits live off the green plants, and many other animals, including humans, live off the rabbits. This might appear to be hard on the rabbits, but rabbits produce many offspring in a short time. Imagine how many rabbits there would be if they reproduced without control. They

CONCEPT REVIEW

1. What parts of the environment does an ecologist study?
2. How do producers differ from consumers?
3. How is a food chain related to a food web?
4. Explain how reproduction and death are part of the balance of nature.
5. In what way do decomposers differ from other consumers

soon would be so numerous that they would eat all the plants. Without the plants, the rabbits would starve. Foxes and other animals that eat rabbits may help keep the rabbit population in balance. Disease or lack of food also may help keep the rabbit population from growing too large. These controls, or checks, apply to all living organisms, including humans, and are just one part of the balance of nature. Investigation 1.2 may help you understand your place in the web of life.

Matter and Energy—The Foundations of Life

1.3 All Biological Activity Requires Energy

Food chains and food webs are based on the cycling of matter from one organism to another organism and the flow of energy through the food web. The details of this cycling and flow are developed throughout this course. Here, you will look at just the broad outline.

All of an organism's activities require energy. Imagine the runners shown in Figure 1.9a trying to run without having eaten energy-rich foods. An activity does not have to be very intense to require energy; even the

GUIDEPOST

Where do organisms obtain the matter and energy they require?

a

b

Figure 1.9
Where do these organisms get their energy?

Explore: Ecological Interactions

Scientists use diagrams to show the feeding relationships within an ecosystem. These relationships can be shown as a single chain (Figure 1a) or as a web that provides a more complete picture (Figure 1b). Arrows point from the organism that is eaten to the organism that eats it. For example, in the chain in Figure 1a, the arrow from the grass to the grasshopper shows that the grasshopper eats the grass.

Figure 1a.
Food Chain

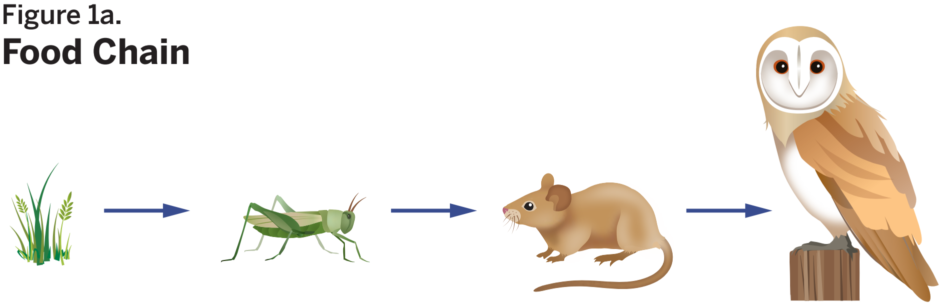
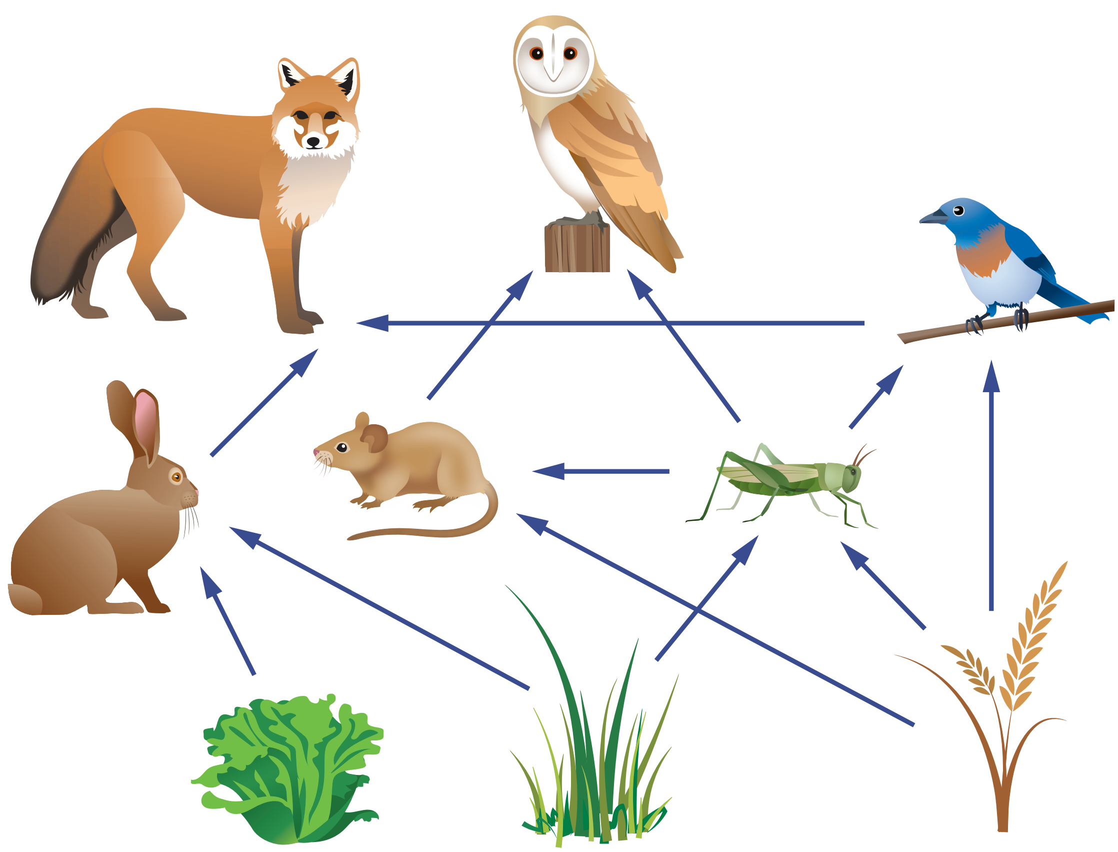


Figure 1b.
Food Web



Guiding Question

What effect did the reintroduction of wolves have on the food web in Yellowstone National Park?

Materials

For each group of four students:

- 1 set of 12 Yellowstone Food Web cards
- 1 additional Yellowstone Food Web card: Gray Wolf

For each student:

- Handout 1.2-1, "Yellowstone Food Web Data"

Process & Procedure

Part One: Investigating the Yellowstone Food Web in 1990

1. Work with your group to examine the 12 Yellowstone Food Web cards in your set. Consider which organisms are familiar to you and which are not.
2. Think about what the organisms on the Food Web cards might eat.
3. Work with your group to sort the cards into groups. Explain how you decided to group the cards.
4. As a group, choose three cards that make a simple food chain. Record your food chain in your science notebook.
5. Work with your group to create a food web using *all* of the cards in your set.

Hint

Put organisms with similar eating patterns on the same row of your food web to make it easy to read (see sample food web in the introduction).

6. Record your food web in your science notebook. Use a full page of paper to draw your food web. Leave space around the name of each organism so that you have room to draw in arrows. Then draw arrows from the eaten organism to the animal that eats it.
7. Share and discuss your food web with another group of students. How similar or different are your ideas?
8. Obtain a copy of Handout 1.2-1, "Yellowstone Food Web Information," from your teacher. Use the information on the handout to revise your food web.

9. Record your revised food web in your science notebook.

10. Discuss with your group the patterns of interaction among the organisms in your food web:
    - Which organisms play a similar role in the food web? Describe these roles.
    - What do you predict would happen to the food web if all of the plants died?

Part Two: Reintroducing the Gray Wolf in 1995

11. Your teacher will give you another Yellowstone Food Web card: the Gray Wolf.

12. Add the wolf to your revised food web.

13. Discuss with your group how the reintroduction of this species affected your food web.

14. Your teacher will introduce another organism into the food web: bacteria. Discuss the role this organism plays in the ecosystem and where to add it to the food web.

Analysis

1. Describe the patterns of interaction among the organisms in your food web:
    a. Which animals eat other animals for food?
    b. Which animals compete for the same food source(s)?
    c. What role did the winter tick play in the food web?
    d. What role did the bacteria play in the food web?
    e. Look again at your food web and Handout 1.2-1. Find an example of a helpful relationship between two animals.

Hint

They do not have to be directly connected in your food web.

2. How did the wolf affect your food web?

3. a. Add humans and cattle to your food web diagram.
   b. Describe how humans and cattle change the food web.

4. What effect do you think restoring wolves to the Yellowstone food web had on each of the following populations in the park? Explain your ideas.
   a. Elk
   b. Small animals
   c. Plants

5. People often think of grizzly bears as carnivores. Grizzlies are omnivores, eating plants, insects, and other animals. More than 80% of their diet comes from seeds, nuts, and other vegetation. Does a food web address the importance of different food sources in an organism's diet? Explain.

6. Review the list of organisms in a familiar ecosystem that you developed for Part One of Activity 1.1.
   a. Construct a food web for that area.
   b. What similarities do you see between the food web you drew for question 6a and the Yellowstone food web?

Section 3: Paper Screen

Overview

The purpose of section 3: Paper Screen is to give the adoption committee an opportunity to examine instructional materials prior to section 4: Pilot Materials. This may include publisher programs, supplemental materials, and/or teacher-created units of study while keeping in mind the priorities established in section 1: Develop the District Lens.

An essential component of section 3: Paper Screen is for the adoption committee to engage in a shared professional learning experience and calibrate themselves using resources not under review. This essential component of section 3: Paper Screen should not be skipped. The facilitation guide and presentation in this section provide two options for this experience. When calibrating for K–8 adoptions, excerpts from *Disruptions in Ecosystems* (https://www.nextgenscience.org/resources/middle-school-disruptions-ecosystems) are provided for this essential step in preparing your committee. When calibrating for elementary grades only, it is recommended that excerpts from *Why is Our Corn Changing*? (https://www.nextgenscience.org/resources/grade-2-why-our-corn-changing-v10) be used for this essential step.

The list of prospective CA NGSS programs should have been pared down to the most promising options as a result of the smaller committee's work in section 2: Prescreen. Now the whole committee will conduct a deeper, more thorough investigation of each of the programs, including the ancillary materials necessary to support science instruction.

The committee members will review each program in its entirety, including:

- Presence/Alignment of science content with the three dimensions of the CA NGSS
- Presence of Phenomena
- Program organization
- Assessment
- Universal access
- Instructional planning and teacher support
- English language development
- Education code requirements

Action Steps 3.1 through 3.5 provide direction on how to conduct this thorough review.

If you are reviewing materials approved by the Instructional Quality Commission (IQC) they have already been reviewed by the Instructional Materials Advisory Panel (IMAP) and the Content Review Panel (CRP) and were determined that they met the requirements of chapter 13 of the *CA Science Framework*. The entire IMAP/CRP report to the IQC will be available https://www.cde.ca.gov/be/pn/im/jun04item01ppt.asp if you would like further details about how these selections were made. The adoption committee's task is to determine which programs best meet the district needs as identified in the section 1: Develop District Lens, not to verify whether the program meets the requirements outlined in chapter 13 of the CA Science Framework.

Data/Resources

Complete sets of materials for each program being considered are available to the committee for this task at https://www.cde.ca.gov/ci/cr/cf/lrdc.asp. A complete list of materials recommended for adoption is available on the California Department of Education website at https://www.cde.ca.gov/ci/sc/im/.

Districts may want to ask publishers which materials are included in each grade-level package in order to ascertain which materials they will purchase. It is recommended to review only the materials that will be part of the district purchase.

Use templates, charts, and data from section 1: Develop District Lens and section 2: Prescreen to assist in this process.

Timeline

The timeline will vary for this section according to how many programs and grade levels the district is reviewing. It is anticipated that section 3: Paper Screen can be completed in 24–28 hours. The shared professional learning experience of sections 3.1–3.5 using training curriculum materials can be completed in 12–16 hours. Afterwards, the same process (sections 3.1–3.5) for materials under review can be completed in approximately 4–6 hours per program still under consideration.

Section 3: Paper Screen - At a Glance

Purpose: To make program recommendations.

Action Steps	Tasks
3.1 – Rubric 1 Foundations Analyzing *what* students are going to learn Read through the instructional materials to identify strengths and limitations as a CA NGSS-aligned curriculum. Overall, determine if the level of alignment is sufficient to continue the Paper Screen Process.	3.1a: Review Materials for Presence of CA NGSS Look through an instructional unit to identify the presence of: ● phenomena/problems; ● three dimensions of CA NGSS; ● Environmental Principles and Concepts (EP&Cs); and ● logical sequence of learning. Use evidence from the unit to document strength/limitations and score the materials. Gather evidence for Teacher Support to be used with Rubric 4. 3.1b: Review Materials for CA NGSS Alignment Decision Point: Review CA NGSS presence, and the Foundational strengths/limitations and needs identified in Section 1: Develop District Lens to decide if it is worth continuing the review.

Action Steps	Tasks
3.2 – Rubric 2 Student Work Analyzing *how* students are going to be learning	3.2a: Review Materials to Determine How Well Materials Provide Powerful Learning Experiences that Engage and Change Student Thinking about Phenomena/Problems Read through an instructional unit to check to what extent the unit provides (a) quality: • opportunities to explain anchoring phenomenon/problem; • three-dimensional conceptual framework; • leveraging of student prior knowledge and experiences; and • experiences that develop metacognition; and • equitable learning opportunities for all students. 3.2b: Review Materials for Quality Features that Support Authentic Learning • Visualize the story of the unit and the pathway of student thinking. • Analyze the quality of student thinking and learning in the unit. • Use evidence from the unit to document strength/limitations and score the materials. • Gather evidence for Teacher Support to be used with Rubric 4.

Action Steps	Tasks
3.3 – Monitoring Student Progress Analyzing how students are assessed	3.3a: Review Materials for the Presence of Performance Assessments. 3.3b: Use evidence from the unit to document strength/limitations and score the materials. Gather evidence for Teacher Support to be used with Rubric 4.
3.4 – Teacher Support Analyzing how the instructional materials provide support to teachers in facilitating all students' understanding of phenomena/problem solutions using the three dimensions. Total scores for the Paper Screen and rank order the instructional materials	3.4a: Review completed Evidence Charts to determine teacher support for student learning from: Section 3.1: NGSS Foundations. Section 3.2: Student Work. Section 3.3: Monitoring Student Progress. Apply "Rubric 4 – Teacher Support Rubric" across the Evidence Charts to obtain a score for Teacher Support. Total the scores from Rubrics 1–4 to obtain a final score for each program. Rank order the programs reviewed. 3.4b: Decision Point Based on the rank order from the Paper Screen, there are two options for the district team to consider: Option #1: Plan the district pilot if a limited number of programs clearly match the district's high-quality criteria. Option #2: Use Rubric 5 when more information is needed about the consistency across the program or if there are too many programs to pilot.

Action Steps	Tasks
3.5 – Program Evaluation (Optional) Use Optional Rubric 5 Program Evaluation to combine the overall analysis from one in-depth unit with an overview of 2–3 other units to determine the consistent high quality of the entire program. Gather additional evidence from other units within the grade level or across grade levels about Progressions of Learning, Unit-to-Unit Coherence, and the Program Assessment System.	3.5a: Review the District High-Quality Instructional Materials Chart and review the "Designed for CA NGSS: Program Evaluation Rubric" to calibrate understanding of the components of the Rubric. Decide if the program evaluation will be done by each member gathering evidence and documenting strengths and limitations or jig-sawing this step. Gather evidence using: • Progressions of Learning • Unit to Unit Coherence • Program Assessment System Complete "Designed for CA NGSS: Program Evaluation Rubric" and "Designed for CA NGSS: Score Sheet." 3.5b: Determine final program scores by consensus. Determine how the program evaluation rubric score impacts the rank order of the instructional materials from the paper screen total for moving forward to Section 4: Pilot Materials.

Before reviewing instructional material under consideration, all Action Steps in section 3: Paper Screen should be experienced once by the adoption committee during the shared professional learning experience and calibration activities.

Section 3: Paper Screen Rubric 1: Designed for CA NGSS: Foundations

Time: 6 hours

Overview

"Paper Screen Rubric 1: Designed for CA NGSS: Foundations" is used to determine how well instructional materials align to CA NGSS and student learning through the presence of: phenomena/problems, the three dimensions of CA NGSS, Environmental Principles and Concepts (EP&Cs), and a logical sequence of learning.

The committee will gather evidence to determine how well the instructional materials align to the CA NGSS by using tools and processes that reveal the presence of:

- phenomena/problems,
- three dimensions,
- EP&Cs, if applicable, and
- logical sequence

Advance Preparation

Prepare a **Navigation Guide** for Instructional Materials under consideration; see **R2** for directions on how to create a Navigation Guide. Navigation Guides for the sample instructional materials (*Disruptions in Ecosystems* and *Why is Our Corn Changing?)* are used as part of the professional learning session to calibrate participants.

Prepare a chart that highlights some norms for productively and respectfully working together throughout this process.

Create a chart which serves as a "key" for the conceptual flow that will be developed. This should be saved for use throughout the entire toolkit.

Prepare charts for consensus building and consensus scoring to be used throughout the paper screen process.

Grouping for this task requires some thought. There are times during this work where committee members will be working in small groups looking at a single chapter/pairs of chapters/section (some reasonable ‘chunk’) of the instructional materials. This group is called the *Parts group* (like an expert group). Larger groups that include participants who have reviewed each of the chapters/sections are called *Whole groups* (like a home group). The terminology of *Parts group* and *Whole group* are used throughout the Paper Screen process.

Suggestions for Grouping	**Example of grouping based on *Disruptions in Ecosystems***
Look at the instructional materials to be reviewed. Group participants so that there is at least one person per chapter/section/etc. of the instructional materials in each Whole group.	*Disruptions* has 5 chapters. You want Whole groups to have at least 5 people. If there are a large number of participants, it is preferable to have 2 or 3 people per chapter (i.e., a total of 10 or 15 people in a Whole group).
To determine the Parts Group, ask participants to “number off” based on the number of chapters/sections/etc. Assign specific chapter/section/etc. to each group. These groups are reading and reviewing the same chapter (or section). They work together through the various steps each Rubric	*Disruptions* has 5 chapters so participants number off by 5. There are 5 Parts Group – chapter 1, chapter 2, etc. If possible, it is recommended that each Part Group have 2-3 participants so that they can read, discuss, and work together.
If there is a smaller group of participants (fewer than 3 times the number of chapters/sections) have them work as one Whole Group. Each Part Group contributes to a single set of charts that rare combined to represent the whole.	If there are fewer than 15 people, form one Part Group for each of the chapter. Each Part Group contributes to a single set of charts that are combined to represent the whole.
If there is a large group (more than 3 times the number of chapters/sections) form multiple Whole Groups. The number of people in a Whole Group should be at least two times the number of chapters/sections so that people can work with a partner(s).	If you have more than 15 people form multiple Whole Groups. This would result in two (or more) sets of whole charts For *Disruptions* 20-30 people = 2 Whole groups of 10-15 30-45 people = 3 Whole groups of 10-15
If the group size less than the number of chapters/sections being reviewed, form Part Groups of at least two people so that they can share their thinking. This may result in teams looking at multiple chapters/sections.	For *Disruptions* Form pairs or triads to review chapters. Repeat as necessary to review all chapters.

The facilitation guide and presentation for “Rubric 1 –Designed for CA NGSS: Foundations” provide a shared professional learning experience and calibration activities for each step in the process. After all Action Step 3 tasks have been experienced once by the adoption committee during the shared professional learning experience and calibration activities, the committee can then return to “Rubric 1–Designed for CA NGSS: Foundations” and begin the Paper Screen process for instructional materials under review.

Action Step 3.1 – Rubric 1 Foundations

Task 3.1a: Review Materials for Alignment

The first step is to determine how well the instructional materials align with key elements of CA NGSS by carefully reviewing the materials with an eye toward the presence of: phenomena/problems, the three dimensions of CA NGSS, the EP&Cs, and a logical learning sequence. These are foundational-level elements that should be present for a material to be considered for adoption.

Setting the Stage:

Start by having a conversation about characteristics and features of high-quality science instructional materials. Be sure to include discussion about the importance of instructional materials containing learning goals that align to CA NGSS grade level expectations. If your district has selected the Preferred Integrated Course Model for middle school, be sure to discuss what level of integration across and between the science domains of Earth and Space Science (ESS), Life Science (LS), Physical Science (PS), and Engineering and Technical Applications of Science (ETS) you expect to see in high-quality instructional materials. This prompt may also be useful when discussing the importance of an integrated approach at the elementary level. Discuss and chart how these features align to your district’s needs and priorities. This will help the committee be more aware of what they expect and desire to see when reviewing materials. High-quality instructional materials should include integration of disciplinary core ideas (DCIs), science and engineering practices (SEPs) and crosscutting concepts (CCCs) in ways that make sense for student learning and an understanding of phenomena/problems. In addition, high quality instructional materials should incorporate the EP&Cs where applicable. This chart will be referred to throughout the Paper Screen process.

Task 3.1b: Review Materials for NGSS Alignment

Divide your instructional unit into manageable chunks (e.g., chapter, section, etc.). Assign chunks to teams or partners. In this way the entire instructional unit will be closely reviewed but teams will have a manageable amount to review.

The handouts necessary for gathering, analyzing, and evaluating evidence for these passes through the instructional materials are:

H1a Navigation Guide for Instructional Materials Review: *Disruptions in Ecosystems* (middle school)

H1b Navigation Guide for Instructional Materials Review: *Why is Our Corn Changing? (elementary)*

H2 Note Taking: Parts Group Strengths and Limitations

H3 DCI Progressions

H4 SEP Progressions

H5 CCC Progressions

H6 Matrix of Environmental Principles and Concepts for CA NGSS

H7 Designed for the CA NGSS: Foundations Rubric

H8 Designed for the CA NGSS: Foundations Strengths and Limitations

H9 Designed for the CA NGSS: Score Sheet

H10 Teacher Support Evidence Chart

Overview of Gathering Evidence and Scoring

Rubric 1 has four components. Each is scored one at a time using the same process:

- Parts Groups gather evidence from their chapter/unit in the form of a conceptual flow and use H2 to individually record strengths and limitations
- Whole Groups tell the story of the unit using the evidence (conceptual flow) from each Parts Group in the order that the publisher presents the materials.
- Whole Groups score by consensus, sharing evidence from H2 Note Taking: Parts Group Strengths and Limitations, chapter/section conceptual flows and discussion.

- Scores are recorded on H9 Designed for CA NGSS: Score Sheet, and summary strengths and limitations are recorded on H8 Designed for CA NGSS: Foundations Strengths and Limitations.
- Participants gather preliminary evidence for Teacher Support on H10 which is used in the Rubric 4 analysis of the instructional materials.

Consensus scoring is a keystone of the CA NGSS TIME process. Each person should share their score publicly. One way to do this is to have a *straw vote* where committee members show their score. Everyone should be able to defend their score selection with evidence from their documents ("H7 – Designed for CA NGSS: Foundations Rubric" and "H8 – Designed for CA NGSS: Foundations - Strengths and Limitations"*)* and the annotated instructional sequence flow.

Committee members should read the descriptions of the score points and have evidence from the unit, their documentation and the flow to support their scores. People with different score points (1, 3, and 5) should share their thinking. A discussion among people with different scores in which they explain their evidence for their score will help the team come to consensus.

Consensus means all participants contribute ideas and encourage the use of one another's ideas and opinions. The committee members should view differences as helpful rather than as a hindrance. Everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue. Those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time. Finally, all share in the final decision. Consensus does not mean a unanimous vote, everyone's first choice, or that everyone agrees. As Facilitator, work to encourage participation, rely on evidence from the conceptual flows, and moderate discussions.

Ultimately, the group will come to a decision, but there must be a "critical mass," enough of the group to give a final score.

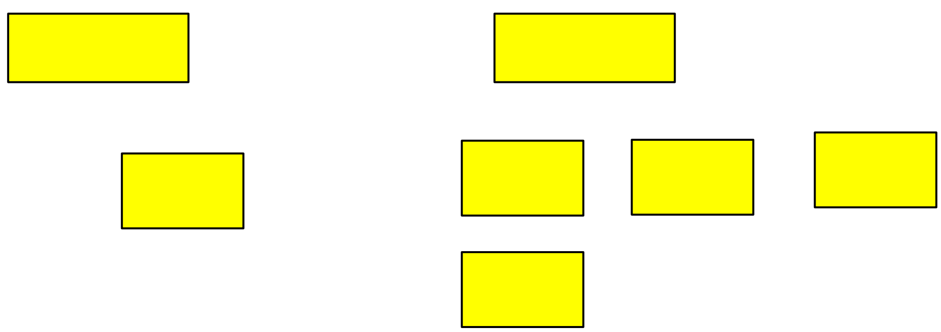
Once consensus has been reached the scores should be entered onto the "H9 – Designed for CA NGSS: Score Sheet."

The committee will go through the process of reaching consensus four times, once for each component of Rubric 1: phenomena/problem, three dimensions of CA NGSS, EP&Cs, and logical sequence of learning. The consensus scores get entered onto the Score Sheet and are saved for the next portion of the review.

Step 1. Mapping out the Conceptual Flow of Instructional Materials

Each team will map out the flow of science concepts through their portion of the instructional materials. This is best done by writing each concept onto a sticky note (one concept per note). It's helpful to write the page number where the concept is introduced because the committee is going to build a visual representation of the unit's concepts as they appear in the instructional materials.

Use H1a Navigation Guide for Instructional Materials Review: *Disruptions in Ecosystems* (middle school) and/or H1b Navigation Guide for Instructional Materials Review: *Why is Our Corn Changing? (elementary)* to assist committee members with where to find different aspects of the instructional materials important to the evidence gathering process. The Navigation Guides provide page numbers (Student and Teacher Materials) for chapters, unit overviews, activities, handouts, and assessments.



Larger concepts or ideas can be written on larger sticky notes with smaller concepts on smaller sticky notes. The positioning of the sticky notes should match the flow of instruction as presented in the instructional materials. In this way, the "story" of the chapter or chunk of lessons should read from left to right. Smaller ideas and concepts which support the larger ideas are positioned below, so the pieces of the story read vertically as well.

Each Parts Group will create their chapter's story. Post them on a wall chart and share the instructional flow from start to finish so that everyone on the committee knows how the unit's ideas and concepts are developed.

Step 2. Digging Deeper

Handouts H2-H10 guide the work as groups dig deeper into the instructional materials. Committee members will consider the key elements of high-quality instruction and look for their presence as they make three passes through the curriculum. A brief description of each document and its use in the process is provided below:

H2 Note Taking: Parts Strengths and Limitations is completed by individuals as they reflect on the presence of: phenomena/problems; three dimensions of the CA NGSS•EP&Cs; and, logical sequence of learning. H2 is used as evidence in consensus scoring,

H3 DCI Progressions, H4 SEP Progressions, H5 CCC Progressions, H6 Matrix of Environmental Principles and Concepts in CA NGSS assist committee members with the extent to which the instructional materials align with the CA NGSS.

H7 Designed for the CA NGSS: Foundations Rubric is used to consensus score the instructional materials. All committee members should have shared understanding of the rubric before attempting to apply it to the gathered evidence.

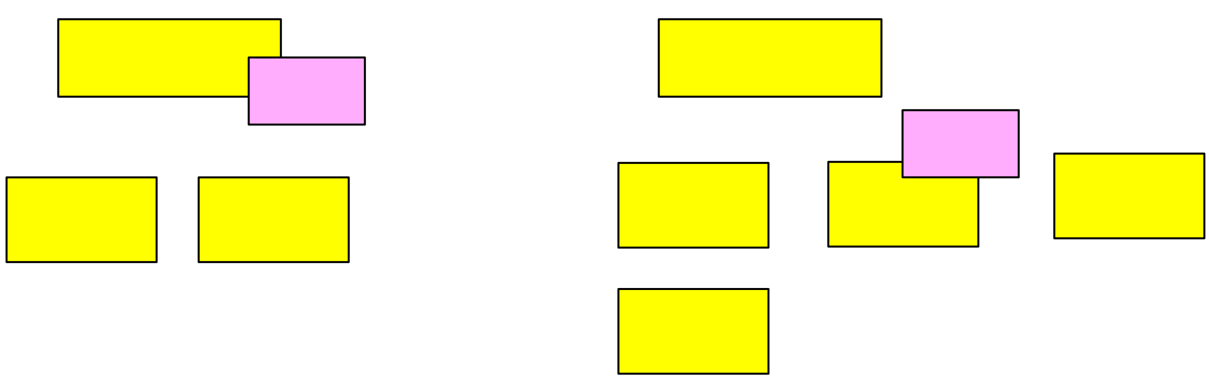
H8 Designed for the CA NGSS: Foundations Strengths and Limitations provides a way to record the consensus conversations. This artifact will be used to support the scoring decision and plan for professional learning experiences, should the instructional materials be adopted.

Based on the consensus conversation, the committee completes H9 Designed for the CA NGSS: Score Sheet.

H10 Teacher Support Evidence Chart: Foundations provides a place to record evidence and rate the features of the instructional materials in terms of how they support teacher use. This will be used in scoring Rubric 4.

Step 3. Looking for and Evaluating Presence of Phenomenon

The committee takes another look at the instructional flow. This time, instead of documenting the concepts, the committee looks for the presence of phenomena. The presence of phenomena is noted on a pink sticky note and added to the yellow concept sticky notes. This documents the presence (or absence) of phenomena.



A brief explanation and definition of scientific phenomena is included in the training presentation. If team members need additional information about scientific phenomena they are encouraged to review the document "H2 – Criteria for Selecting Phenomena" included in the [professional learning module from the 2017 CA NGSS Statewide Rollout](). A more in-depth understanding of phenomena-driven instruction can be achieved by fully utilizing the presentation for middle school included in the same professional learning module (approximately 1.5 hours).

Next, the committee evaluates the presence of the phenomena. The committee reads through the first row of the "H7 – Designed for CA NGSS: Foundations Rubric" to become familiar with features of phenomena and what constitutes the different quality levels as they relate to presence in the instructional materials.

Section 3: Paper Screen Rubric 1 – **H7**

Designed for the NGSS: Foundations Rubric

Components and Indicators	High Quality 5	Medium Quality 3	Low Quality 1
F1. Presence of Phenomena/Problem. The materials include phenomena/problems that • have the ***potential*** to drive student learning. • have the ***potential*** to relate across the dimensions.	The materials include phenomena/problems that have strong *potential* to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have some *potential* to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have limited *potential* to drive student learning toward the targeted learning goals.
F2. Presence of Three Dimensions. The materials include the three dimensions, such that • the DCIs, SEPs, and CCCs are present and have the *potential* to support student learning. • when engineering design is a learning focus, it is integrated with the appropriate dimensions (i.e., engineering is not isolated).	The materials consistently provide opportunities for students to develop and use grade-appropriate elements of the three dimensions.	The materials occasionally provide opportunities for students to develop and use grade-appropriate elements of the three dimensions.	The materials rarely provide opportunities for students to use grade-appropriate elements of the three dimensions.
F3. Presence of Environmental Principles and Concepts (EP&Cs) The materials include (as applicable) • instructional content that incorporates the California EP&Cs. • opportunities for students to examine the interactions and interdependence of human societies and natural systems. • opportunities for students to develop and implement solutions to real-world environmental problems.	The materials consistently provide opportunities for students to examine and use elements of the EP&Cs.	The materials occasionally provide opportunities for students to examine and use elements of the EP&Cs.	The materials rarely provide opportunities for students to examine and use elements of the EP&Cs.
F4. Presence of Logical Sequence. Materials demonstrate appropriate sequencing of three dimensions when • they include a targeted set of DCIs, SEPs, and CCCs within a sequence; • the sequence is clear and logical across the DCIs; and • the SEPs and CCCs are potentially sufficient and appropriate for students to figure out the phenomena or problems. • phenomenon or problems are linked to each other	The materials consistently exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials occasionally exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials rarely exhibit a clear, logical, and appropriate sequence across the three dimensions.

The committee shares evidence from H2—Note Taking: Strengths and Limitations, the chapter/section conceptual flow charts, unit "story" of all of the charts, and their discussion.

Through a consensus process (see overview above) the committee determines a score which is entered on "H9 -- Designed for CA NGSS Score Sheet" (see below) and then summarizes the Strengths and Limitations of these materials for this rubric component on H8 (see below).

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1. Phenomena/Problems		
SW 2. Three-Dimensional Conceptual Framework		
SW 3. Prior Knowledge		
SW 4. Metacognitive Abilities		
SW 5. Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1. Phenomena/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**SUM=**	x 1.00=
Grand Total (out of 100)		

Name of Instructional Materials ___________________________ Grade Level/Course _______ Unit/Module Title_________________

Section 3: Paper Screen Rubric 1 – **H8**

Designed for CA NGSS: Foundations - Strengths and Limitations

Directions

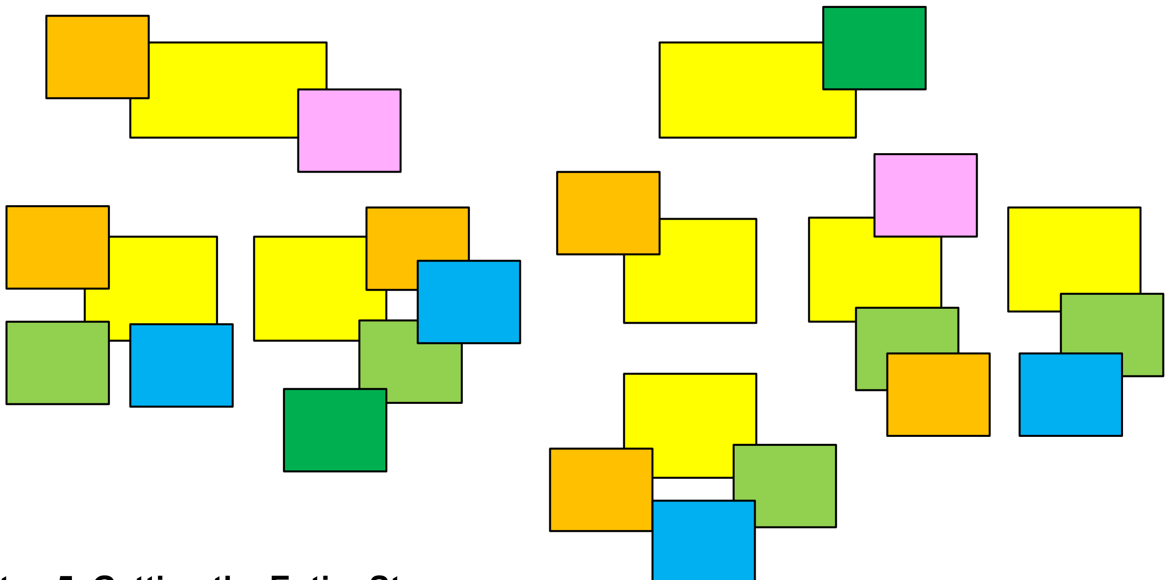
1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the *Designed for CA NGSS Rubric: Foundations* and your district lens.
3. Reflect on the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Component	Strengths	Limitations
F1. Presence of Phenomena/ Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles & Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		

Step 4. Continue the process for Presence of the Three Dimensions and Environmental Principles and Concepts

The committee takes another look at the instructional flow. This time, the committee looks for evidence of the three dimensions of the CA NGSS and EP&Cs (if applicable)., Participants work with a partner to look for evidence, one partner looks for evidence of SEPs and CCCs and another partner looks for evidence of DCIs and EP&Cs (if applicable).

Evidence of these features will be noted on sticky notes and added to the conceptual story line or flow. To match the colors of CA NGSS, SEPs are written on blue sticky notes, CCCs on green sticky notes, DCIs on orange sticky notes, and the EP&Cs on dark green sticky notes. The specific element level (bullet from the matrix) for the SEP, CCC, DCI, and EP&C (if applicable) should be recorded on the sticky note.



Step 5. Getting the Entire Story

Before evaluating the quality of each dimension, each Parts Group shares in the order of the entire unit. In sequential order, describe the ways in which the three dimensions and EP&Cs appear in the unit. This allows the committee to get a sense of the incorporation of key features throughout the unit. Committee members should refer to the chart they created as evidence when citing examples of how the features support learning.

At this point, the committee should discuss the overall presence of phenomena/problems, three dimensions, EP&Cs, and a logical sequence for student learning as demonstrated in the unit. Some questions to guide the discussion include:

Are phenomenoa connected to each other within the chapter/section and across the unit? Are the three dimensions connected? Are the EP&Cs included as applicable? Are the three dimensions and EP&Cs connected to the overarching conceptual framework?

Step 6. Evaluating the Presence of Three Dimensions and Environmental Principles and Concepts

Next the committee will evaluate the quality of the evidence as it relates to the components. Read through the next rows of the “H7 – Designed for CA NGSS:

Foundations Rubric" to become familiar with the different quality levels associated with the presence of three dimensions. Decide upon a rating and record on H9. Note summary strengths and limitations on "H8 – Designed for CA NGSS: Foundations - Strengths and Limitations."

Repeat the process to evaluate the presence of the EP&Cs. As before, decide upon a rating and record on H9. Note that there is a row to record a score if the EP&Cs are applicable, and a row for if they are not applicable. Record strengths and limitations on "H8 – Designed for CA NGSS: Foundations - Strengths and Limitations."

Step 7. Continue on?

At this point the committee should look at the evidence, Score Sheet, and District Lens. Before continuing to invest more time in the Paper Screen review process it is worth considering if this particular set of instructional materials is strong enough to merit the effort. The committee should have enough evidence at this point to make a decision.

If the committee decides it is not worth continuing the analysis, the "H8 – Designed for CA NGSS: Foundations - Strengths and Limitations" should guide the report as to why the decision was made not to move forward.

Step 8. Teacher Support

Materials that score sufficiently require one more analysis before going on to Rubric 2. The Parts Groups will analyze the instructional materials for how well they support teachers in implementing phenomena-based, three-dimensional instruction for all students. Individuals in the Parts Groups complete H10 Designed for CA NGSS Foundation Teacher Support for use with Rubric 4.

Step 9. Value the Process/Reflection

The committee reflects on the value of analyzing and evaluating instructional materials used in Rubric 1. The committee also reflects on what they would like to remember to apply to their context through a quick write on sticky notes.

CA NGSS TIME

California Next Generation Science Standards Toolkit for Instructional Materials Evaluation

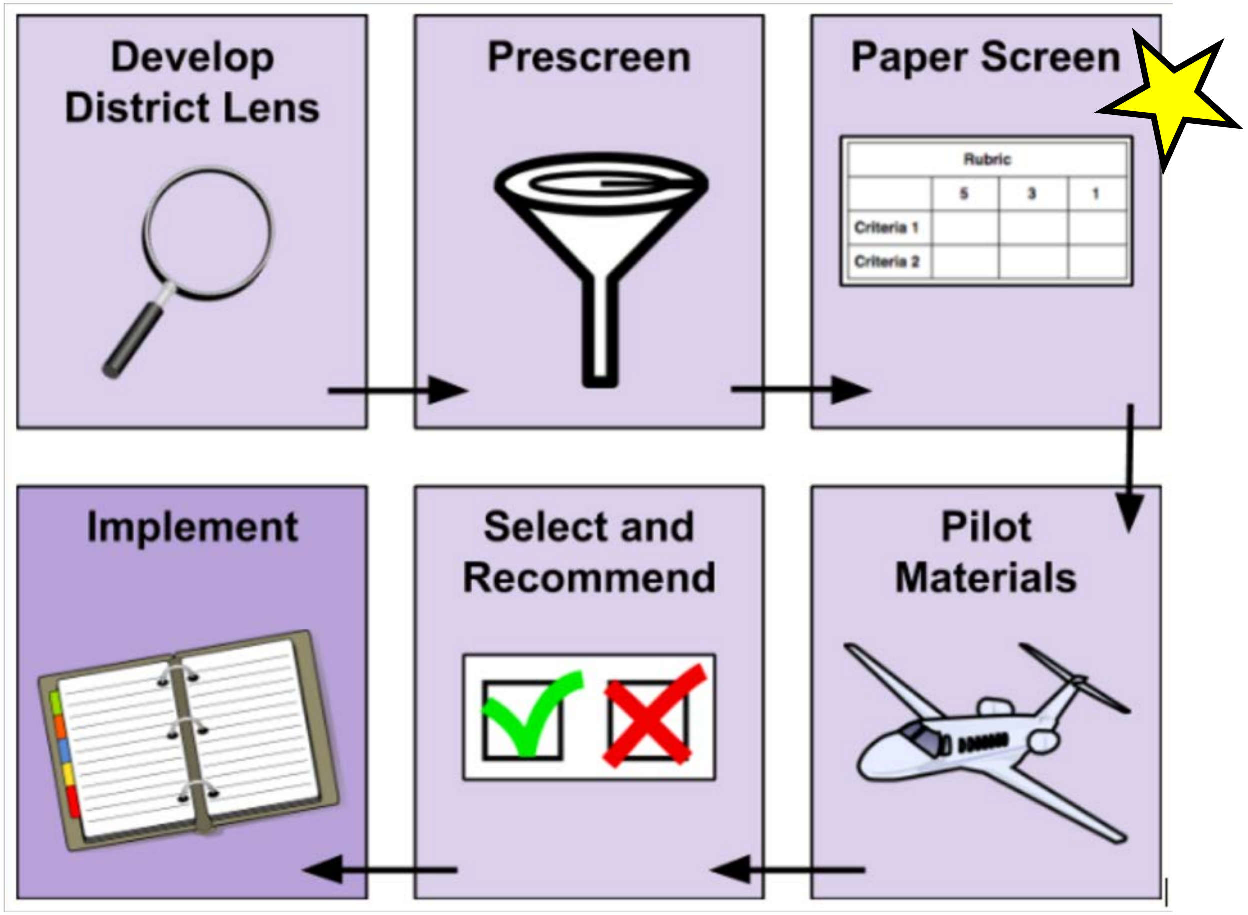
Section 3: Paper Screen
Rubric 1 Designed for CA NGSS: Foundations

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

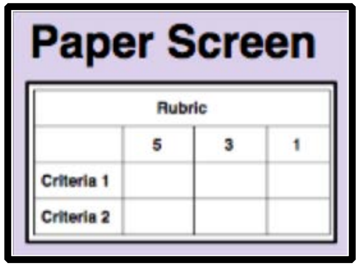
Purpose & Outcomes

- Learn a process for analyzing instructional materials aligned to CA NGSS.
- Apply the process and tools to help you:
  - Gain a shared understanding of the characteristics of high-quality instructional materials.
  - Use the process to inform the selection of instructional materials *and* to plan for classroom use.
  - Deepen your understanding of CA NGSS through professional learning experiences.

CA NGSS TIME Road Map



Paper Screen: You Are Here



- **Rubric 1: Foundations**
  What are students going to learn?
- Rubric 2: Student Work
  How are students going to learn?
- Rubric 3: Monitoring Student Progress
  How are students assessed?
- Rubric 4: Teacher Supports
  How do the materials support teachers to facilitate student learning?

Rubric 1 Goals

Driving question:

What are students going to learn during this unit?

We will determine how well instructional materials align to CA NGSS to support this learning through:

- the *presence* of phenomena/problems
- the *presence* of three dimensions of CA NGSS and the Environmental Principles and Concepts (EP&Cs)
- the *presence* of a logical sequence of learning

Essential Questions

What are characteristics and features of high-quality science instructional materials?

How do they align to your district's needs and priorities?

Categorizing Concepts **G1**

Sort the strips into two groups:

- Big ideas
- Smaller ideas

What is your rationale for your grouping?

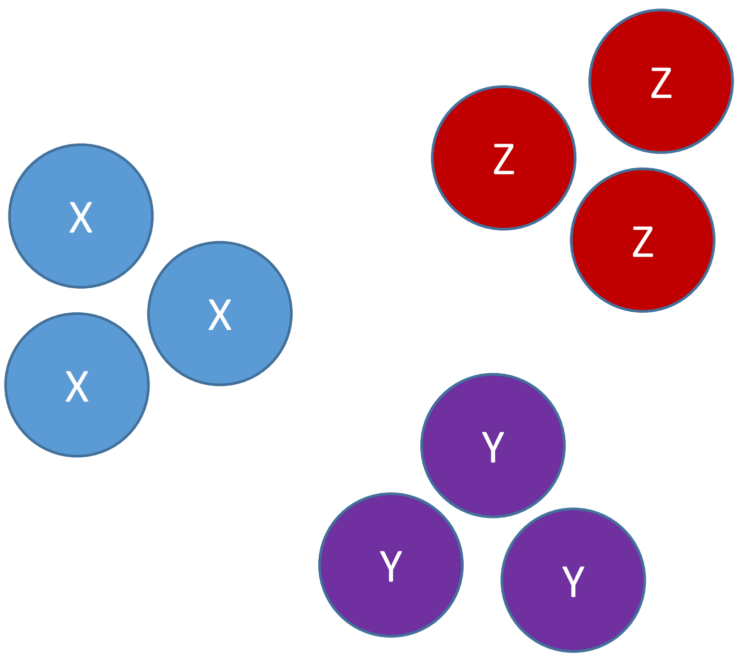
Facts and Concepts

Facts are pieces of information. The focus is on verifiable and discrete details. In teaching, facts/smaller ideas are often presented without making connections to the big ideas of science.

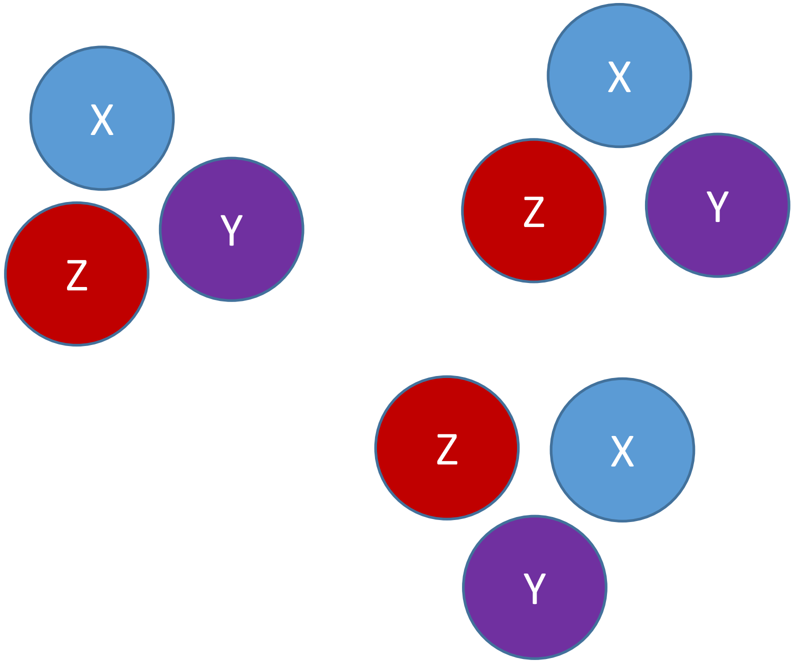
Concepts are overarching ideas that clearly show the relationships between smaller ideas. They are frequently abstract. In teaching, concepts are often presented with connections to the real world and to the big ideas of science.

Group Arrangements

Parts group (experts in a chapter or investigation)

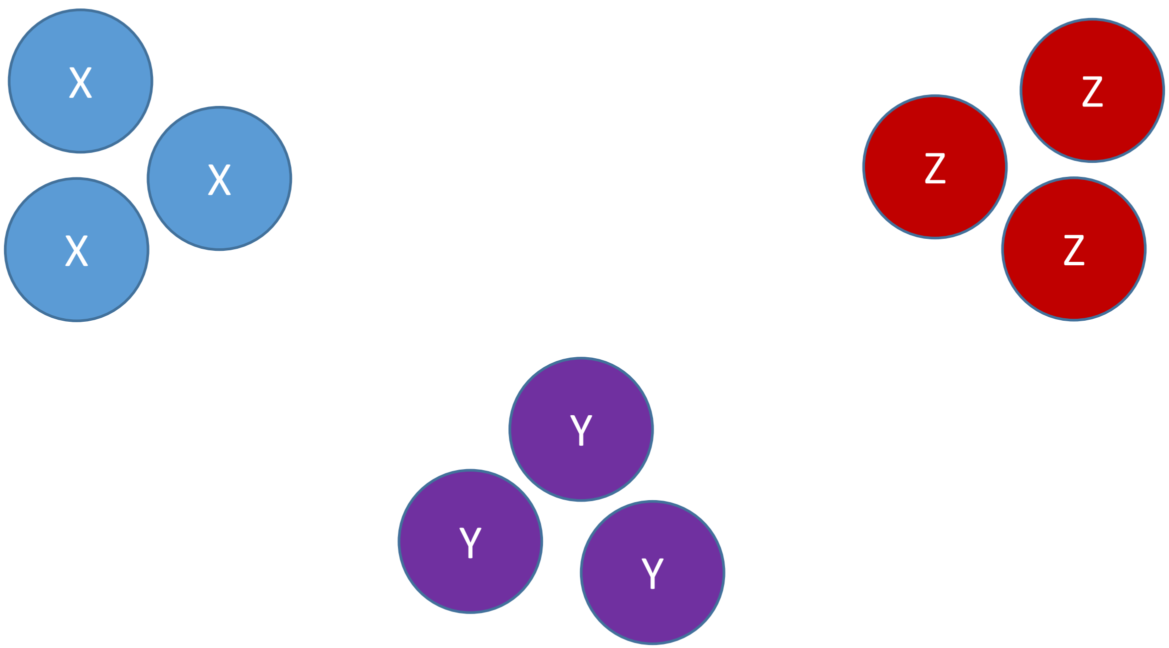


Whole group (table group looking at whole unit)



Transition

Sit in your **Parts Group** for this next activity.



Navigation Guide for Instructional Materials Review H1

Look at the Navigation Guide to find:

- chapters
- units overview and activities
- student edition
- teacher edition
- handouts
- assessments

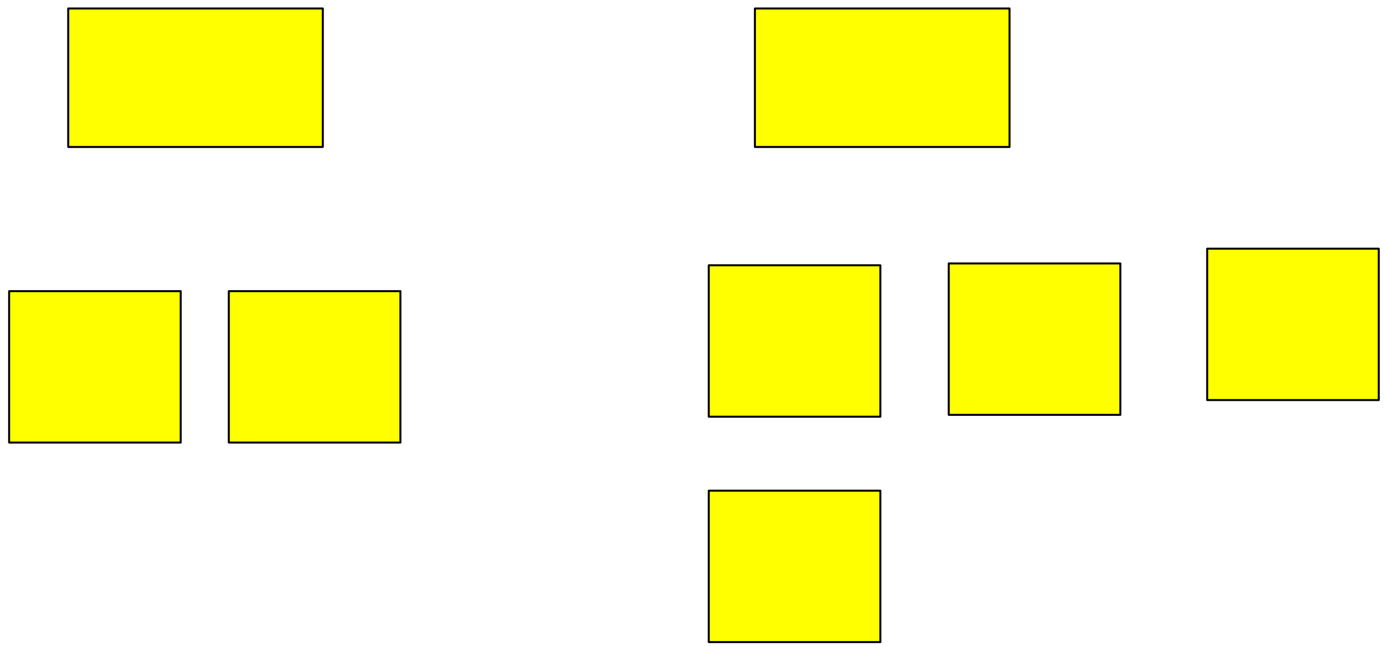
Gather Evidence/Go Visual

Gather Evidence

- Review student materials
- Write concepts addressed on yellow sticky notes
- Record page number(s) where concepts are introduced.
- Refer to Teacher Edition and Student Handouts as needed

Go Visual

Go Visual: Conceptual Flow of Instructional Materials



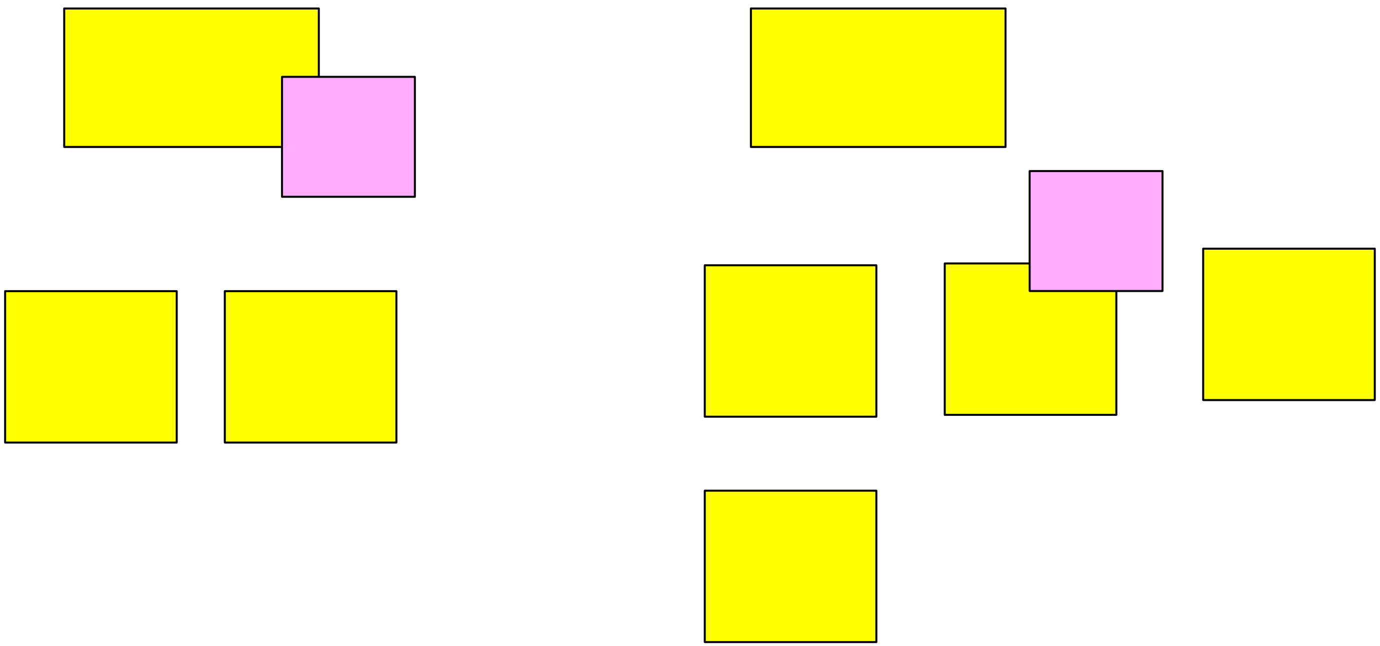
Tell the Story

- Come together in your **whole group**.
- Share the flow of concepts across the unit that students learn.

Scientific Phenomena Defined

Scientific phenomena are occurrences in the natural and human-made world that can be observed and which cause one to wonder and ask questions.

Identify and Add Phenomena to Conceptual Flow

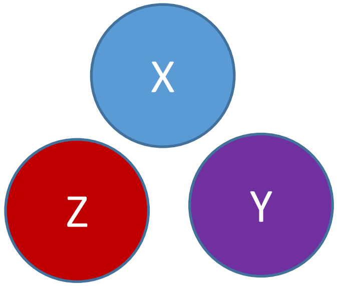


Note Taking: Strengths and Limitations

- Discuss the evidence with your Part Group
- As an individual complete H2 for:

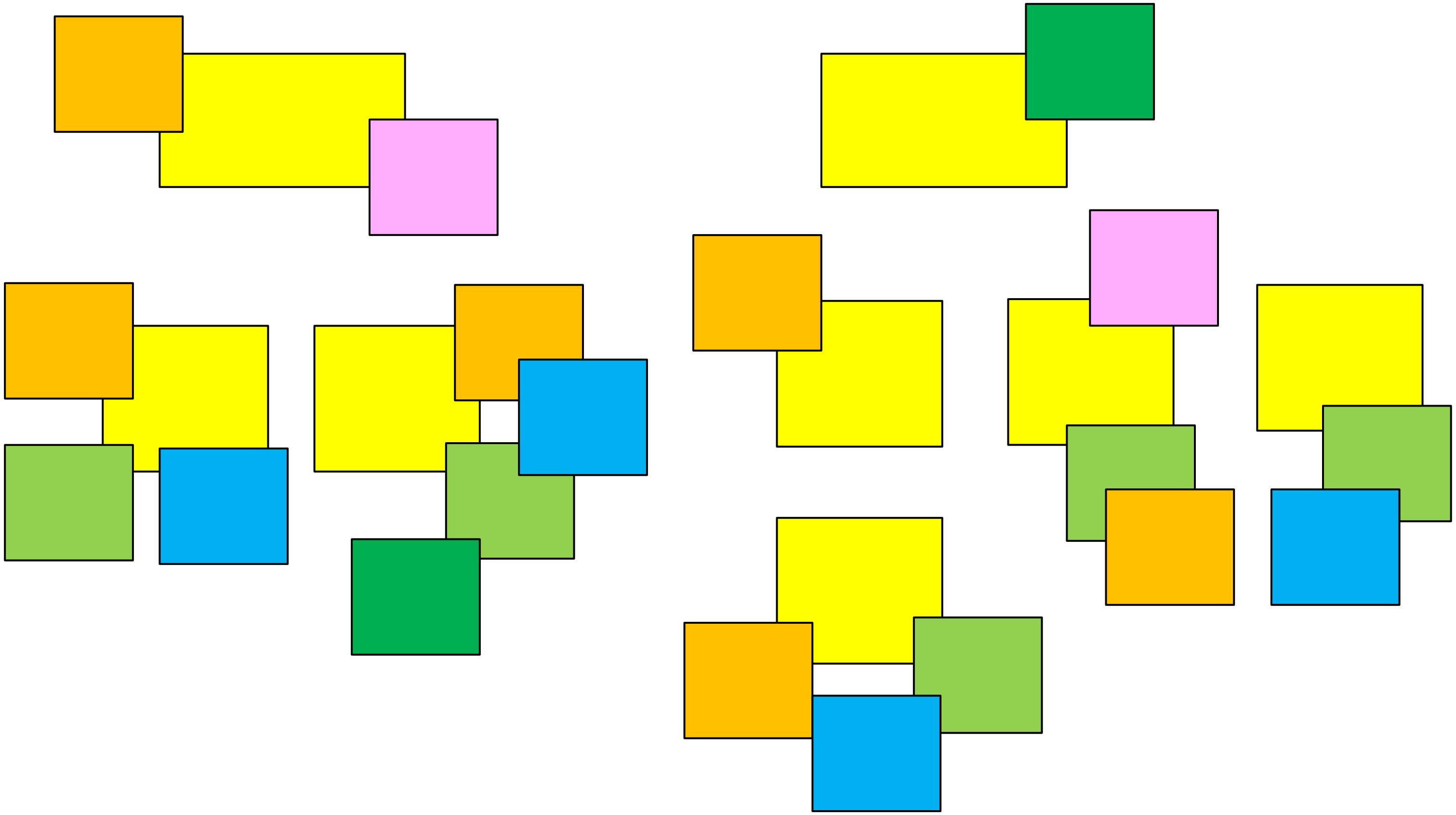
  F1. Presence of Phenomena/Problem.

Tell the Story - Continued



- Come together in your **whole group**.
- Share the phenomenon (a) across the unit that students “figure out”

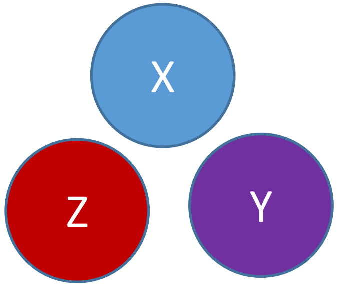
Identify and Add Three Dimensions and EP&Cs to the Conceptual Flow



Note Taking: Strengths and Limitations

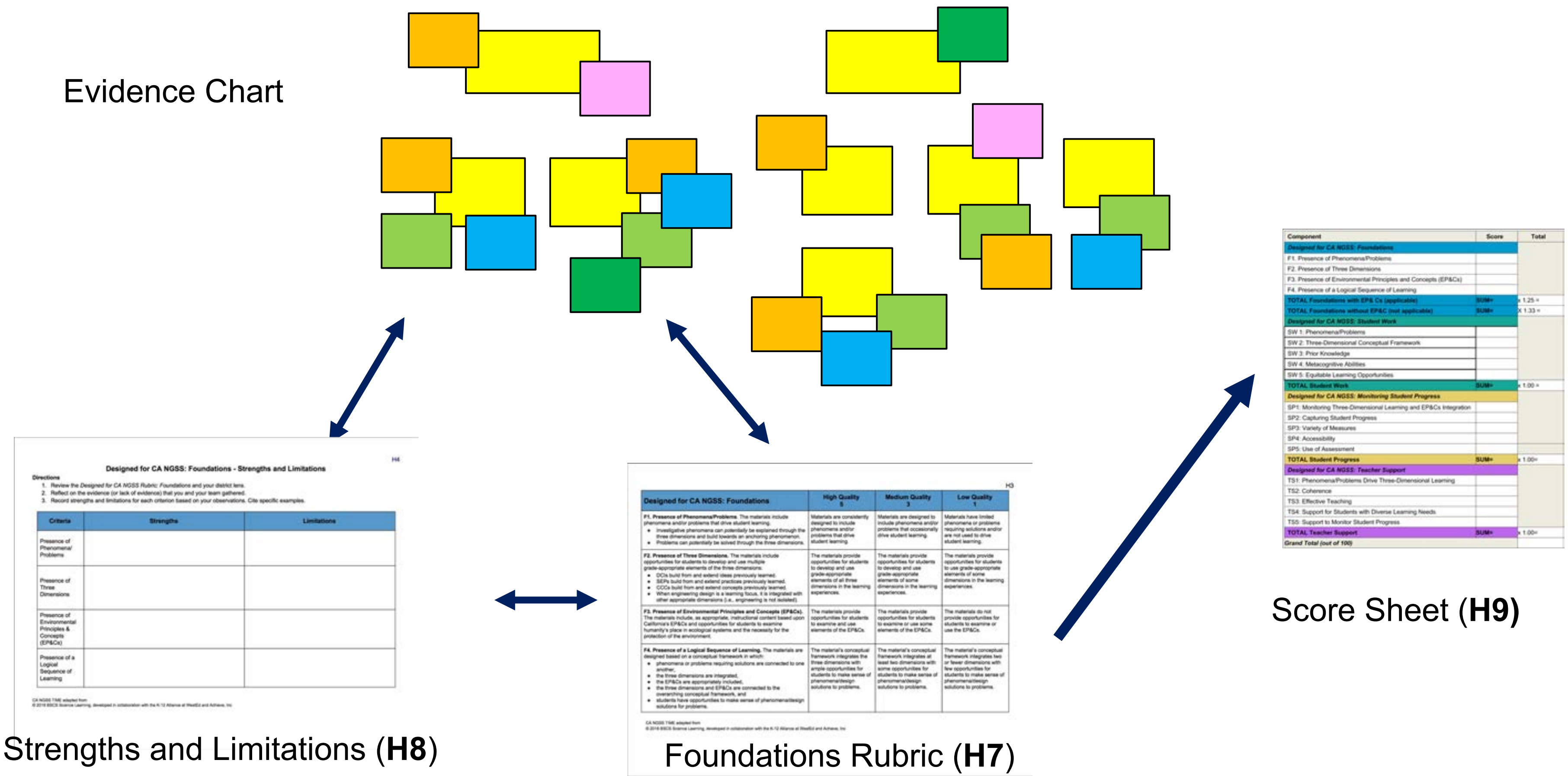
- Discuss the evidence with your part group
- As an individual complete H2 for these components:
  - F2. Presence of Three Dimensions.
  - F3. Presence of EP&Cs (if appropriate).
  - F4. Presence of Logical Sequence.
- Save H2 for whole group scoring

Tell the Story Again



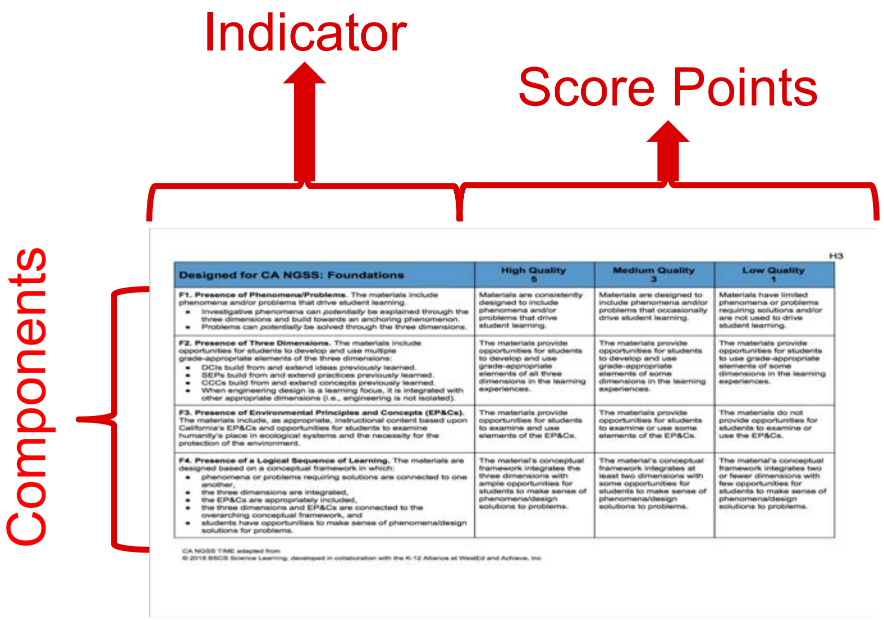
- Come together in your **whole group**.
- Tell the story of student learning across the unit explaining the flow (at the element level) of SEPs, CCCs, and DCIs.
- Tell the story of student learning across the unit explaining the flow of the EP&Cs (where appropriate).

Scoring Process



Understanding the Rubric

Recognize the format of the rubric: components, indicators and score points



H3

Designed for CA NGSS: Foundations	High Quality 5	Medium Quality 3	Low Quality 1
F1. Presence of Phenomena/Problems. The materials include phenomena and/or problems that drive student learning. • Investigative phenomena can *potentially* be explained through the three dimensions and build towards an anchoring phenomenon. • Problems can *potentially* be solved through the three dimensions.	Materials are consistently designed to include phenomena and/or problems that drive student learning.	Materials are designed to include phenomena and/or problems that occasionally drive student learning.	Materials have limited phenomena or problems requiring solutions and/or are not used to drive student learning.
F2. Presence of Three Dimensions. The materials include opportunities for students to develop and use multiple grade-appropriate elements of the three dimensions: • DCIs build from and extend ideas previously learned. • SEPs build from and extend practices previously learned. • CCCs build from and extend concepts previously learned. • When engineering design is a learning focus, it is integrated with other appropriate dimensions (i.e., engineering is not isolated).	The materials provide opportunities for students to develop and use grade-appropriate elements of all three dimensions in the learning experiences.	The materials provide opportunities for students to develop and use grade-appropriate elements of some dimensions in the learning experiences.	The materials provide opportunities for students to use grade-appropriate elements of some dimensions in the learning experiences.
F3. Presence of Environmental Principles and Concepts (EP&Cs). The materials include, as appropriate, instructional content based upon California's EP&Cs and opportunities for students to examine humanity's place in ecological systems and the necessity for the protection of the environment.	The materials provide opportunities for students to examine and use elements of the EP&Cs.	The materials provide opportunities for students to examine or use some elements of the EP&Cs.	The materials do not provide opportunities for students to examine or use the EP&Cs.
F4. Presence of a Logical Sequence of Learning. The materials are designed based on a conceptual framework in which: • phenomena or problems requiring solutions are connected to one another, • the three dimensions are integrated, • the EP&Cs are appropriately included, • the three dimensions and EP&Cs are connected to the overarching conceptual framework, and • students have opportunities to make sense of phenomena/design solutions for problems.	The material's conceptual framework integrates the three dimensions with ample opportunities for students to make sense of phenomena/design solutions to problems.	The material's conceptual framework integrates at least two dimensions with some opportunities for students to make sense of phenomena/design solutions to problems.	The material's conceptual framework integrates two or fewer dimensions with few opportunities for students to make sense of phenomena/design solutions to problems.

CA NGSS TIME adapted from

What Would It Look Like?

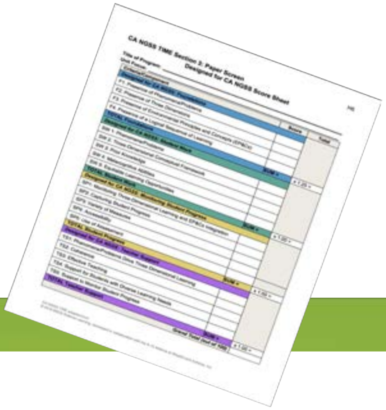
For each component of the rubric:

- Read and underline key words in the indicators.
- Read score points (5,3,1).
- Discuss what a “5” might look like in any instructional materials. What might the materials include? What evidence might be indicated on the conceptual flow graphic?

Scoring: Reaching Consensus

- all participants contribute ideas
- view differences as helpful rather than as a hindrance; disagree publicly
- paraphrase the discussion when needed and seek to understand each other's point of view
- not a unanimous vote, but something the team can "live with"

Scoring Each Component



1. Review and discuss component, indicators and score points.
2. Discuss evidence from the conceptual flow graphic
3. Share individual strengths and limitations (H2).
4. Share initial score.
5. Discuss evidence for score and reach consensus.
6. Complete whole group strengths and limitations (H8).
7. Record final score on H9.

Components to Score

F1. Presence of Phenomena/Problem.

F2. Presence of Three Dimensions.

F3. Presence of EP&Cs (if appropriate).

F4. Presence of Logical Sequence.

Total Score for Rubric 1 Foundations

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	X 1.66 =

Continue on?

Look at the score sheet and evidence collected to decide whether or not this instructional material is good enough to warrant moving forward in the paper screen process.

Teacher Support: Foundations

- Use evidence from the Teacher Materials.
- Read through the *Teacher Support Evidence Chart: Foundations* (**H10**).
- Individually, place a check mark in the appropriate column for each feature.
- Document the strengths and limitations of these features.

You will use this analysis in Rubric 4.

Value of The Process

What is the value of Rubric 1 in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 3: Paper Screen Rubric 1: Designed for CA NGSS: Foundations Script (Facilitator Guide)

Facilitator Note: Participants learn the paper screen process using materials that are not on the SBE-approved instructional materials list. This allows participants to calibrate a shared understanding of the characteristics of high-quality instructional materials. They then apply the same process to instructional materials they are considering for adoption. Embedded in the toolkit instructions are DISTRICT APPLICATIONS for using the rubrics with instructional materials that are under consideration for district adoption.

Purpose

This section helps with understanding and using the *California Next Generation Science Standards Toolkit for Instructional Materials Evaluation* (CA NGSS TIME) Rubric 1: Foundations.

Time: 6 hours

Part 1	Welcome and Process Overview	40 minutes
Part 2	Examining Instructional Materials for The Presence of CA NGSS Features	225 minutes
Part 3	Using the Rubrics to Identify Foundational Elements in Instructional Materials	85 minutes
Part 4	Reflection and Next Steps	10 minutes

Materials:

Slides

S1	Title
S2	Purpose & Outcomes
S3	CA NGSS TIME Road Map
S4	Paper Screen: You Are Here
S5	Rubric 1 Goals
S6	Essential Questions
S7	Categorizing Concepts **(G1)**

S8 Facts and Concepts
S9 Group Arrangements
S10 Transition
S11 Navigation Guide for Instructional Materials Review (**H1**)
S12 Gather Evidence/Go Visual
S13 Go Visual: Conceptual Flow of Instructional Materials
S14 Tell the Story
S15 Scientific Phenomena Defined
S16 Identify and Add Phenomena to Conceptual Flow
S17 Note Taking: Strengths and Limitations
S18 Tell the Story - Continued
S19 Identify and Add Three Dimensions and EP&Cs to the Conceptual Flow
S20 Note Taking: Strengths and Limitations
S21 Tell the Story Again
S22 Scoring Process
S23 Understanding the Rubric
S24 What Would It Look Like?
S25 Scoring: Reaching Consensus
S26 Scoring Each Component
S27 Components to Score
S28 Total Score for Rubric 1 Foundations
S29 Continue On?
S30 Teacher Support: Foundations
S31 Value of The Process

Group Handouts

G1a Big Ideas/Smaller Ideas Strips *Disruption in the Ecosystems* MS (1 set, cut apart/group of 4)
G1b Big Ideas/Smaller Ideas Strips *Why is Our Corn Changing?* ES (1 set, cut apart/group of 4)

Handouts

H1a Navigation Guide for Instructional Materials Review: *Disruptions in Ecosystems (middle school)*
H1b Navigation Guide for Instructional Materials Review: *Why is Our Corn Changing? (elementary)*
H2 Note Taking: Parts Strengths and Limitations
H3 DCI Progressions
H4 SEP Progressions

H5 CCC Progressions
H6 Matrix of Environmental Principles and Concepts in CA NGSS
H7 Designed for CA NGSS: Foundations Rubric
H8 Designed for CA NGSS: Foundations-Strengths and Limitations
H9 Designed for CA NGSS: Score Sheet
H10 Teacher Support Foundations

Resources for facilitators:

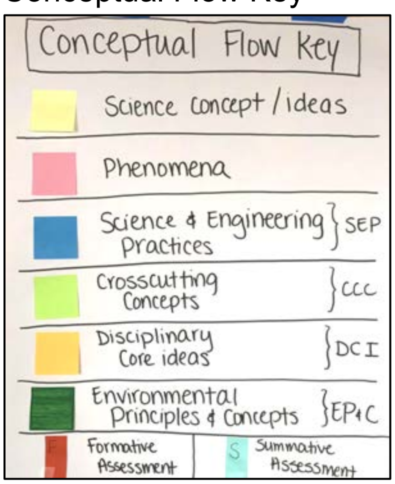
R1 Answer key for G1 – Big Idea/Smaller Idea Strips
R2 Guidelines for creating a Navigation Guide

Charts

C1 Norms for Collaborative Work

- Be kind and respectful
- Be present and engage in the process (today and beyond)
- Ask questions for clarification
- Use evidence to support your ideas
- Presume positive intentions
- Nobody is an expert, everybody learns

C2 Conceptual Flow Key



C3 Consensus Building Strategies

- Show your score
- Provide evidence to support and refute
- Use Strength and Limitations
- Partner with a colleague to help communicate your ideas
- Take a break
- Shift locations

- Shift communication channels (e.g. from verbal to written)
- What would it take to move the scores?

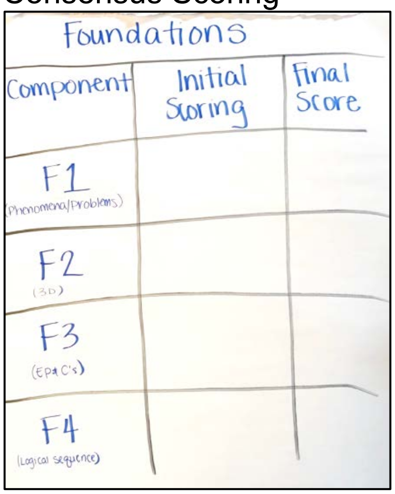
C4

Paper Screen

- Rubric 1: Foundations
  What are students going to learn?
- Rubric 2: Student Learning
  How are students going to learn?
- Rubric 3: Monitoring Student Progress
  How are students assessed?
- Rubric 4: Teacher Supports
  How do the materials support teachers to facilitate student learning

C5

Consensus Scoring



Supplies:

- Chart paper, markers, and painter's blue tape
- Sticky notes (3" x 3"): yellow, orange, green, blue, pink
- Sharpies (enough for each person to have one)
- Sets of instructional materials (Teacher Edition and Student Edition)

Advance Preparation:

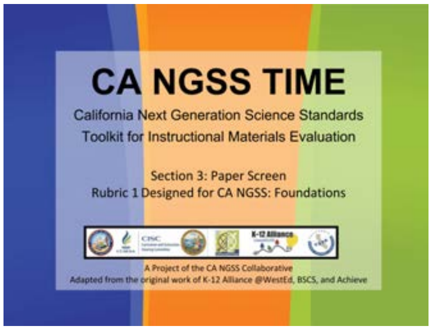
1. Cut strips in **G1** so that each table has one set of strips. Place strips in envelopes.
2. Prepare a **Navigation Guide** for Instructional Materials under consideration; see R2 for directions on how to create a Navigation Guide. Navigation Guides for learning and calibrating on the paper screen process are available as H1a

(*Disruptions in Ecosystems)* and H1b (*Why is our Corn Changing?).*

3. Create **Chart C1** (Norms for Collaborative Work). Use as is or edit to meet your needs. Save for use with each rubric.
4. Create **Chart C2** (Conceptual Flow Key) and save for use with each rubric.
5. Create **Chart C3** (Consensus Building Strategies). Use as is or edit to meet your needs. Save for use with each rubric
6. Create **Chart C4 (Paper Screen)** and post in a location that can be accessed through out the training. Create a large moveable paper arrow pointer.
7. Create **Chart C5 (Consensus Scoring)** and post when scoring.
8. **Grouping** –There are times where participants are working in small groups looking at a single chapter/pairs of chapters/section (some reasonable 'chunk') of the instructional materials. This group is called the *Parts Group* (like an expert group). Larger groups that include participants who have reviewed each of the chapters/sections are called *Whole Groups* (like a home group). The terminology of Parts Group and Whole Group are used throughout the Paper Screen process.

Suggestions for Grouping	Example of grouping based on *Disruptions in Ecosystems*
Look at the instructional materials to be reviewed. Group participants so that there is at least one person per chapter/section/etc. of the instructional materials in each Whole group.	*Disruptions* has 5 chapters. You want Whole groups to have at least 5 people. If there are a large number of participants, it is preferable to have 2 or 3 people per chapter (i.e., a total of 10 or 15 people in a Whole group).
To determine the Parts Group, ask participants to “number off” based on the number of chapters/sections/etc. Assign specific chapter/section/etc. to each group. These groups are reading and reviewing the same chapter (or section). They work together through the various steps of each Rubric	*Disruptions* has 5 chapters so participants number off by 5. There are five Parts Groups – chapter 1, chapter 2, etc. If possible, it is recommended that each Parts Group have 2-3 participants so that they can read, discuss, and work together.
If there is a smaller group of participants (fewer than 3 times the number of chapters/sections) have them work as one Whole Group. Each Parts Group contributes to a single set of charts that rare combined to represent the whole.	If there are less than 15 people, form one Whole Group with a Parts Group for each of the chapters. Each Part Group contributes to a single set of charts that are combined to represent the whole.
If there is a large group (more than 3 times the number of chapters/sections) form multiple Whole Groups. The number of people in a Whole Group should be at least two times the number of chapters/sections so that people can work with a partner(s).	If you have more than 15 people form multiple Whole Groups. This would result in two (or more) sets of whole charts For *Disruptions* 20-30 people = 2 Whole groups of 10-15 30-45 people = 3 Whole groups of 10-15
If the group size less than the number of chapters/sections being reviewed, form Parts Groups of at least two people so that they can share their thinking. This may result in teams looking at multiple chapters/sections.	For *Disruptions* Form pairs or triads to review chapters. Repeat as necessary to review all chapters.

Part I – Welcome & Process Overview (40 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 1: Title** a. Welcome participants to the session. Introduce yourself. b. Ask participants to stand if they have served on a statewide committee to select instructional materials. Ask them to stay standing. Ask participants to stand if they have served on a district committee to select instructional materials. Ask them to stay standing. Ask participants to stand if they have served on a department committee to select instructional materials. Ask participants to continue to stand if the materials their committees selected were “loved” by all of the teachers at their site. Remind participants that while given the best efforts of well-intentioned people, no single instructional material is going to suit the needs of everyone! c. Remind participants that when they worked to identify their district’s context, they identified key priorities to use during the evaluation. We are calling that *Developing the District Lens*. d. Tell them to keep those priorities in mind as they look through materials. e. Use **Chart C1** to introduce the norms for collaboration for the group. Ask participants if they would like to add any other norm that may be important to them. For example, step out of the room if you need to make or take calls. *Facilitator Notes: Depending on group size and composition, you may want to have participants introduce themselves. Keep it brief. Please note the suggestions about grouping found in Advanced Preparation. You may need to move people around.*

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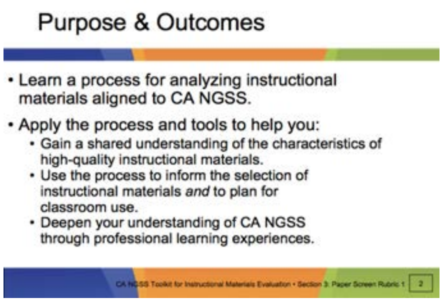

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Slide 2: Purpose & Outcomes

a. Tell participants that they will be learning a process and use several tools for analyzing instructional materials for CA NGSS.

b. Have participants read slide, emphasizing that TIME is a professional learning opportunity as well as an analysis and selection of instructional.

Facilitator Note: The Purpose & Outcomes apply to the whole Paper Screen process and will be revisited before each rubric. Rubric specific goals are included in each presentation.

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Slide 3: CA NGSS TIME Roadmap

a. Explain to participants that the CA NGSS TIME has several components:

1) Develop District Lens – This was already done to learn about your district by collecting demographics, looking at the mission statement, LCAP, and science needs.

2) The Prescreen section is a way to narrow the choices of instructional materials.

3) The Paper Screen is a process and tool for gathering data from print or digital media, comparing that data to indicators found in the CA NGSS TIME Rubrics, and analyzing the evidence based on a critical examination of the instructional materials.

4) The Pilot Materials section is a means of gathering data from the classroom from the perspective of both students and teachers.

5) The Select and Recommend section brings the Pilot and Paper Screen data together to make a recommendation for which materials to adopt along with requirements for professional learning needed to implement.

6) The Implement Phase is the district plan, timeline,

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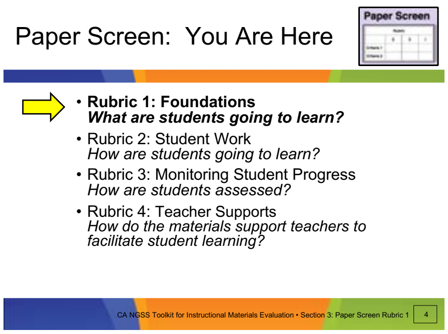
<tr><td>
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Slide 4: Paper Screen – You Are Here

a. Explain that the Paper Screen process involves the use of several rubrics which lead to an evidence-based decision for selecting instructional materials to pilot and consider for adoption.

i. The first phase utilizes Rubric 1 to analyze instructional materials for the *presence* of phenomenon/problems, the three dimensions of NGSS, EP&Cs, and other foundational elements.

ii. After Rubric 1 is completed, the team will look at the evidence to decide if it is worth continuing the analysis of these materials. If the answer is yes, the group will continue to use the rest of the rubrics. If the answer is no, the group would move to the next instructional materials to be reviewed.

iii. Rubric 2 is used to examine changes in student thinking over the course of their learning, and how they make sense of phenomenon/problem using the 3-dimensions and the EP&Cs when appropriate.

iv. Rubric 3 examines the quality of assessment tasks used to monitor student progress.

v. Rubric 4 examines the quality of teacher supports found in the materials.

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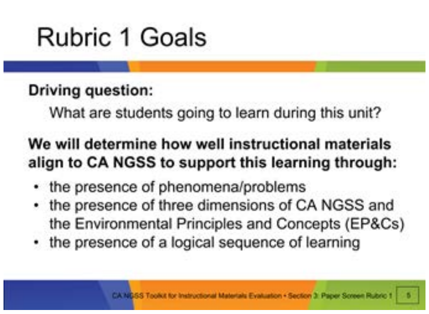
<tr><td>
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Slide 5: Rubric 1 Goals

a. Tell participants that they will be answering the driving question on the slide.

b. To answer this question evidence will be gathered directly from the instructional materials by evaluating the <u>presence</u> of: phenomena/problems; three dimensions of NGSS, Environmental Principles &

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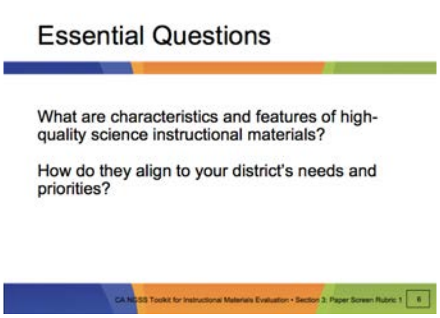
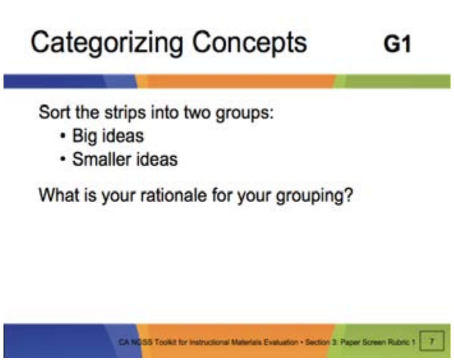
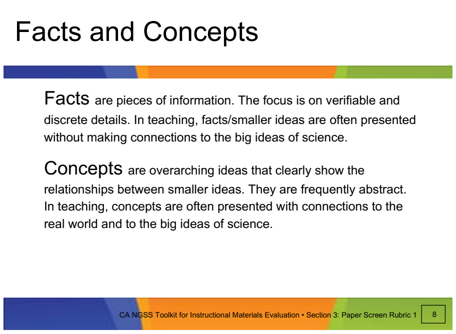
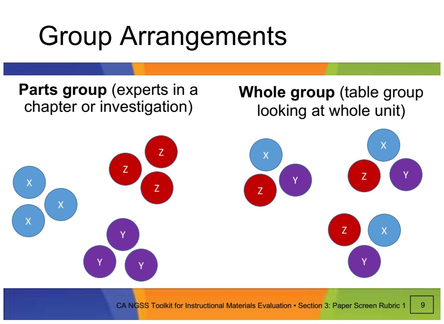
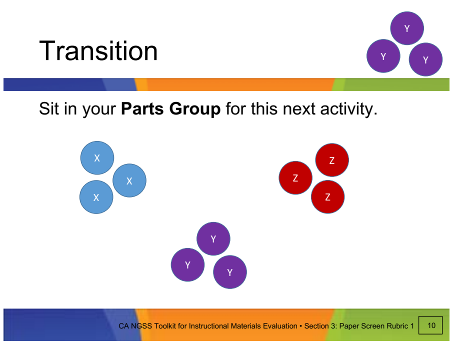
	Concepts (EP&Cs); and a logical sequence of learning.
	**Slide 6: Essential Questions** a. Quick Write: Individually, write the characteristic features and elements of high-quality science instructional materials. b. Table Share: Ask individuals to share their ideas with their table group. c. Whip Around: Briefly, have each group share a couple of the features identified and record their ideas on a chart. d. Table Group: Examine your district lens. What criteria of instructional materials align with the needs of your district's students as identified in your district lens? Annotate the alignments on the chart. *Facilitator Note: Retain this chart to make a connection, where appropriate, to the components in the CA NGSS TIME Paper Screen rubrics. The criteria generated may not be addressed by CA NGSS TIME, however, local needs may be addressed in Rubric 4.*
	**Slide 7: Categorizing Concepts (G1)** a. Transition to this step by explaining how important it is for the teams to have a common understanding of the grain size of concepts or ideas in the instructional materials. Explain that participants are going to do an activity to calibrate discussions on grain size of DCI-type statements that might be found in instructional materials. b. Distribute envelopes with **G1** (**Big Ideas/Smaller Ideas Strips)** to each group. Have the group members sort the strips according to the two categories: "Big Ideas/Concepts" and "Smaller Ideas." Allow time for participants to struggle with and construct their own understanding of the grain size of an idea. Ask groups to share the outcome of their sorting activity and the

Slide	Slide Title and Facilitation Notes
	rationale for their decisions. *Facilitator Note: If using the Why is Our Corn Changing? unit you will need to use G1b which include idea strips from that unit. Note that R1 is the answer key to the sorting activity.* DISTRICT APPLICATION: It is worth doing this step with the committee. Use the Big Ideas/Smaller Ideas strips from the training module even though they do not directly align with the instructional materials under review.
	**Slide 8: Facts and Concepts** a. Ask participants to read the slide and see how it resonates with their discussion during the sort. Note that facts are smaller grain size and not representative of a concept. *Facilitator Note: Some participants may express that a statement is a fact in elementary school and becomes a concept in middle or high school. A fact does not grow up to be a concept! A concept can be learned at an awareness or knowledge level (often in elementary and middle school) and at an understanding level in high school and college).* b. Explain that as participants review instructional materials, they should focus on the bigger ideas and concepts and not get lost in the facts.
	**Slide 9: Group Arrangement** *Facilitator Note: See Advanced Preparation for an explanation of how to group participants. When reviewing potential curriculum, use the publisher titles (e.g., unit, module, chapter, investigation).* a. Explain to participants that CA NGSS TIME is a collaborative process. They will work in two groups--parts and whole--moving back and forth between the two. b. Explain that the group names really refer to the scope of the review participants are doing. The **Parts Group**

Slide	Slide Title and Facilitation Notes
	becomes an expert at an investigation or chapter - just part of the curriculum. The **Whole Group** is comprised of each chapter/investigation. Its responsibility is to look at the whole module/unit. These two groups will come to consensus often. DISTRICT APPLICATION: District teams will need to figure out how best to make this work based on the size of their team. A key consideration is that people should have a partner when they do the review as it is important to be able to talk through the process and thinking. This contributes to the learning and understanding about NGSS and the instructional materials.
	**Slide 10: Transition to the next step.** a. Ask participants to number off (according to the number of parts--e.g., chapters, investigations found in the materials. b. Ask participants to move into alike-numbered groups (all the 1s together, 2s together, etc.). Explain that these groups are the Parts Groups. Allow time for them to move into their groups. c. Explain to participants that they are going to use a middle school unit of instruction on ecosystems to learn the CA NGSS TIME process. Participants will then use that process on instructional materials under consideration by the district. *Facilitator Note: For learning the Paper Screen process there are two units available. Disruptions to Ecosystems is appropriate for a K-12 audience. For elementary only groups consider using Why is Our Corn Changing? If a K-12 group is large and there are enough facilitators, split the group into elementary and secondary and use both units.*

Part II – Presence of CA NGSS Features in Instructional Materials (225 minutes)

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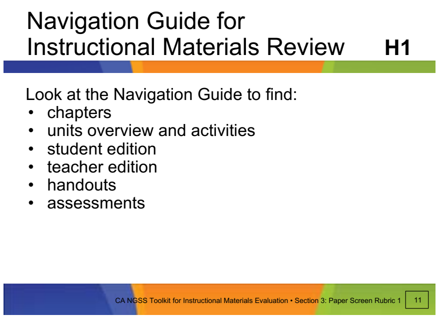

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Slide 11: Navigation Guide for Instructional Materials (H1)

a. Explain to participants that *to learn* the CA NGSS TIME processes and tools they will use *Disruptions in Ecosystems* (3rd Version, 2018). Once participants know the TIME process, they can replicate the process to evaluate instructional materials for the district.

b. To start, give participants 10 minutes to discuss with their groups what concepts they would expect to find in material centered on *Disruptions in Ecosystems*. Ask a couple of groups to briefly share their ideas.

c. Distribute **H1a (Navigation Guide for *Disruptions in Ecosystems*).** This instructional material is divided into chapters and has a student edition, handouts, and teacher materials. The Navigation Guide will help participants find the various components of the unit.

Facilitator note: If you are working with an elementary district distribute H1b, the Navigation Guide for Why is Our Corn Changing? If you are using a sample material other than Disruptions in Ecosystems or Why is Our Corn Changing? substitute that name into this script and use a Navigation Guide for that instructional material.

DISTRICT APPLICATION: When working with the district team, you will use this process on the instructional materials that made it through Section 2: Prescreen. Before the district team meets, Navigation Guides for each of the materials under review need to be created. R2 provides directions for creating Navigation Guides.

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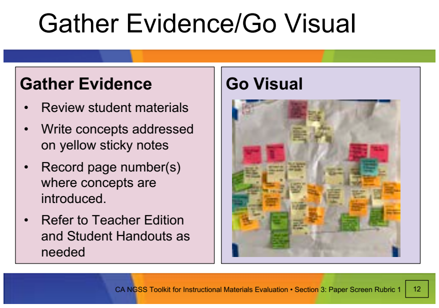	**Slide 12: Gather Evidence/Go Visual** a. Ask Parts Groups (groups they are currently in) to use the Navigation Guide to read their chapters/section/etc. As they read, they will determine the flow of concepts as the publisher presents them. Explain that participants will read through the materials several times to gather evidence of the concepts, phenomena/problems, DCIs, SEPs. CCCs, and EP&Cs. b. Distribute the chapter/section/etc. of the instructional materials to the appropriate Parts Group. Have participants first focus on the student edition to determine the big ideas (concepts) in their chapter/section. Teacher materials can be consulted after the student materials are examined. If reviewing primary (K-2) instructional materials, consulting the teacher materials may provide more evidence of student learning versus just reviewing the student materials. c. Point to the yellow sticky note on **C2 Conceptual Flow Key.** Distribute medium-sized yellow sticky notes and Sharpie markers to each person. Have participants read their chapter and write the concepts (one per sticky note) and page number in the instructional materials. Remind participants to write concepts, not facts. d. Have some large yellow sticky notes available. Some chapters/sections/etc. may have an overarching idea. These can be represented on the larger sticky note. e. Allow 60 minutes for reading and note-taking. As participants are working, continue to provide reminders to include page numbers. DISTRICT APPLICATION: Decide how to divide the material for review. It is not feasible to do this deep level analysis for every chapter/section of every grade level. For example, select one module/unit for primary and another for upper elementary; select one unit for 6th, another for 7th, and another for 8th; select one unit for biology, another for chemistry and another for physics.

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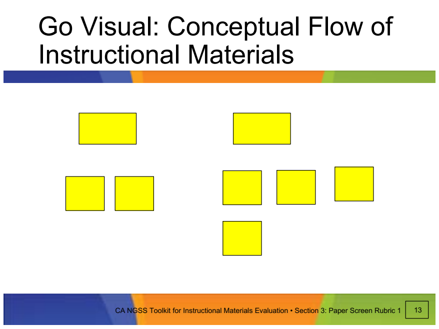
	Choose the SAME topic for each of the materials under review.
	**Slide 13: Conceptual Flow of Instructional Materials** **Parts Groups** a. Explain that this graphic helps make thinking public and provides evidence to support district recommendations. b. Explain that each Parts Group will construct their conceptual flow for their chapter/section/etc. Then the Whole Groups will share their findings in the order in the instructional materials, to reveal the flow of the entire unit/module. c. Distribute chart paper to each Parts Group. d. Demonstrate the process, being clear that the chart paper should be horizontal (landscape orientation) and that the sticky notes will be placed in the order in which they appear in the materials. This is NOT a time to consider how one might rearrange the learning sequence to teach it. ○ Have each person in the Parts Group read one of their sticky notes from the beginning of the chapter. ○ Have participants clump like big ideas until all of the sticky notes from the beginning to the end of the chapter have been posted on the chart paper. Check page numbers on the sticky notes to keep track of the sequence of ideas as the publisher presented them. ○ Determine if there are any overarching big ideas (larger sticky notes). Add where appropriate. *Facilitator Note: Locate enough wall space so that each whole group can display conceptual flows for each chapter sequentially. When teams share the storyline of the entire unit, they will be able to share from left to right and see each parts group's work.*

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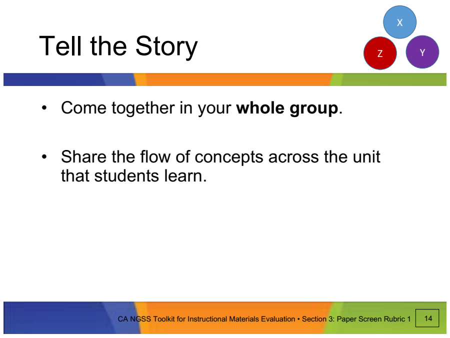


Slide 14: Tell the Story

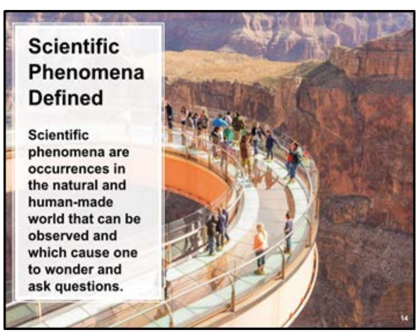
Whole Group

a. Conduct a whole group conversation about the flow of the concepts.

b. Remind groups that their conceptual flow is a representation of how the concepts are presented in the instructional materials and not how a teacher might rearrange them.

Facilitator Note: Parts Group charts should be in sequential order to construct one large unit/module flow.

c. Ask the different Parts groups to share their flows in sequential order, thus connecting each chapter's conceptual flow to provide a view of the entire unit.



Slide 15: Scientific Phenomena Defined

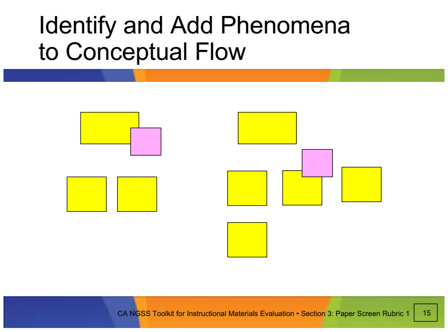
All Participants

a. This is an animated slide. Ask participants what they think a phenomenon is.

b. After participants share, click the slide. Ask how this definition resonates with their ideas. Share that this slide actually represents phenomena (e.g., the canyon formation, color of the walls) and a design problem (how to build a bridge that goes over the canyon for prime viewing)

c. Explain that NGSS aligned instructional materials are phenomena-driven or design problems that are solved.

d. Tell participants that there are different levels or sizes of phenomenon. Phenomenon that drive the unit, ones which students come back to over and over, are called anchoring phenomenon—as they help anchor the unit. Smaller, lesson-based phenomenon are called investigative phenomenon.

Slide	Slide Title and Facilitation Notes
	Facilitator Note: If participants are not familiar with the different grain sizes of phenomena at this point, that's ok. This concept will be revisited later. Also, participants that would like more information about scientific phenomena are encouraged to review the document "H2 - Criteria for Selecting Phenomena" included in the the [professional learning module from the 2017 CA NGSS Statewide Rollout](). A more in-depth understanding of phenomena-driven instruction can be achieved by fully utilizing the presentation for middle school included in the same professional learning module (approximately 1.5 hours). A different grade level for the same session can be found here: *http://workshops.sjcoe.org/Workshop/Print/170*
	**S16: Identify and Add Phenomena to Conceptual Flow** **Part Groups** *Facilitator Note: The amount of time spent on identifying phenomena will depend on the experience of the group.* a. Distribute pink sticky notes (and sharpies if necessary) and point to the pink sticky notes on **C2 Conceptual Flow Key**. b. Tell participants that they will re-read their chapter/section/etc. to identify phenomenon. Explain that instructional materials may have one phenomenon, several phenomena, or not include a phenomenon. Participants should not infer a phenomenon or imagine a phenomenon that they could include. Instead, participants need to document what is actually present in the materials. c. Have participants re-read their chapter to locate phenomena/design problems and write each one on a pink sticky note. Note the page number where each phenomenon is introduced. d. Have each person in the Parts Group read one of their sticky notes from the beginning of the chapter. e. Have participants clump like phenomenon until all of the sticky notes from the beginning to the end of the chapter

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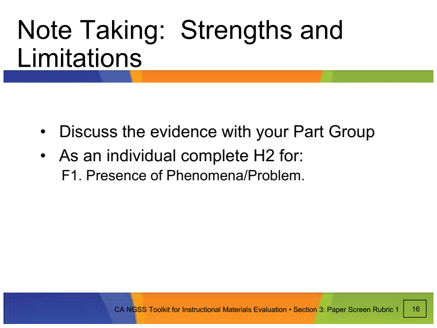
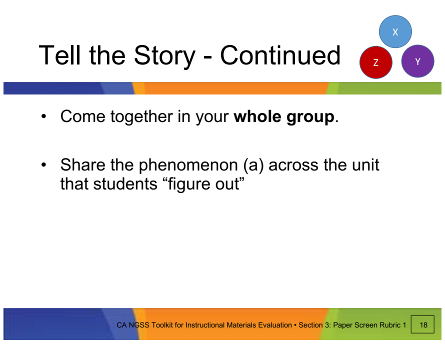
<tr><td></td><td>have been posted on the chart paper. Check page numbers on the sticky notes to keep track of the sequence of ideas as the publisher presented them.</td></tr>
<tr><td>
</td><td>S17: Note Taking: Strengths and Limitations

Individual

a. Distribute H2 (Note Taking: Part Group Strengths and Limitations) for individuals to complete for F1.

b. Ask participants to reflect on the conceptual flow and phenomenon story they constructed for their chapter/section/etc.

c. Have participants, as individuals, take a few moments to record strengths and limitations for F1. Record evidence (e.g., page numbers; number and placement of phenomena sticky notes).

d. Remind participants that this is their thinking. They will use this data in the final scoring of Rubric 1.</td></tr>
<tr><td>
</td><td>S18: Tell the Story - Continued

Whole Group

a. Conduct a whole group conversation about the flow of the concepts and the phenomenon.

b. Remind groups that their conceptual flow is a representation of the phenomena in the instructional materials and not phenomena a teacher might use.

Facilitator Note: Parts Group Charts should be in sequential order to construct one large unit/module flow.

c. Ask the different Parts groups to share their flows in sequential order, thus connecting each chapter’s conceptual flow to provide a view of the entire unit.</td></tr>
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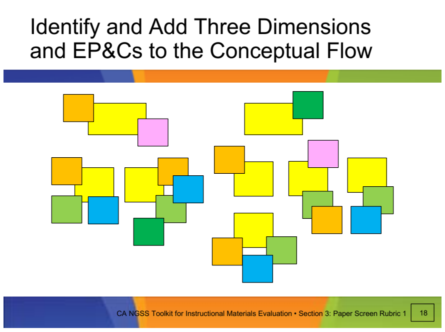
Slide	Slide Title and Facilitation Notes
	d. Ask participants to discuss the flow of the phenomena, written on pink sticky notes. As groups share, ask other to think about connections to their chapter/section of the unit. e. Ask participants to return to **H2 (Note Taking: Part Groups Strength and Limitations)** for F1 and determine if they want to add anything, based on the unit story, to their individual chapter/section strengths and limitation entries. f. Explain that participants will return to their Part Groups to continue to gather evidence in terms of the presence of the 3 dimensions and EP&Cs. *Facilitator Note: As groups work through this rubric, they will continue to add to their chapter's conceptual flow. Suggest that each Parts Group consider one of the following ways in which to continue their work: take their own chapter flow off of the wall, go to their work space, then return it to the wall; work from a picture they take of their chapter and the unit; work at the whole unit flow posted on the wall.*
	**Slide 19: Identify and Add Three Dimensions and EP&Cs to the Conceptual Flow** **Part Groups** a. Briefly explain that NGSS-aligned instructional materials lead to mastery of the performance expectations. High-quality instructional materials offer opportunities for students to learn about the disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs). In addition, the materials should offer opportunities, when applicable, for students to develop their understanding of the EP&Cs. b. Distribute green (CCC), blue (SEP), orange (DCI) and dark green (EP&C) sticky notes (and sharpies if necessary). Point to the different colors on **C2 Conceptual Flow Key**. c. Explain that each Parts Group will re-read the materials to

Slide	Slide Title and Facilitation Notes
	find evidence of the presence of these dimensions. This will be done as a jig saw with different members reading for different dimensions. *Facilitator Note: If the Part Group is large enough, assign 1 or more members as a subgroup to look for DCIs; another to look for SEPs; another to look for CCCs and another to look for EP&Cs. If the Part Group is small, ask members to read for more than one dimension. For example, one subgroup might read for DCIs and EP&Cs; another subgroup might read for SEPs and CCCs.* d. Distribute **H3 (DCI Progressions), H4 (SEP progressions), H5 (CCC Progressions) and H6 (Matrix of EP&Cs in CA NGSS).** Ask participants to use these matrices to identify the <u>element level</u> of the dimension. Write the appropriate <u>element</u> on separate sticky notes. If the entire element is not addressed, use ellipses (…) to capture what is addressed. *Facilitator Note: The bulleted items in the matrices are the "element level of the dimension".* e. Ask sub groups to write their evidence and page number on the appropriate colored sticky note—one piece of evidence per sticky note! f. If there are several people in each sub group, have each person in the subgroup read one of their sticky notes for DCIs-from the beginning of the chapter. Then ask subgroup participants to clump like DCIs until all of the sticky notes from the beginning to the end of the chapter have been posted on the chart paper as the publisher presented them. g. Repeat e-f for the other dimensions (SEP, CCC, EP&C), one at a time. *Facilitator Note: If there is only one person reading for a dimension, modify step "e" so that the person simply shares the evidence he/she found for that dimension in the sequence the publisher presented them.*

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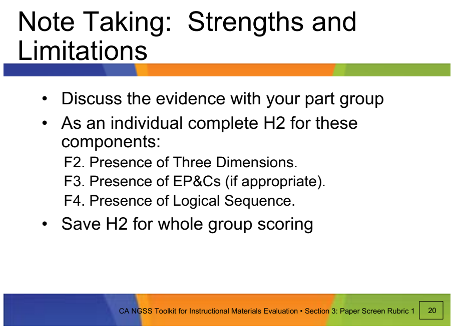
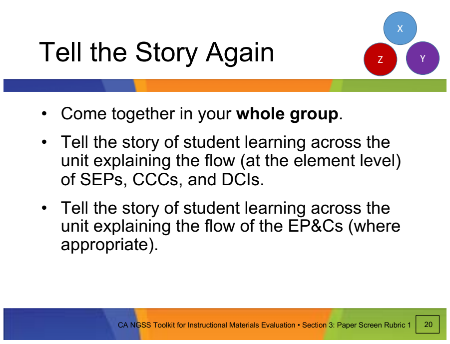
	**S20: Note Taking: Strengths and Limitations** **Individual** a. Ask participants to reflect on the conceptual flow and phenomenon story they constructed for their chapter/section/etc. b. Have participants, as individuals, take a few moments to record (on **H2**) strengths and limitations for F2, 3, 4. Record evidence (e.g., page numbers; number and placement of sticky notes on the chapter/section conceptual flow). c. Remind participants that this is their thinking. They will use this data in the final scoring of Rubric 1.
	**S21: Tell the Story Again** **Whole Group** a. Have participants return to their Whole group. b. Ask subgroups from each Parts Group to present their chapter/section/etc. to reconstruct the unit flow, this time focusing on presenting the three dimensions, EP&Cs, and logical sequencing of student learning as evidenced by the chapters. Suggest that they share one dimension at a time so that the Whole group gets a sense of how each dimension feature is present (or not) throughout the entire unit. c. Have a brief discussion about the overall sequencing of student learning as demonstrated in this unit. Are phenomenon identified and connected to each other? Are the three dimensions identified? Are the EP&Cs included where applicable? Do students have opportunities to make sense of the phenomena or opportunities to design solutions for problems?

Part III – Using the Rubrics to Identify Foundational Elements in Instructional Materials (85 min)

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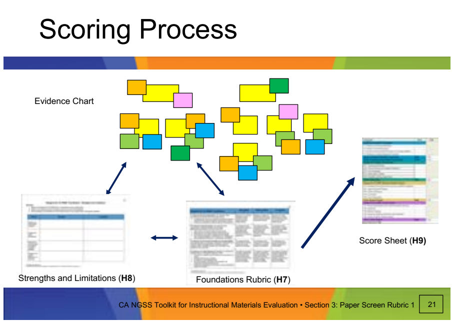	**Slide 22: Scoring Process** a. Explain that participants will use the evidence chart, rubric and strength and limitations chart to evaluate and consensus score each component of the rubric. b. Explain that the conceptual flow evidence chart provides an overall picture of the presence of phenomenon/problems, the 3 dimensions and the EP&Cs c. Distribute **H7 (Designed for NGSS: Foundations Rubric)** and explain that this rubric provides guidance for evaluating and scoring based on evidence found in the instructional materials. d. Distribute **H8 (Designed for NGSS: Foundations Strengths and Limitations)** and explain that this tool helps organize the evidence that supports the Foundations Rubric and can be used in the Planning phase to inform professional learning during implementation. e. Distribute **H9 (Paper Screen Score Sheet)** and explain that the scores for each component of the rubric are entered on this sheet, totaled at the end of the entire process, and used to rank order the analyzed materials. f. Explain that these resources serve as artifacts of the process and serve as evidence for decision-making and recommendations for adoption. Be detailed and keep good records.

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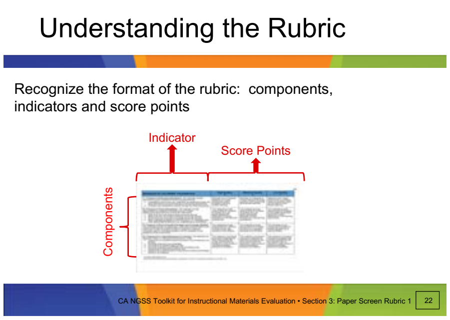
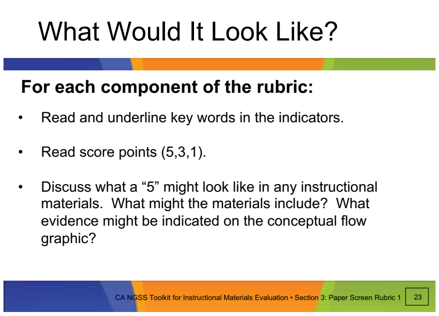
	**Slide 23: Understanding the Rubric** Explain that each rubric consists of components, indicators, and score points. The indicators help explain the components, and the score points help identify the degree to which the materials meet the criteria.
	**Slide 24: What Would It Look Like?** a. Ask participants to read the first component: Presence of Phenomena/Designing Solutions. Have participants underline key words in the indicator that describe what they are looking for in the instructional materials. b. Have participants read the score points to see a description of the different quality levels for the phenomena indicator. c. Facilitate a discussion about what a level '5' might look like for phenomena in any instructional material. What might the materials include? (e.g., phenomena pictures; graphic of the relationships between phenomena). What evidence might be indicated on the conceptual flow graphic? (e.g., pink sticky note that indicates a phenomenon introduced at the start of the chapter/unit and are other colored sticky notes that directly support learning related to that pink sticky note). *Facilitator Note: the purpose of this activity is to calibrate participants in their understanding of the component, indicator and score points. Once calibrated, participants can apply their understanding to any set of instructional materials.*

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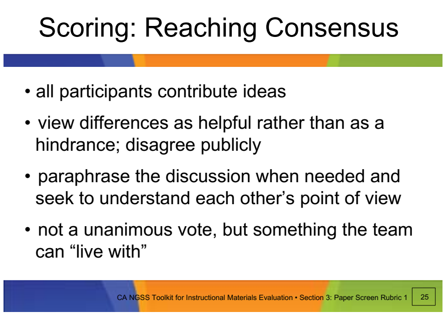	**Slide 25: Scoring: Reaching Consensus** a. Remind participants that each CA NGSS TIME rubric is scored by reaching consensus. b. Explain to participants that consensus means all participants contribute ideas and encourage the use of one another's ideas and opinions. c. The group views differences as helpful rather than as a hindrance. d. Everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue. e. Those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time. f. All share in the final decision. Consensus does not mean a unanimous vote, everyone's first choice, or that everyone agrees. *Facilitator Note: Start the consensus scoring process by asking participants for their initial score by using the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by raising 1, 3, or 5 fingers.* *When the group does not reach consensus easily, using multiple different consensus reaching strategies will be important to find what works for the group. See C3, Consensus Building Strategies, for ideas to try. Additional strategies to try if the group is split evenly; talk a walk and share your evidence with a partner that did not score the IM the same; line up in two lines facing each other discuss your evidence one on one, have one line move one down one person and discuss again, repeat multiple times; have someone chart the evidence as it is shared aloud to ensure all voices are heard, then have participants review the evidence and rescore.*

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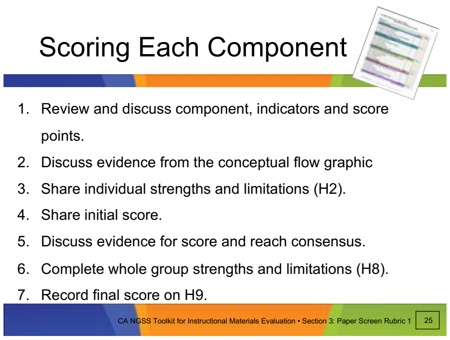
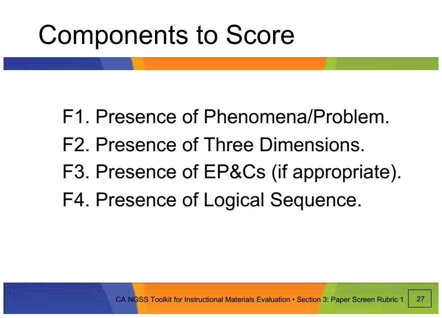
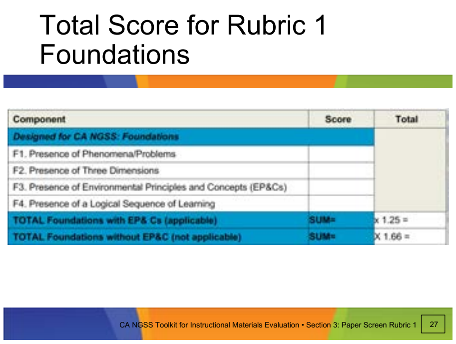
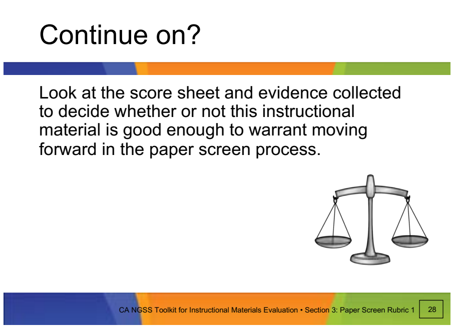
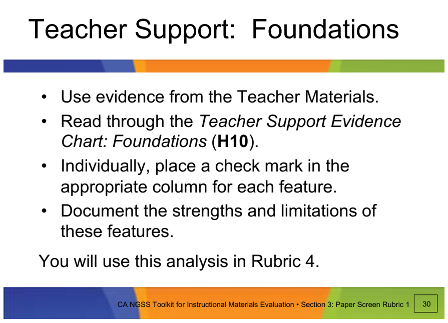
	**Slide 26: Soring Each Component** a. Use this slide to provide an overview of what participants will do to score each component. b. Then ask participants to review and discuss F1: Presence of Phenomena/Problems, the indicators for that component and the score points. Underline any key words they want to remember. c. Have participants return to their conceptual flow to look for evidence in support of the indicators. d. Have individuals share the strengths and limitations for this component that they entered on **H2**. e. Ask the participants for their initial score by using the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by raising 1, 3, or 5 fingers. f. Record the initial vote on Chart **C5 (Consensus Scoring)** ○ If the initial score is unanimous, move to **H8** to record summary strengths and limitation for this component. ○ If the initial score is not unanimous, facilitate a discussion to reach consensus. Start with these strategies: ▪ ask participants to provide evidence (from the conceptual flow, their **H2** notes on strengths and limitations, or those of others) to support their score ▪ ask participants who gave a score of ‘5’ to explain why they scored it a ‘5,’ relying on their evidence; have a “1’ explain why they scored it as a ‘1’ ▪ Discuss/debate and ask for a rescore using the fist of 5. Record the second score on Chart **C5 (Consensus Scoring).** *Facilitator Notes: Encourage full participation, ensure that discussions and decisions are based on evidence from the*

Slide	Slide Title and Facilitation Notes
	instructional materials. If necessary, use additional strategies found on ***Chart C3 (Consensus Building Strategies)*** *Ultimately, the group will come to a decision, but there must be a critical mass enough of the group to be in favor to get the decision carried out (Definition modified from The Adaptive School: Developing and Facilitating Collaborative Groups by Robert Garmston and Bruce Wellman, 2000, Four Hats Seminars, El Dorado Hills, California.)* g. Based on the consensus conversation, complete **H8 (Designed for NGSS: Foundations Strengths and Limitations)** as a summary of the discussion. This form will be used as an artifact of Rubric 1 to support the scoring decision, and to plan professional learning if the materials are adopted. h. Record consensus score on **H9 (Paper Screen Score Sheet)** for F1: Presence of Phenomena/Problems.
	**Slide 27: Components to Score** a. Review the next components to score. Ask participants to review and discuss F2. Presence of Three Dimensions, the indicators for that component and the score points. Underline any key words they want to remember. b. Toggle back to Slide 25 and repeat the process for F2. c. After component F2 is scored, ask participants to review and discuss F3. Presence of EP&Cs if appropriate, the indicators for that component and the score points. Underline any key words they want to remember. d. Toggle back to Slide 25 and repeat the process for F3, e. After component F3 is scored, ask participants to review and discuss F4. Presence of Logical Sequence, the indicators for that component and the score points. Underline any key words they want to remember, f. Toggle back to Slide 25 and repeat the process for F4.

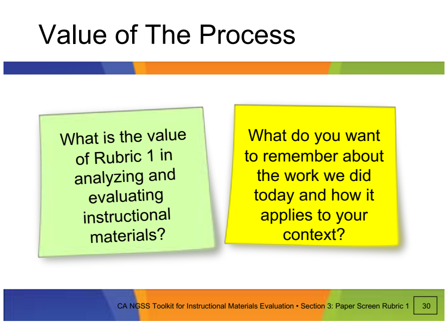
<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td></td><td>Facilitator Note: At the end of the scoring process for all components, remind participants to keep the handouts with scores, strengths, and limitations. These are the data that will be used to support decision-making and recommendations for materials selection. Encourage participants to properly name and store these.</td></tr>
<tr><td>
</td><td>Slide 28: Total Score for Rubric 1 Foundations

a. Ask the group to enter the scores for each component.
b. If EP&Cs were scored, enter the score. If they were not score, leave the box blank.
c. Add the scores to arrive at a total.
d. If EP&Cs were scored, multiply the sum by 1.25 to get the total. If EP&Cs were not scored, multiply the sum by 1.66 to get the total.</td></tr>
<tr><td>
</td><td>Slide 29: Continue on?

DISTRICT APPLICATION: If the district did the Pre-Screen process, the committee had a winnowed list of materials to review. This is a second opportunity to decide if the materials warrant moving forward for the rest of the Paper Screen process. To make this decision, the committee reviews the score sheet, evidence charts, and strengths and limitations. They determine if they have sufficient evidence to stop the process because the materials do not meet a minimal level of quality (e.g., the materials scored mostly 1s on the rubric).</td></tr>
</table>

Slide	Slide Title and Facilitation Notes
	**Slide 30: Teacher Support: Foundations** e. If the materials warrant further review using the Paper Screen Process, distribute **H10.** f. Ask participants to notice the key features of the chart. g. Explain that they have focused on the Student Edition as the main source of evidence for analysis. Now they will consider the support that is provided by the Teacher Materials. h. Ask participants to follow the directions on the slide to complete **H10**.

Part IV – Reflection and Next Steps (10 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 31: Value of the Process** a. Explain to participants that they have analyzed a unit through the perspective of **what** students learn as they engage in phenomena, use the three dimensions, and connect to the EP&Cs. In Rubric 2 they will build on this to consider **how** students are asked to learn and what thinking is required of them. b. Invite participants to review the chart they made at the beginning highlighting the characteristic features and elements of high-quality instructional materials. Ask them to make additions to the chart in light of the learning they experienced during this process. c. Ask participants to do a quick write on two large sticky notes to answers the prompts on the screen. d. Collect the value statements; ask participants to keep the remember statements. *Facilitator Note: Compile the value statements and create a*

Slide	Slide Title and Facilitation Notes
	summary statement on a large piece of paper that can be added to the left of the conceptual flow charts for the unit. *The charts and the conceptual flows created during this section will be used again. SAVE THEM! If the team is going to continue the next day in the same room they can stay on the walls. If not, tape the sticky notes onto the poster so that they stay in place when the posters are rolled up.*

Big Ideas/Smaller Ideas Strips: Disruptions in Ecosystems (Middle)

Cut out each strip. Sort the strips into two groups—Big Ideas and Smaller Ideas. With your group, discuss the rationale for your grouping (See slide 10).

Coral reefs are fragile.
Blue Bay is a marine ecosystem.
Scientists use models to show how things work, to construct explanations for why things happen, and to make predictions.
One major cause of ecosystem disruption is human activity.
The term fishery includes all the people and organizations that catch a certain species of fish to eat or sell.
Solutions to environmental problems can lessen the negative impact humans have on Earth.
Animals interact with plants and other animals and with non-living things including air, water, and soil.
Yellowstone National Park was created in 1872.
Quagga mussels are filter feeders.

Big Ideas/Smaller Ideas Strips: Why Is Our Corn Changing? (Elementary)

Cut out each strip. Sort the strips into two groups—Big Ideas and Smaller Ideas. With your group, discuss the rationale for your grouping (see slide 10).

Plants need light and water to grow.
Plant growth can be measured.
Leaves help plants get light.
Plants have predictable characteristics at different stages of development.
Roots help plants get water.
The structure inside a seed needs water.
Available resources and conditions affect plant growth.
Plants have external parts that help them survive and grow.

Water causes harvest corn to change.
Plant growth can be measured.
Plants have different parts that help make new plants.
Structures inside a seed become a plant.
Roots help plants get water.

Navigation Guide: *Disruptions in Ecosystems* (Middle School)

Overview

The middle school unit: *Disruption in Ecosystems* (Third Field Test Version, AMNH, and LHS) consists of a Student Edition (SE), Handouts, and Teacher Materials. Each of the five chapters, in both the Teacher Materials and Student Edition is presented in a 5E Learning Sequence.

How to Use this Navigation Guide

Read the pertinent Student Edition pages first. Read the Teacher Edition pages to clarify the Student Edition. Review the Handouts when prompted by the Teacher Edition.

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
Chapter 1 **Wolves in Yellowstone**	3–36	6–82	● Overview: 6–8 ● Assessment Overview: 9–11 ● Activity 1.1 – Engage ○ Rationale and NGSS Integration: 12 ○ Activity Overview: 13–14 ○ Teaching Suggestions: 14–19 ○ Suggested Answers to Analysis (Assessment): 20–22 ○ More Information (Key Vocabulary, Group Work, KWLs, Word Walls, Supporting English Language Learners): 22–24 ○ Materials and Advance Preparation, Teaching Suggestions: 25–26 ● Activity 1.2 – Explore ○ Rationale and NGSS Integration: 27 ○ Activity Overview: 27–29 ○ Teaching Suggestions: 29–34 ○ Suggested Answers to Analysis (Assessment): 34–35 ○ Materials and Advance Preparation, Teaching Suggestions: 37–38 ● Activity 1.3 – Explain ○ Rationale and NGSS Integration: 39 ○ Activity Overview: 39–41 ○ Teaching Suggestions: 42–45 ○ Suggested Answers to Analysis (Assessment): 45–48 ○ More Information (DART): 48 ○ Materials and Advance Preparation, Teaching Suggestions: 49–50 ● Activity 1.4 – Explain ○ Rationale and NGSS Integration: 51

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
			○ Activity Overview: 51–52 ○ Teaching Suggestions: 53–56 ○ Suggested Answers to Analysis (Assessment): 57–58 ○ More Information (includes Graphing): 60 ○ Materials and Advance Preparation, Teaching Summary: 61–62 ● Activity 1.5 – Elaborate ○ Rationale and NGSS Integration 63 Activity Overview: 63–65 ○ Teaching Suggestions: 65–68 ○ Suggested Answers to Analysis (Assessment): 69 ○ More Information (The Explanation Tool): 70 ○ Materials and Advance Preparation, Teaching Summary: 71–72 ● Activity 1.6 – Evaluate ○ Rationale and NGSS Integration: 73 ○ Activity Overview: 73–75 ○ Teaching Suggestions: 75–78 ○ Suggested Answers to Analysis (Assessment): 79 ○ More Information (Venn Diagrams): 80 ○ Materials and Advance Preparation, Teaching Summary: 81–82

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details

Chapter 2
Ecosystem Models
	39–66	83–158	• Overview: 83–85
			• Assessment Overview: 86–88
			• Teacher Background: 89–91
			• Activity 2.1 – Engage
			  ○ Rationale and NGSS Integration: 92
			  ○ Activity Overview: 93–94
			  ○ Teaching Suggestions: 94–96
			  ○ Suggested Answers to Analysis (Assessment): 96–97
			  ○ More Information (Group Work): 97
			  ○ Materials and Advance Preparation, Teaching Suggestions: 99–100
			• Activity 2.2 – Explore
			  ○ Rationale and NGSS Integration 101
			  ○ Activity Overview: 101–102
			  ○ Teaching Suggestions: 102–106
			  ○ Suggested Answers to Analysis (Assessment) and the Explanation Tool: 106
			  ○ Materials and Advance Preparation, Teaching Suggestions: 107–108
			• Activity 2.3 – Explain
			  ○ Rationale and NGSS Integration: 109
			  ○ Activity Overview: 110–111
			  ○ Teaching Suggestions: 111–117
			  ○ Suggested Answers to Analysis and the Explanation Tool (Assessment): 117-122
			  ○ Materials and Advance Preparation: 123–124

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
			• Activity 2.4 – Explain o Rationale and NGSS Integration: 125 o Activity Overview: 125–126 o Teaching Suggestions: 127–134 o Suggested Answers to Analysis (Assessment): 134–136 o More Information (Scientific Representations): 136 o Materials and Advance Preparation, Teaching Suggestions: 137–138 • Activity 2.5 – Elaborate o Rationale and NGSS Integration 139 o Activity Overview: 139–140 o Teaching Suggestions: 140–145 o Suggested Answers to Analysis (Assessment): 145 o Materials and Advance Preparation, Teaching Suggestions: 147–148 • Activity 2.6 – Evaluate o Rationale and NGSS Integration: 149 o Activity Overview: 149–150 o Teaching Suggestions: 151–153 o Suggested Answers to Analysis (Assessment) and The Explanation Tool: 154-156 o Materials and Advance Preparation, Teaching Suggestions: 157–158

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details

Chapter 3
 	
Interactions Between Populations and Resources
	69–93	159–204	• Overview: 159–161
			• Assessment Overview: 162–164
			• Activity 3.1 – Engage
			  ○ Rationale and NGSS Integration: 165
			  ○ Activity Overview: 166
			  ○ Teaching Suggestions: 166–168
			  ○ Suggested Answers to Analysis (Assessment): 169
			  ○ More Information (Vocabulary): 170
			  ○ Teaching Summary: 171
			• Activity 3.2 – Explore
			  ○ Rationale and NGSS Integration: 172
			  ○ Activity Overview: 172–174
			  ○ Teaching Suggestions: 174–177
			  ○ Suggested Answers to Analysis (Assessment): 177
			  ○ More Information (Group Work): 178
			  ○ Materials and Advance Preparation, Teaching Suggestions: 179–180
			• Activity 3.3 – Explain
			  ○ Rationale and NGSS Integration: 181
			  ○ Activity Overview: 181–182
			  ○ Teaching Suggestions: 183–185
			  ○ Suggested Answers to Analysis (Assessment): 186
			  ○ More Information (The Argument Tool): 186
			  ○ Materials and Advance Preparation, Teaching Suggestions: 187–188
			• Activity 3.4 – Elaborate
			  ○ Rationale and NGSS Integration: 189

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
			o Activity Overview: 189–191 o Teaching Suggestions: 191–193 o Suggested Answers to Analysis (Assessment): 194–195 o More Information (Walking Debate): 195–196 o Materials and Advance Preparation, Teaching Suggestions: 197–198 • Activity 3.5 – Evaluate o Rationale and NGSS Integration 199 Activity Overview: 199–200 o Teaching Suggestions: 200–202 o Suggested Answers to Analysis (Assessment): 203 o Materials and Advance Preparation, Teaching Suggestions: 204

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
Chapter 4 **Zebra Mussels**	95–122	205–259	• Overview: 205–207 • Assessment Overview: 208–210 • Activity 4.1 – Engage o Rationale and NGSS Integration: 211–212 o Activity Overview: 212–213 o Teaching Suggestions: 213–216 o Suggested Answers to Analysis (Assessment): 216 o More Information (Vocabulary, Group Work, KWLs, DART): 217–218 o Materials and Advance Preparation, Teaching Suggestions: 219–220 • Activity 4.2 – Explore o Rationale and NGSS Integration: 221 o Activity Overview: 221–222 o Teaching Suggestions: 223–226 o Suggested Answers to Analysis (Assessment): 226–227 • Activity 4.3 – Explain o Rationale and NGSS Integration: 231 o Activity Overview: 231–232 o Teaching Suggestions: 233–236 o Suggested Answers to Analysis (Assessment): 236–238 o More Information (Stop to Think, Walking Debate): 239–240 o Materials and Advance Preparation, Teaching Suggestions: 241–242 • Activity 4.4 – Elaborate

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
			○ Rationale and NGSS Integration: 243 ○ Activity Overview: 243–244 ○ Teaching Suggestions: 245–248 ○ Suggested Answers to Analysis (Assessment): 248–250 ○ More Information (The Explanation Tool, The Argument Tool): 250–251 ○ Materials and Advance Preparation, Teaching Suggestions: 253–254 • ● Activity 4.5 – Evaluate ○ Rationale and NGSS Integration: 255 ○ Activity Overview: 255–256 ○ Teaching Suggestions: 256–258 ○ Suggested Answers to Analysis (Assessment): 258 ○ Materials and Advance Preparation, Teaching Suggestions: 259

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
Chapter 5 **Designing Solutions**	125–146	261–324	• Overview: 261–263 • Assessment Overview: 264–266 • Activity 5.1 – Engage ○ Rationale and NGSS Integration: 267 ○ Activity Overview: 267–269 ○ Teaching Suggestions: 269–273 ○ Suggested Answers to Analysis (Assessment): 273–274 ○ More Information (KWLs, Science Content Information, Teaching Information): 274–275 ○ Materials and Advance Preparation, Teaching Suggestions: 277–278 • Activity 5.2 – Explore ○ Rationale and NGSS Integration: 279 ○ Activity Overview: 280–281 ○ Teaching Suggestions: 281–284 ○ Suggested Answers to Analysis (Assessment): 284–286 ○ Materials and Advance Preparation, Teaching Suggestions: 287–288 • Activity 5.3 – Explain ○ Rationale and NGSS Integration: 289 ○ Activity Overview: 289–291 ○ Teaching Suggestions: 291–296 ○ Suggested Answers to Analysis (Assessment): 296–297 ○ More Information (Sustainability, Venn Diagrams): 297–298 ○ Materials and Advance Preparation, Teaching

Lesson/Chapter Number and Title	Student Edition pages	Teacher Edition pages	Teacher Edition Details
			Suggestions: 299–300 • Activity 5.4 – Elaborate ○ Rationale and NGSS Integration: 301 ○ Activity Overview: 301–302 ○ Teaching Suggestions: 303–307 ○ Suggested Answers to Analysis (Assessment): 307–308 ○ Materials and Advance Preparation, Teaching Suggestions: 309–310 • Activity 5.5 – Evaluate ○ Rationale and NGSS Integration: 311 ○ Activity Overview: 312 ○ Teaching Suggestions: 313–318 ○ Suggested Answers to Analysis (Assessment): 318 ○ Materials and Advance Preparation, Teaching Suggestions: 319–320

Navigation Guide: *Why is our Corn Changing?* (Elementary School)

Overview

The second grade unit: *Why is our Corn Changing?* (Creative Commons 4.0, www.nextgenstorylines.org) consists of a Teacher Guide, Student Activity Sheets, Unit Outline, Unit, and Front Matter (note there is no formal student edition). Each lesson is part of a larger story that build upon student questions and wonderings about the phenomenon.

How to Use this Navigation Guide:

Read the Student Activity Sheets and the Unit Outline first. Read the Teacher's Guide to clarify the Student Activity Sheets and Unit Outline.

Some lessons are out of order because of experimentation time considerations (i.e. growing time).

Chapter/Lesson Number and Title	Student Edition Pages (Activity Sheets)	Teacher Edition Pages	Teacher Edition Details
Lesson 1: Is something going to happen to this corn that got wet?	1–2	L1: Anchoring Phenomena	Teachers Guide 1-6
Lesson 2: What is this thing made of?	3–4	L2: Investigation	Teachers Guide 1-7
Lesson 3: What happened to the wet harvest corn?	5–6	L3: Investigation	Teachers Guide 1-7
Lesson 4(a): Now what happened to the wet harvest corn?	7–8	L4: Problematizing	Teachers Guide 1-9
Lesson 5: How much did the wet harvest corn change?	13–14	L5: Investigation	Teacher's Guide 1-7
Lesson 6a: Why are the different parts growing in different directions?	none	L6: Problematizing	Teacher's Guide 1-10

Chapter/Lesson Number and Title	Student Edition Pages (Activity Sheets)	Teacher Edition Pages	Teacher Edition Details
Lesson 7: What we noticed and what are we wondering so far?	17	L7: Putting pieces together	Teacher's Guide 1-7
*Lesson 4b: What did we figure out from planting the kernels and the cob?	9	L4: Putting pieces together	Teachers Guide 1-11
*Lesson 4c: Does the seed have something in it that's alive?	11–12	L4: Investigation (page 2)	Teachers Guide 1-10
Lesson 8a: How did the harvest corn change?	19–20	L8: Problematizing	Teacher's Guide 1-9
Lesson 8b: What have we figured out from experiment #3?	21–22	L8: Investigation	Teachers Guide 1-10
*Lesson 6b: Why are the different parts growing in different directions?	15– 16	L6: Investigation	Teacher's Guide 1-9
Lesson 9a: What else do plants need to grow?	23–25	L9: Problematizing	Teacher's Guide 1-9
Lesson 9b: How much did my plants change?	27–28	L9: Investigation	Teacher's Guide 1-7
Lesson 9c: Why are the different plants growing in different directions?	29–30	L9: Putting pieces together	Teachers Guide 1-6
Lesson 9d: What has our class figured out from all of our experiments?	31–39		Teacher's Guide 1-4

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name ____________________________

Designed for CA NGSS: Foundations
Note Taking Parts Group – Strengths and Limitations

Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

Components	Strengths	Limitations
F1. Presence of Phenomena/ Problems.		
F2. Presence of Three Dimensions.		
F3. Presence of Environmental Principles & Concepts (EP&Cs).		
F4. Presence of a Logical Sequence of Learning.		

Disciplinary Core Ideas in the *Next Generation Science Standards*

NGSS@NSTA
STEM STARTS HERE

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Physical Science				
PS1: Matter and Its Interactions				
PS1.A: Structure and Properties of Matter	• Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) • Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3) • A great variety of objects can be built up from a small set of pieces. (2-PS1-3)	• Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects. (5-PS1-1) • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2) • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)	• Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1) • Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2), (MS-PS1-3) • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4) • In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4) • Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1) • The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)	• Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. (HS-PS1-1) • The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. (HS-PS1-1),(HS-PS1-2) • The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. (HS-PS1-3),(secondary to HS-PS2-6) • Stable forms of matter are those in which the electric and magnetic field energy is minimized. A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart. (HS-PS1-4)
PS1.B: Chemical Reactions	• Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	• When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4) • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)	• Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2),(MS-PS1-3),(MS-PS1-5) • The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5) • Some chemical reactions release energy, others store energy. (MS-PS1-6)	• Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. (HSPS1-4),(HS-PS1-5) • In many situations, a dynamic and condition-dependent balance between a reaction and the reverse reaction determines the numbers of all types of molecules present. (HS-PS1-6) • The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. (HS-PS1-2),(HS-PS1-7)
PS1.C: Nuclear Processes				• Nuclear processes, including fusion, fission, and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process. (HSPS1-8) • Spontaneous radioactive decays follow a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. (secondary to HS-ESS1-5),(secondary to HS-ESS1-6)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
PS2: Motion and Stability: Forces and Interactions				
PS2.A: Forces and Motion	• Pushes and pulls can have different strengths and directions. (KPS2-1),(K-PS2-2) • Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1),(K-PS2-2)	• Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1) • The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)	• For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's third law). (MS-PS2-1) • The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. (MS-PS2-2) • All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MSPS2-2)	• Newton's second law accurately predicts changes in the motion of macroscopic objects. (HS-PS2-1) • Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. In any system, total momentum is always conserved. (HS-PS2-2) • If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. (HS-PS2-2),(HS-PS2-3)
PS2.B: Types of Interactions	• When objects touch or collide, they push on one another and can change motion. (K-PS2-1)	• Objects in contact exert forces on each other. (3-PS2-1) • Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4) • The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)	• Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (MS-PS2-3) • Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—e.g., Earth and the sun. (MS-PS2-4) • Forces that act at a distance (electric and magnetic) can be explained by fields that extend through space and can be mapped by their effect on a test object (a ball, a charged object, or a magnet, respectively). (MS-PS2-5)	• Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4) • Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields. (HS-PS2-4),(HS-PS2-5) • Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (HS-PS2-6),(secondary to HS-PS1-1),(secondary to HS-PS1-3)
S2.C: Stability and Instability in Physical Systems				• …and "electrical energy" may mean energy stored in a battery or energy transmitted by electric currents. (secondary to HS-PS2-5)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
PS3: Energy				
PS3.A: Definitions of Energy		• The faster a given object is moving, the more energy it possesses. (4-PS3-1) • Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)	• Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1) • A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2) • Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4) • The term “heat” as used in everyday language refers both to thermal motion (the motion of atoms or molecules within a substance) and radiation (particularly infrared and light). In science, heat is used only for this second meaning; it refers to energy transferred when two objects or systems are at different temperatures. (secondary to MS-PS1-4) • Temperature is not a measure of energy; the relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (secondary to MS-PS1-4)	• Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms. (HSPS3-1),(HS-PS3-2) • At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy. (HSPS3-2) (HS-PS3-3) • These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as either motions of particles or energy stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space. (HS-PS3-2)
PS3.B: Conservation of Energy and Energy Transfer	• Sunlight warms Earth’s surface. (K-PS3-1),(K-PS3-2)	• Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) • Light also transfers energy from place to place. (4-PS3-2) • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)	• When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5) • The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4) • Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)	• Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system. (HS-PS3-1) • Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems. (HS-PS3-1),(HS-PS3-4) • Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior. (HS-PS3-1) • The availability of energy limits what can occur in any system. (HS-PS3-1) • Uncontrolled systems always evolve toward more stable states—that is, toward more uniform energy distribution (e.g., water flows downhill, objects hotter than their surrounding environment cool down). (HS-PS3-4)
PS3.C: Relationship Between Energy and Forces	• A bigger push or pull makes things go faster. (secondary to K-PS2-1)	• When objects collide, the contact forces transfer energy so as to change the objects’ motions. (4-PS3-3)	• When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)	• When two objects interacting through a field change relative position, the energy stored in the field is changed. (HS-PS3-5)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
PS3.D: Energy in Chemical Processes and Everyday Life		• The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) • The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)	• The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6) • Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)	• Although energy cannot be destroyed, it can be converted to less useful forms—for example, to thermal energy in the surrounding environment. (HS-PS3-3),(HS-PS3-4) • Solar cells are human-made devices that likewise capture the sun's energy and produce electrical energy. (secondary to HS-PS4-5) • The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5) • Nuclear Fusion processes in the center of the sun release the energy that ultimately reaches Earth as radiation. (secondary to HS-ESS1-1)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
PS4: Waves and Their Applications in Technologies for Information Transfer				
PS4.A: Wave Properties	• Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1)	• Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (Note: This grade band endpoint was moved from K–2.) (4-PS4-1) • Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)	• A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) • A sound wave needs a medium through which it is transmitted. (MS-PS4-2)	• The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is passing. (HS-PS4-1) • Information can be digitized (e.g., a picture stored as the values of an array of pixels); in this form, it can be stored reliably in computer memory and sent over long distances as a series of wave pulses. (HS-PS4-2),(HSPS4-5) • [From the 3–5 grade band endpoints] Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.) (HS-PS4-3) • Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. (secondary to HS-ESS2-3)
PS4.B: Electromagnetic Radiation	• Objects can be seen only when light is available to illuminate them. Some objects give off their own light. (1-PS4-2) • Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3)	• An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)	• When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2) • The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2) • A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2) • However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2)	• Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features. (HS-PS4-3) • When light or longer wavelength electromagnetic radiation is absorbed in matter, it is generally converted into thermal energy (heat). Shorter wavelength electromagnetic radiation (ultraviolet, X-rays, gamma rays) can ionize atoms and cause damage to living cells.(HS-PS4-4) • Photovoltaic materials emit electrons when they absorb light of a high-enough frequency. (HS-PS4-5) • Atoms of each element emit and absorb characteristic frequencies of light. These characteristics allow identification of the presence of an element, even in microscopic quantities. (secondary to HS-ESS1-2)
PS4.C: Information Technologies and Instrumentation	• People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	• Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)	• Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)	• Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them. (HS-PS4-5)

Disciplinary Core Ideas in the *Next Generation Science Standards*

NGSS@NSTA
STEM STARTS HERE

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Life Science				
LS1: From Molecules to Organisms: Structures and Processes				
LS1.A: Structure and Function	• All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)	• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)	• All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) • Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MSLS3-2) • Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) • In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)	• Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (secondary to HS-LS3-1) • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)
LS1.B: Growth and Development of Organisms	• Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)	• Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)	• Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) • Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4) • Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)	• In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)
LS1.C: Organization for Matter and Energy Flow in Organisms	• All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)	• Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) • Plants acquire their material for growth chiefly from air and water. (5-LS1-1)	• Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6) • Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)	• The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5) • The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6) • As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7) • As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another and release energy to the surrounding environment and to maintain body temperature. Cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. (HS-LS1-7)
LS1.D: Information Processing	• Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)	• Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)	• Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)	

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
LS2: Ecosystems: Interactions, Energy, and Dynamics				
LS2.A: Interdependent Relationships in Ecosystems	• Plants depend on water and light to grow. (2-LS2-1) • Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	• The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)	• Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) • Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)	• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HSLS2-2)
LS2.B: Cycles of Matter and Energy Transfer in Ecosystems		• Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)	• Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)	• Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3) • Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4) • Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)
LS2.C: Ecosystem Dynamics, Functioning, and Resilience		• When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)	• Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) • Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)	• A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2),(HS-LS2-6) • Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
LS2.D: Social Interactions and Group Behavior		• Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)		• Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HSLS2-8)
LS3: Heredity: Inheritance and Variation of Traits				
LS3.A: Inheritance of Traits	• Young animals are very much, but not exactly, like, their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)	• Many characteristics of organisms are inherited from their parents. (3-LS3-1) • Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)	• Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1) • Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)	• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)
LS3.B: Variation of Traits	• Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)	• Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) • The environment also affects the traits that an organism develops. (3-LS3-2)	• In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2) • In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)	• In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2) • Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)
LS4: Biological Evolution: Unity and Diversity				
LS4.A: Evidence of Common Ancestry and Diversity		• Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: moved from K-2) (3-LS4-1) • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)	• The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1) • Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2) • Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3)	• Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)
LS4.B: Natural Selection		• Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	• Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) • In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)	• Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2),(HS-LS4-3) • The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
LS4.C: Adaptation		• For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)	• Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)	• Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2) • Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3),(HS-LS4-4) • Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3) • Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5),(HS-LS4-6) • Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. (HS-LS4-5)
LS4.D: Biodiversity and Humans	• There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)	• Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	• Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)	• Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary to HSLS2-7) • Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (HS-LS4-6)

Disciplinary Core Ideas in the *Next Generation Science Standards*

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	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Earth and Space Science				
ESS1: Earth's Place in the Universe				
ESS1.A: The Universe and Its Stars	• Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	• The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)	• Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)	• The star called the sun is changing and will burn out over a lifespan of approximately 10 billion years. (HS-ESS1-1) • The study of stars' light spectra and brightness is used to identify compositional elements of stars, their movements, and their distances from Earth. (HS-ESS1-2),(HS-ESS1-3) • The Big Bang theory is supported by observations of distant galaxies receding from our own, of the measured composition of stars and non-stellar gases, and of the maps of spectra of the primordial radiation (cosmic microwave background) that still fills the universe. (HSESS1-2) • Other than the hydrogen and helium formed at the time of the Big Bang, nuclear fusion within stars produces all atomic nuclei lighter than and including iron, and the process releases electromagnetic energy. Heavier elements are produced when certain massive stars achieve a supernova stage and explode. (HS-ESS1- 2),(HS-ESS1-3)
ESS1.B: Earth and the Solar System	• Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	• The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)	• The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2),(MSESS1-3) • This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1) • The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)	• Kepler's laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system. (HS-ESS1-4) • Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (secondary to HS-ESS2-4)
ESS1.C: The History of Planet Earth	• Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)	• Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)	• The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4) • Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (HS.ESS1.C GBE) (secondary to MS-ESS2-3)	• Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. (HS-ESS1-5) • Although active geologic processes, such as plate tectonics and erosion, have destroyed or altered most of the very early rock record on Earth, other objects in the solar system, such as lunar rocks, asteroids, and meteorites, have changed little over billions of years. Studying these objects can provide information about Earth's formation and early history. (HS-ESS1-6)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
ESS2: Earth's Systems				
ESS2.A: Earth Materials and Systems	• Wind and water can change the shape of the land. (2-ESS2-1)	• Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)	• All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1) • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)	• Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. (HSESS2-1),(HS-ESS2-2) • Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. (HS-ESS2-3) • The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles. (HS-ESS2-4)
ESS2.B: Plate Tectonics and Large-Scale System Interactions	• Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)	• The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)	• Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3)	• The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection. (HS-ESS2-3) • Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history. (ESS2.B Grade 8 GBE) (HS-ESS2-1) (secondary to HS-ESS1-5)
ESS2.C: The Roles of Water in Earth's Surface Processes	• Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)	• Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)	• Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) • The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MSESS2-5) • Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) • Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)	• The abundance of liquid water on Earth's surface and its unique combination of physical and chemical properties are central to the planet's dynamics. These properties include water's exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks. (HS-ESS2-5)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
ESS2.D: Weather and Climate	• Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)	• Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1) • Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)	• Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) • Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) • The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)	• The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. (HS-ESS2-4) • Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen. (HS-ESS2-6),(HS-ESS2-7) • Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate. (HS-ESS2-6),(HS-ESS2-4) • Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HSESS3-6)
ESS2.E: Biogeology	• Plants and animals can change their environment. (KESS2-2)	• Living things affect the physical characteristics of their regions. (4-ESS2-1)		• The many dynamic and delicate feedbacks between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it. (HS-ESS2-7)

	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
ESS3: Earth and Human Activity				
ESS3.A: Natural Resources	• Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1)	• Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)	• Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)	• Resource availability has guided the development of human society. (HS-ESS3-1) • All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. (HS-ESS3-2)
ESS3.B: Natural Hazards	• Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)	• A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (4-ESS3-2.)	• Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)	• Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. (HS-ESS3-1)
ESS3.C: Human Impacts on Earth Systems	• Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (K-ESS3-3) (secondary to K-ESS2-2)	• Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	• Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) • Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MSESS3-3),(MS-ESS3-4)	• The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. (HS-ESS3-3) • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4)
ESS3.D: Global Climate Change			• Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)	• Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. (HS-ESS3-5) • Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. (HS-ESS3-6)

Disciplinary Core Ideas in the *Next Generation Science Standards*

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	Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Engineering, Technology, and the Application of Science				
ETS1: Engineering Design				
ETS1.A: Defining and Delimiting an Engineering Problem	• A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (K-2-ETS1-1) (secondary to KPS2-2) • Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) (secondary to K-ESS3-2) • Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	• Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) (secondary to 4-PS3-4)	• The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (MS-ETS1-1) (secondary to MS-PS3-3)	• Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (HS-ETS1-1) (secondary to HS-PS2-3) (secondary to HS-PS3-3) • Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (HS-ETS1-1)
ETS1.B: Developing Possible Solutions	• Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-1) (secondary to K-ESS3-3) (secondary to 2-LS2-2)	• Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) • Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)	• A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) (secondary to MS-PS1-6) • There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. MS-ETS1-2), (MS-ETS1-3) (secondary to MS-PS3-3) (secondary to MS-LS2-5) • Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) • Models of all kinds are important for testing solutions. (MS-ETS1-4)	• When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary to HS-LS2-7) (secondary to HS-LS4-6) (secondary to HS-ESS3-2),(secondary HS-ESS3-4) (HS-ETS1-3) • Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. (HS-ETS1-4) (secondary to HS-LS4-6)
ETS1.C: Optimizing the Design Solution	• Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-1) (secondary to 2-ESS2-1)	• Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3) (secondary to 4-PS4-3)	• Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of the characteristics may be incorporated into the new design. (MS-ETS1-3 (secondary to MS-PS1-6) • The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MSETS1-4) (secondary to MS-PS1-6)	• Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (tradeoffs) may be needed. (HSETS1-2) (secondary to HS-PS1-6) (secondary to HS-PS2-3)

Science & Engineering Practices in *Next Generation Science Standards*

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Asking Questions and Defining Problems: A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world(s) works and which can be empirically tested. Engineering questions clarify problems to determine criteria for successful solutions and identify constraints to solve problems about the designed world. Both scientists and engineers also ask questions to clarify ideas.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.	Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.	Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, clarify arguments and models.	Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.
• Ask questions based on observations to find more information about the natural and/or designed world(s).	• Ask questions about what would happen if a variable is changed.	• Ask questions that arise from careful observation of phenomena, models, or unexpected results, to clarify and/or seek additional information. • Ask questions to identify and/or clarify evidence and/or the premise(s) of an argument. • Ask questions to determine relationships between independent and dependent variables and relationships in models. • Ask questions to clarify and/or refine a model, an explanation, or an engineering problem.	• Ask questions that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. • Ask questions that arise from examining models or a theory, to clarify and/or seek additional information and relationships. • Ask questions to determine relationships, including quantitative relationships, between independent and dependent variables. • Ask questions to clarify and refine a model, an explanation, or an engineering problem.
• Ask and/or identify questions that can be answered by an investigation.	• Identify scientific (testable) and non-scientific (non-testable) questions. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	• Ask questions that require sufficient and appropriate empirical evidence to answer. • Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.	• Evaluate a question to determine if it is testable and relevant. • Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.
		• Ask questions that challenge the premise(s) of an argument or the interpretation of a data set.	• Ask and/or evaluate questions that challenge the premise(s) of an argument, the interpretation of a data set, or the suitability of the design.
• Define a simple problem that can be solved through the development of a new or improved object or tool.	• Use prior knowledge to describe problems that can be solved. • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.	• Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.	• Define a design problem that involves the development of a process or system with interacting components and criteria and constraints that may include social, technical and/or environmental considerations.

Science and Engineering Practices

Developing and Using Models: A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations. Modeling tools are used to develop questions, predictions and explanations; analyze and identify flaws in systems; and communicate ideas. Models are used to build and revise scientific explanations and proposed engineered systems. Measurements and observations are used to revise models and designs.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.	Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.	Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.	Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).
• Distinguish between a model and the actual object, process, and/or events the model represents. • Compare models to identify common features and differences.	• Identify limitations of models.	• Evaluate limitations of a model for a proposed object or tool.	• Evaluate merits and limitations of two different models of the same proposed tool, process, mechanism, or system in order to select or revise a model that best fits the evidence or design criteria. • Design a test of a model to ascertain its reliability.
• Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).	• Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. • Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution. • Develop and/or use models to describe and/or predict phenomena.	• Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed. • Use and/or develop a model of simple systems with uncertain and less predictable factors. • Develop and/or revise a model to show the relationships among variables, including those that are not observable but predict observable phenomena. • Develop and/or use a model to predict and/or describe phenomena. • Develop a model to describe unobservable mechanisms.	• Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. • Develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations.
• Develop a simple model based on evidence to represent a proposed object or tool.	• Develop a diagram or simple physical prototype to convey a proposed object, tool, or process. • Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.	• Develop and/or use a model to generate data to test ideas about phenomena in natural or designed systems, including those representing inputs and outputs, and those at unobservable scales.	• Develop a complex model that allows for manipulation and testing of a proposed process or system. • Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.

Science and Engineering Practices

Planning and Carrying Out Investigations: Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters. Engineering investigations identify the effectiveness, efficiency, and durability of designs under different conditions.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.	Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.	Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.	Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
• With guidance, plan and conduct an investigation in collaboration with peers (for K). • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.	• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	• Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. • Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.	• Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible variables or effects and evaluate the confounding investigation's design to ensure variables are controlled. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. • Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.
• Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.	• Evaluate appropriate methods and/or tools for collecting data.	• Evaluate the accuracy of various methods for collecting data.	• Select appropriate tools to collect, record, analyze, and evaluate data.
• Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. • Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal. • Make predictions based on prior experiences.	• Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. • Make predictions about what would happen if a variable changes. • Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.	• Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. • Collect data about the performance of a proposed object, tool, process, or system under a range of conditions.	• Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. • Manipulate variables and collect data about a complex model of a proposed process or system to identify failure points or improve performance relative to criteria for success or other variables.

Science and Engineering Practices

Analyzing and Interpreting Data: Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis. Engineering investigations include analysis of data collected in the tests of designs. This allows comparison of different solutions and determines how well each meets specific design criteria—that is, which design best solves the problem within given constraints. Like scientists, engineers require a range of tools to identify patterns within data and interpret the results. Advances in science make analysis of proposed solutions more efficient and effective.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.	Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.	Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
• Record information (observations, thoughts, and ideas). • Use and share pictures, drawings, and/or writings of observations. • Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. • Compare predictions (based on prior experiences) to what occurred (observable events).	• Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.	• Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships. • Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships. • Distinguish between causal and correlational relationships in data. • Analyze and interpret data to provide evidence for phenomena.	• Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.
	• Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.	• Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible.	• Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible.
		• Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).	• Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.
	• Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.	• Analyze and interpret data to determine similarities and differences in findings.	• Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations.
• Analyze data from tests of an object or tool to determine if it works as intended.	• Analyze data to refine a problem statement or the design of a proposed object, tool, or process. • Use data to evaluate and refine design solutions.	• Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.	• Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. • Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

Based on Appendix F of the Next Generation Science Standards © 2013 Achieve, Inc. on behalf of the 26 NGSS Lead States.

Science and Engineering Practices

Using Mathematics and Computational Thinking: In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships. Mathematical and computational approaches enable scientists and engineers to predict the behavior of systems and test the validity of such predictions.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Mathematical and computational thinking in K–2 builds on prior experience and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).	Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.	Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.	Mathematical and computational thinking in 9-12 builds on K-8 and experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.
		• Decide when to use qualitative vs. quantitative data.	• Decide if qualitative or quantitative data are best to determine whether a proposed object or tool meets criteria for success.
• Use counting and numbers to identify and describe patterns in the natural and designed world(s).	• Organize simple data sets to reveal patterns that suggest relationships.	• Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.	• Create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system.
• Describe, measure, and/or compare quantitative attributes of different objects and display the data using simple graphs.	• Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems.	• Use mathematical representations to describe and/or support scientific conclusions and design solutions.	• Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations.
• Use quantitative data to compare two alternative solutions to a problem.	• Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem.	• Create algorithms (a series of ordered steps) to solve a problem. • Apply mathematical concepts and/or processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems. • Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.	• Apply techniques of algebra and functions to represent and solve scientific and engineering problems. • Use simple limit cases to test mathematical expressions, computer programs, algorithms, or simulations of a process or system to see if a model "makes sense" by comparing the outcomes with what is known about the real world. • Apply ratios, rates, percentages, and unit conversions in the context of complicated measurement problems involving quantities with derived or compound units (such as mg/mL, kg/m3, acre-feet, etc.).

Science and Engineering Practices

Constructing Explanations and Designing Solutions: The end-products of science are explanations and the end-products of engineering are solutions. The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories. The goal of engineering design is to find a systematic solution to problems that is based on scientific knowledge and models of the material world. Each proposed solution results from a process of balancing competing criteria of desired functions, technical feasibility, cost, safety, aesthetics, and compliance with legal requirements. The optimal choice depends on how well the proposed solutions meet criteria and constraints.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.	Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.	Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
• Use information from observations (firsthand and from media) to construct an evidence-based account for natural phenomena.	• Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).	• Construct an explanation that includes qualitative or quantitative relationships between variables that predict(s) and/or describe(s) phenomena. • Construct an explanation using models or representations.	• Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.
	• Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.	• Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. • Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events.	• Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. • Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.
	• Identify the evidence that supports particular points in an explanation.	• Apply scientific reasoning to show why the data or evidence is adequate for the explanation or conclusion.	• Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.
• Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. • Generate and/or compare multiple solutions to a problem.	• Apply scientific ideas to solve design problems. • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.	• Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system. • Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. • Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and re-testing.	• Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Science and Engineering Practices

Engaging in Argument from Evidence: Argumentation is the process by which evidence-based conclusions and solutions are reached. In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem. Scientists and engineers use argumentation to listen to, compare, and evaluate competing ideas and methods based on merits. Scientists and engineers engage in argumentation when investigating a phenomenon, testing a design solution, resolving questions about measurements, building data models, and using evidence to evaluate claims.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).	Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).	Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).	Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.
• Identify arguments that are supported by evidence. • Distinguish between explanations that account for all gathered evidence and those that do not. • Analyze why some evidence is relevant to a scientific question and some is not. • Distinguish between opinions and evidence in one's own explanations.	• Compare and refine arguments based on an evaluation of the evidence presented. • Distinguish among facts, reasoned judgment based on research findings, and speculation in an explanation.	• Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.	• Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues. • Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.
• Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.	• Respectfully provide and receive critiques from peers about a proposed procedure, explanation or model.by citing relevant evidence and posing specific questions.	• Respectfully provide and receive critiques about one's explanations, procedures, models and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.	• Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence and challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining what additional information is required to resolve contradictions.
• Construct an argument with evidence to support a claim.	• Construct and/or support an argument with evidence, data, and/or a model. • Use data to evaluate claims about cause and effect.	• Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.	• Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence.
• Make a claim about the effectiveness of an object, tool, or solution that is supported by relevant evidence.	• Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.	• Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system, based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints. • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	• Make and defend a claim based on evidence about the natural world or the effectiveness of a design solution that reflects scientific knowledge, and student-generated evidence. • Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and/or logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information: Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Communicating information and ideas can be done in multiple ways: using tables, diagrams, graphs, models, and equations as well as orally, in writing, and through extended discussions. Scientists and engineers employ multiple sources to obtain information that is used to evaluate the merit and validity of claims, methods, and designs.

K–2 Condensed Practices	3–5 Condensed Practices	6–8 Condensed Practices	9–12 Condensed Practices
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.	Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.	Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.	Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.
• Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).	• Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence. • Compare and/or combine across complex texts and/or other reliable media to support the engagement in other scientific and/or engineering practices.	• Critically read scientific texts adapted for classroom use to determine the central ideas and/or obtain scientific and/or technical information to describe patterns in and/or evidence about the natural and designed world(s).	• Critically read scientific literature adapted for classroom use to determine the central ideas or conclusions and/or to obtain scientific and/or technical information to summarize complex evidence, concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
• Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.	• Combine information in written text with that contained in corresponding tables, diagrams, and/or charts to support the engagement in other scientific and/or engineering practices.	• Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.	• Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.
• Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.	• Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.	• Gather, read, synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. • Evaluate data, hypotheses, and/or conclusions in scientific and technical texts in light of competing information or accounts.	• Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source. • Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs that appear in scientific and technical texts or media reports, verifying the data when possible.
• Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.	• Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts.	• • Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.	• Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).

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Crosscutting Concepts in *Next Generation Science Standards*

K-2	3-5	6-8	9-12
Patterns: Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.			
• Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.	• Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena and designed products. • Patterns of change can be used to make predictions. • Patterns can be used as evidence to support an explanation.	• Macroscopic patterns are related to the nature of microscopic and atomic-level structure. • Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. • Patterns can be used to identify cause and effect relationships. • Graphs, charts, and images can be used to identify patterns in data.	• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. • Classifications or explanations used at one scale may fail or need revision when information from smaller or larger scales is introduced; thus requiring improved investigations and experiments. • Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system. • Mathematical representations are needed to identify some patterns. • Empirical evidence is needed to identify patterns.
Cause and Effect: Mechanism and Prediction: Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.			
• Events have causes that generate observable patterns. • Simple tests can be designed to gather evidence to support or refute student ideas about causes.	• Cause and effect relationships are routinely identified, tested, and used to explain change. • Events that occur together with regularity might or might not be a cause and effect relationship.	• Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. • Cause and effect relationships may be used to predict phenomena in natural or designed systems. • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.	• Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. • Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system. • Systems can be designed to cause a desired effect. • Changes in systems may have various causes that may not have equal effects.
Scale, Proportion, and Quantity: In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.			
• Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). • Standard units are used to measure length.	• Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods. • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.	• Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. • The observed function of natural and designed systems may change with scale. • Proportional relationships (e.g., speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. • Scientific relationships can be represented through the use of algebraic expressions and equations. • Phenomena that can be observed at one scale may not be observable at another scale.	• The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. • Some systems can only be studied indirectly as they are too small, too large, too fast, or too slow to observe directly. • Patterns observable at one scale may not be observable or exist at other scales. • Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. • Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).

Crosscutting Concepts

K-2	3-5	6-8	9-12
Systems and System Models: A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.			
• Objects and organisms can be described in terms of their parts. • Systems in the natural and designed world have parts that work together.	• A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. • A system can be described in terms of its components and their interactions.	• Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. • Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. • Models are limited in that they only represent certain aspects of the system under study.	• Systems can be designed to do specific tasks. • When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models. • Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. • Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.
Energy and Matter: Flows, Cycles, and Conservation: Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.			
• Objects may break into smaller pieces, be put together into larger pieces, or change shapes.	• Matter is made of particles. • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems. • Energy can be transferred in various ways and between objects.	• Matter is conserved because atoms are conserved in physical and chemical processes. • Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. • Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). • The transfer of energy can be tracked as energy flows through a designed or natural system.	• The total amount of energy and matter in closed systems is conserved. • Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. • Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems. • Energy drives the cycling of matter within and between systems. • In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.
Structure and Function: The way an object is shaped or structured determines many of its properties and functions.			
• The shape and stability of structures of natural and designed objects are related to their function(s).	• Different materials have different substructures, which can sometimes be observed. • Substructures have shapes and parts that serve functions	• Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore, complex natural and designed structures/systems can be analyzed to determine how they function. • Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.	• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. • The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.
Stability and Change: For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand..			
• Some things stay the same while other things change. • Things may change slowly or rapidly	• Change is measured in terms of differences over time and may occur at different rates. • Some systems appear stable, but over long periods of time will eventually change.	• Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale. • Small changes in one part of a system might cause large changes in another part. • Stability might be disturbed either by sudden events or gradual changes that accumulate over time. • Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms.	• Much of science deals with constructing explanations of how things change and how they remain stable. • Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. • Feedback (negative or positive) can stabilize or destabilize a system. • Systems can be designed for greater or lesser stability

Matrix of Environmental Principles and Concepts in CA NGSS

K-2	3-5	6-8	9-12
Principle I: The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.			
• Humans need food, clean air, and water from healthy natural systems in order to live, grow, and survive. • Everything that humans do, such as building and moving from place-to-place, depends on natural resources from healthy natural systems. • The health of natural systems influences the amount of food, clean air, water and other resources available to meet human needs.	• Ecosystem goods obtained from healthy natural systems, such as timber, fuels, water, and clean air are essential to human life and to the functioning of our economies and cultures. • Ecosystem services from healthy natural systems, such as water filtration, decomposition, cycling of nutrients, oxygen production, and pollination are essential to human life and to the functioning of our economies and cultures.	• Human lives, communities, societies, and activities (e.g., agriculture, industry) depend on matter (e.g., timber, water, carbon, nitrogen, phosphorus) produced by natural systems. • The quality, quantity, and reliability of the ecosystem goods and services humans obtain from Earth's land, ocean, atmosphere, and biosphere are directly affected by the health of those natural systems. • The health, viability, and biological diversity of the natural systems on which humans depend are directly affected by human population growth, human activities, and per-capita consumption of ecosystem goods and services.	• Human lives, communities, societies, and activities (e.g., agriculture, fisheries, and industry) depend on and benefit from the biodiversity of Earth's natural systems. • The biodiversity of natural systems influences the quality, quantity, and reliability of the ecosystem goods and ecosystem services that human lives, communities, societies, and activities depend on. • The availability and reliability of the ecosystem goods and ecosystem services that natural systems provide humans are directly affected by the size and growth of human populations, and their consumption rates, as well as the operation of human communities.
Principle II: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.			
• Human activities cause changes to natural systems (habitats) where plants and animals, including humans, get what they need to live, grow, and survive. • Human activities that change natural systems influence which plants and animals can survive in an area, and may cause some species to disappear.	• Human activities can have major effects on natural systems by decreasing the amount of water, polluting air and water, and removing native vegetation. • Changes to natural systems due to human activity can affect how organisms interact with the environment and their chances for survival. • Growing human communities can result in habitat destruction, changes to the numbers and kinds of organisms living in an area, and the overall health of ecosystems.	• Human population growth, consumption of ecosystem goods and services, and the operation of human communities directly and indirectly affect the health, viability, and biological diversity of natural systems. • Human practices such as methods used to extract, transport, and consume resources, and social systems (e.g., laws, economics, and politics) directly and indirectly influence the geographic extent, composition, biological diversity, and viability of natural systems. • Human-caused changes to natural systems can occur at rates that can cause species to die, move away, or go extinct.	• Human social systems (e.g., laws, economics, and politics) and practices (e.g., methods used to extract, transport, and resource consumption) can alter natural systems processes and cycles, thereby influencing the carrying capacities of ecosystems and their geographic extent, composition, biological diversity, health, viability, and functioning. • Human population growth and associated anthropogenic changes (e.g., habitat destruction, pollution, climate change, invasive species) result from extracting, harvesting, transporting, and consuming natural resources, and can lead to the disruption of natural systems, thereby influencing the functioning and geographic extent, composition, biological diversity, and viability of ecosystems and threatening the survival of some species.
Principle III: Natural systems proceed through cycles that humans depend upon, benefit from and can alter.			
• Not applicable	• Humans depend on and benefit from cycles (e.g., water, carbon, nitrogen, life cycles) and processes (e.g., erosion, decomposition, soil formation) that occur in Earth's systems (biosphere, hydrosphere, atmosphere, and geosphere). • Human activities and practices (e.g., mining, manufacturing, land management, energy production and use) alter the cycles and processes that occur in natural systems. • Human-caused changes to natural systems cycles and processes affect the functioning of those systems and the organisms that depend on them.	• Humans depend on and benefit from the repeated cycling of matter between living and nonliving parts of ecosystems. • Human activities and practices alter cycles and processes in natural systems, disrupting physical and biological components of ecosystems, and causing shifts in populations of organisms. • Human lives, communities, and societies, and activities (e.g., agriculture, fisheries, and industry) depend on and benefit from natural systems cycles among the biosphere, hydrosphere, atmosphere, and geosphere. • Human-caused changes to natural systems cycles and processes can affect the health, viability, and functioning of those systems and the organisms that depend on them.	• Human practices, including the methods used to extract, harvest, transport and consume natural resources alter the cycles and processes that operate within natural systems, directly and indirectly influencing the quality, quantity, and reliability of ecosystem goods and ecosystem services available to support human lives, communities, and societies. • Human activities can alter Earth's major cycles and processes influencing the geographic extent, composition, biological diversity, health, viability, and functioning of natural systems. • Human-caused changes to cycles and processes in natural systems can diminish supplies of fresh water and clean air and may also result in global-scale changes such as: desertification, climate change, and decreased availability of arable soil.

K-2	3-5	6-8	9-12
Principle IV: The exchange of matter between natural systems and human societies affects the long-term functioning of both.			
• Not applicable	• Human activities (e.g., manufacturing, energy production, agriculture) require matter from natural systems and produce byproducts. • The byproducts of human activities are not readily prevented from entering natural systems where they may result in beneficial, neutral, or detrimental effects. • Human use of matter from natural systems and resulting byproducts can affect the health, viability, and functioning of those systems and the organisms that depend on them.	• When byproducts (e.g., chemicals, waste products, other materials) of human activities enter natural systems they cause changes to local conditions that directly can affect the growth of plants and animals, which in turn can affect the health, viability, and functioning of the overall system, and the other organisms that depend on them. • Energy is released as a byproduct of many human activities (e.g., power production, manufacturing) and enters natural systems where it causes changes to and affects the functioning of terrestrial, freshwater, coastal, and marine ecosystems. • The capacity of natural systems to adjust to the matter and energy entering from human activities depends on the nature of the system as well as the scope, scale, and duration of the activity and the types of byproducts.	• The increasing consumption of resources (matter and energy) from growing human populations and associated activities is resulting in global-scale changes to natural systems (e.g., increased amounts of atmospheric carbon dioxide, overfishing, loss of tropical rainforests) which influence the capacity of Earth's natural systems to adjust to human-caused alterations. • The byproducts of human activities (e.g., pollution, waste products) that result from the expansion and operation of human communities and the use of natural resources, influence the functioning and geographic extent, composition, biological diversity, and viability of ecosystems and can threaten the survival of some species. • The scope, scale, and duration of human activities that consume natural resources and produce byproducts, influence the capacity of natural systems to recover from human-caused alterations and directly influence both the long-term viability of associated natural systems and the sustainability of human societies.
Principle V: Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.			
• There are many different factors to consider when making choices and decisions about human activities that can cause changes to natural systems. • When designing and choosing a solution to a problem, it is important to understand how different solutions might affect natural systems and the plants and animals that live there.	• There are many different things to consider when thinking about and making choices about activities that can affect natural systems, including how to minimize the impacts on natural systems and the living things that depend on them. • Criteria for success and design constraints should take into account potential effects on natural systems. • Research on engineering design problems and solutions should include determining potential impacts on natural systems.	• There are many different things to consider when thinking about and making choices about activities that can affect natural systems, including how to minimize the impacts on natural systems and the living things that depend on them. • Research on engineering design problems and solutions should include determining potential impacts on natural systems. • Systematic processes for evaluating possible solutions, and the legal, economic and political systems that govern them, should consider criteria for success and design constraints that account for potential impacts on natural systems.	• The spectrum of what is considered in making decisions about natural systems and resources, and how those factors influence decisions, should take into account sustaining biodiversity and natural system function, as well as human dependence on the living world for the resources and other benefits provided by biodiversity. • Established criteria and design constraints should take into account potential impacts on natural systems and should be quantified to the extent possible and stated in such a way that one can tell if a given design minimizes those impacts. • Global challenges can impact natural systems and resources, as well as social, economic, and political conditions in local communities, therefore engineering design solutions should take into account the full spectrum of these factors when evaluating and engineering design solutions. • Decisions about the priority of certain criteria over others (trade-offs) should assess social, economic, and political factors, with particular emphasis on environmental factors that can influence the long-term functioning of affected ecosystems and the survival of the organisms that depend on them.

Designed for the NGSS: Foundations Rubric

Components and Indicators	High Quality 5	Medium Quality 3	Low Quality 1
F1. Presence of Phenomena/Problem. The materials include phenomena/problems that • have the ***potential*** to drive student learning. • have the ***potential*** to relate across the dimensions.	The materials include phenomena/problems that have strong *potential* to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have some *potential* to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have limited *potential* to drive student learning toward the targeted learning goals.
F2. Presence of Three Dimensions. The materials include the three dimensions, such that • the DCIs, SEPs, and CCCs are present and have the *potential* to support student learning. • when engineering design is a learning focus, it is integrated with the appropriate dimensions (i.e., engineering is not isolated).	The materials consistently provide opportunities for students to develop and use grade-appropriate elements of the three dimensions.	The materials occasionally provide opportunities for students to develop and use grade-appropriate elements of the three dimensions.	The materials rarely provide opportunities for students to use grade-appropriate elements of the three dimensions.
F3. Presence of Environmental Principles and Concepts (EP&Cs). The materials include (as applicable) • instructional content that incorporates the California EP&Cs. • opportunities for students to examine the interactions and interdependence of human societies and natural systems. • opportunities for students to develop and/or implement solutions to real-world environmental problems.	The materials consistently provide opportunities for students to examine and use elements of the EP&Cs.	The materials occasionally provide opportunities for students to examine and use elements of the EP&Cs.	The materials rarely provide opportunities for students to examine and use elements of the EP&Cs.
F4. Presence of Logical Sequence. Materials demonstrate appropriate sequencing of three dimensions when • they include a targeted set of DCIs, SEPs, and CCCs within a sequence; • the sequence is clear and logical across the DCIs; and • the SEPs and CCCs are potentially sufficient and appropriate for students to figure out the phenomena or problems. • phenomenon or problems are linked to each other.	The materials consistently exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials occasionally exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials rarely exhibit a clear, logical, and appropriate sequence across the three dimensions.

Designed for CA NGSS: Foundations - Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the *Designed for CA NGSS Rubric: Foundations* and your district lens.
3. Reflect on the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Component	Strengths	Limitations
F1. Presence of Phenomena/ Problems.		
F2. Presence of Three Dimensions.		
F3. Presence of Environmental Principles & Concepts (EP&Cs).		
F4. Presence of a Logical Sequence of Learning.		

CA NGSS TIME Section 3: Paper Screen Designed for CA NGSS Score Sheet

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1. Phenomena/Problems		
SW 2. Three-Dimensional Conceptual Framework		
SW 3. Prior Knowledge		
SW 4. Metacognitive Abilities		
SW 5. Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00 =
Designed for CA NGSS: Teacher Support		
TS1. Phenomena/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**SUM=**	x 1.00 =
Grand Total (out of 100)		

If additional information is needed before deciding which programs will move forward to *Section 4: Pilot Materials*, complete *Section 3: Paper Screen Rubric 5 Designed for CA NGSS: Program*

Evaluation. This optional step provides a process to analyze an instructional program across units or across grade levels to determine the consistency of high-quality NGSS materials; and to look at the program in its entirety to add to the decision (from the paper screen) as to which programs will be piloted. Scores from Rubric 5 are not included the original score sheet and should be ranked separately.

Designed for CA NGSS: Program Evaluation	
PE1. Progressions of Learning	
PE2. Unit-to-Unit Coherence	
PE3. Program Assessment System	
TOTAL Program Evaluation	**SUM=**

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name ____________________________

CA NGSS TIME Section 3: Paper Screen
Teacher Support Evidence Chart: Foundations

Key Features of Instructional Materials		Strong	Adequate	Weak
F1. Presence of Phenomena/Problems. Identify and provide background information about the phenomena/problems in the unit and how they match the targeted learning goals.				
F2. Presence of Three Dimensions. Identify and provide background information about each of the three dimensions in the unit. Also take note of any support for engineering, technology, and applications of science.	SEPs			
	DCIs			
	CCCs			
	Engineering			
F3. Presence of Environmental Principles and Concepts (EP&Cs). Identify and provide background information about California's EP&Cs in the unit and how they match the learning opportunities for students.				
F4. Presence of Logical Sequence of Learning. Identify and provide background information on the sequence of learning in the unit.				

Strengths related to these Teacher Supports	Limitations related to these Teacher Supports

Answer Key for G1a Big Ideas/Smaller Ideas Strips: *Disruptions in Ecosystems* (Middle School)

Big Ideas

Animals interact with plants and other animals and with non-living things including air, water, and soil.

Scientists use models to show how things work, to construct explanations for why things happen, and to make predictions.

One major cause of ecosystem disruption is human activity.

Solutions to environmental problems can lessen the negative impact humans have on Earth.

Smaller Ideas

Yellowstone National Park was created in 1872.

Quagga mussels are filter feeders.

The term fishery includes all the people and organizations that catch a certain species of fish to eat or sell.

Coral reefs are fragile.

Blue Bay is a marine ecosystem.

Answer Key for G1a Big Ideas/Smaller Ideas Strips: *Why Is Our Corn Changing?* (Elementary School)

Big Ideas

Plants need light and water to grow.

Plants have external parts that help them survive and grow.

Structures inside a seed become a plant.

Available resources/conditions affect plant growth.

Plants have predictable characteristics at different stages of development.

Plants have different parts that help make new plants.

Smaller Ideas

Roots help plants get water.

Leaves help plants get light.

The structure inside the seed needs water.

Water causes harvest corn to change.

Plant growth can be measured.

Creating a Navigation Guide for Instructional Materials

The following steps can be used to create a Navigation Guide **(H1)** for instructional materials under consideration for adoption.

1. Determine the components of the curriculum (i.e. teacher edition/student edition; teacher's guide/storyline).
2. Determine how the components are organized (units, chapters, lessons, etc.).
3. Determine the components that address evidence of student learning (this may be in a student edition, student worksheets etc.) for use in developing the conceptual flow.
4. Determine the teacher materials (teacher edition, teacher's guide, unit outline, etc.) for use in developing the conceptual flow.
5. Develop a chart that has columns to include the chapter/lesson numbers and titles, student edition pages, teacher edition pages, and teacher edition details that will be reviewed.

Chapter/Lesson Number and Title	Student Edition Pages	Teacher Edition Pages	Teacher Edition Details

6. Complete the chart with the lessons in teaching order. Include the student material and teacher material pages that correspond to each lesson.
7. Write Overview and How to Use this Navigation Guide sections.

Section 3: Paper Screen Rubric 2 Designed for CA NGSS: Student Work

Time: 4 hours

Overview

In section 3 “Paper Screen Rubric 1: Foundations” the committee analyzed *what* the instructional materials provided for students to learn. Section 3 “Paper Screen Rubric 2: Designed for CA NGSS: Student Work” is used to analyze instructional materials for *how* the instructional materials suggested students would accomplish that learning. Using section 3 “Paper Screen Rubric 2: Designed for CA NGSS: Student Work,” the committee will examine how well the instructional materials provide powerful learning experiences that engage and change student thinking about phenomena/problems.

The committee will gather evidence to determine how well the instructional materials align to the CA NGSS by using tools and processes that reveal the quality of:

- opportunities to explain phenomena/problems,
- building a three-dimensional conceptual framework,
- leveraging student prior knowledge and experiences,
- providing experiences that develop metacognition, and
- providing equitable learning experiences for all students

Advance Preparation

Ensure adequate space for adding charts for “Rubric 2: Designed for CA NGSS: Student Work” to the wall with the conceptual flows built from “Rubric 1: Designed for NGSS: Foundations.”

Post C1-Norms, C2-Conceptual Flow Key, and C-3 Consensus scoring from Rubric 1.

Participants should retain their Parts and Whole Groups formed in “Rubric 1: Designed for NGSS: Foundations.”

Prepare a score sheet chart for the work about to take place.

Action Step 3.2 – Rubric 2: Student Work

Task 3.2a: Review Features Necessary for Authentic Student Learning

This portion of CA NGSS TIME builds upon section 3: "Rubric 1: Designed for NGSS: Foundations" and provides an opportunity to consider student thinking and engagement and focus on how students are going to learn. Once again, participants will engage in an iterative process of gathering evidence, analyzing evidence, and scoring evidence.

The facilitation guide and presentation for section 3 "Rubric 2: Designed for CA NGSS: Student Work" provides a shared professional learning experience and calibration activities for each step in the process ultimately leading to consensus about the quality of opportunities for student learning.

Setting the Stage

Start by having a conversation about characteristics of instructional materials that can provide opportunities for student thinking and engagement. Consider how the district's needs and priorities inform these opportunities. This will help the committee be more aware of what they expect and desire to see when reviewing materials. Ensure discussion occurs around the following: high-quality instructional materials should engage students in explaining phenomena or solving problems, elicit and engage prior knowledge, build conceptual understanding over time, develop metacognitive abilities, and promote learning for all student. To support this, you will be directed to take some time to ground participants in the research of *How People Learn* (NRC, 2000), a foundational document that helped inform *A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas* (NRC, 2012).

Overview of Gathering Evidence and Scoring

Rubric 2 has five components. Each is scored one at a time using the same process:

- Parts Groups gather evidence from their chapter/unit in the form of a conceptual flow and use H13 to individually record strengths and limitations
- Whole Groups tell the story of the unit using the evidence (path of student thinking) from each Parts Group in the order that the publisher presents the materials.
- Whole Groups score by consensus using the rubric H, sharing evidence from H13 Note Taking Parts Group Strengths and Limitations, chapter/section paths of student thinking and discussion.

- Scores are reported on H9--Designed for CA NGSS Score Sheet, and summary strengths and limitations are recorded on H15--Designed for CA NGSS: Student Work Strengths and Limitations.
- Then participants gather preliminary evidence for Teacher Support on H16 which is used in the Rubric 4 analysis of the instructional materials.

Consensus scoring is a key stone of the CA NGSS TIME process. Each person should share their score publicly. One way to do this is to have a *straw vote* where committee members show their score. Everyone should be able to defend their score selection with evidence from their documents ("H14 – Designed for CA NGSS: Student Work Rubric" and "H15 – Designed for CA NGSS: Student Work - Strengths and Limitations"*)* and the annotated instructional sequence flow.

Committee members should read the descriptions of the score points and have evidence from the unit, their documentation and the flow to support their scores. People with different score points (1, 3, and 5) should share their thinking. A discussion among people with different scores in which they explain their evidence for their score will help the team come to consensus.

Consensus means all participants contribute ideas and encourage the use of one another's ideas and opinions. The committee members should view differences as helpful rather than as a hindrance. Everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue. Those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time. Finally, all share in the final decision. Consensus does not mean a unanimous vote, everyone's first choice, or that everyone agrees. As Facilitator, work to encourage participation, rely on evidence from the conceptual flows, and moderate discussions.

Ultimately, the group will come to a decision, but there must be a "critical mass," enough of the group to give a final score.

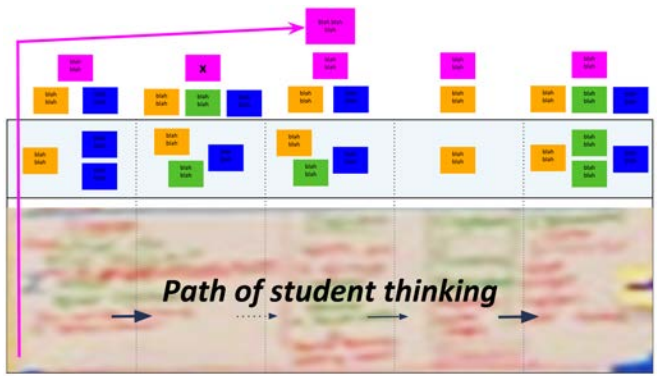
Once consensus has been reached the scores should be entered onto the "H9 – Designed for CA NGSS: Score Sheet."

The committee will go through the process of reaching consensus five times, once each for phenomena/problems, three-dimensional conceptual framework, prior knowledge, metacognitive abilities, and equitable learning opportunities.

Task 3.2b – Review Materials for Quality Features that Support Authentic Student Learning

Participants will work with their Parts Group where they will continue to focus on their part of the investigation or chapter (just part of the curriculum).

Step 1. Gather Evidence & Go Visual Overview

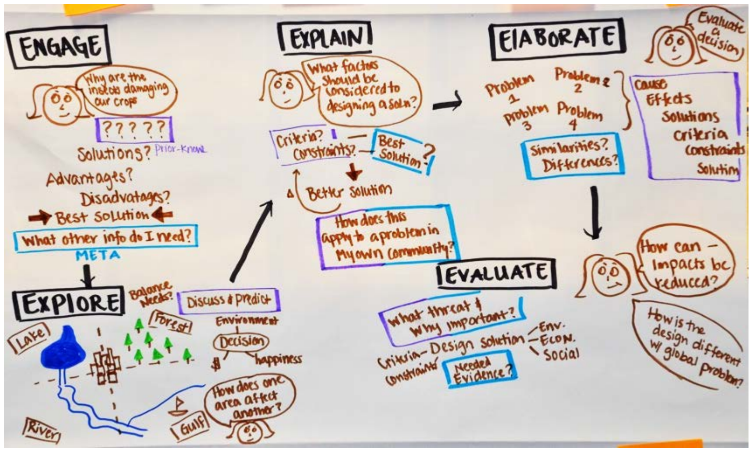


Each team (Parts Group) will add evidence for Rubric 2 below their conceptual flow created in Rubric 1.

- Step 1a. Move or rewrite the phenomena/problem from the conceptual flow and place at the top of the chart.
- Step 1b. Create the path of student thinking by Identify and analyze key learning experiences for three-dimensionality, their relationship to understanding phenomena or problems, and helping students experience science in a way that approximates the nature of science.
- Step 1c. Refine the original dimensions from the conceptual flow based on how the dimensions are used by students to make sense of phenomena/problems.,
- Step 4c. Use strength arrows to Identify the extent to which an anchoring phenomenon/problem or investigative phenomenon/problem drive student learning.

Step 2. Visualizing the Pathway of Student Thinking

Each Parts Group will add on to their evidence charts by summarizing the path of student thinking toward the learning goal, using arrows to show connections between lessons. The focus is on what students are learning/thinking, not the activities they are doing.



- Step 2a. What Drives the Student Learning?

  Using the “H12 – Designed for the CA NGSS: Student Work Evidence Chart,” participants review student activities. Each small group should tell the story of student learning in their assigned lesson(s) of the chapter. Note that they should pay attention to the following questions:

  - What is driving student learning (e.g. the question, scenario, problem, phenomenon, etc.)?
  - What ideas and practices students develop through the experiences?
  - How do students access, engage, and use prior knowledge to further their thinking?
  - How do students develop metacognitive abilities?

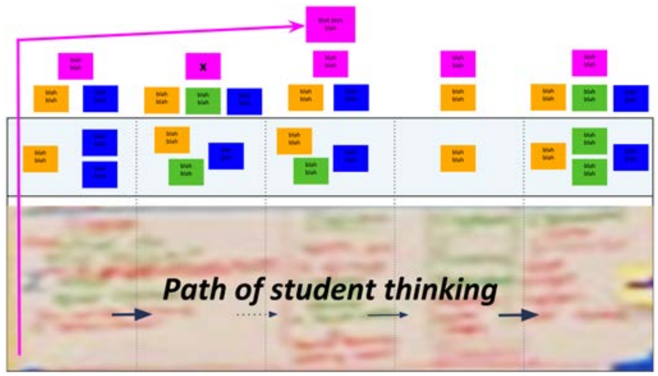
- Step 2b. Strengths and Limitations

  Using H13 Note Taking Parts Strengths and Limitations. Individual record their strength and limitations for each component to be used as evidence when scoring.

Step 3. Tell the Story

As a Whole Group, Part Groups In sequential order, describe the path of if/how the anchoring/investigative phenomenon/problem drives student learning.

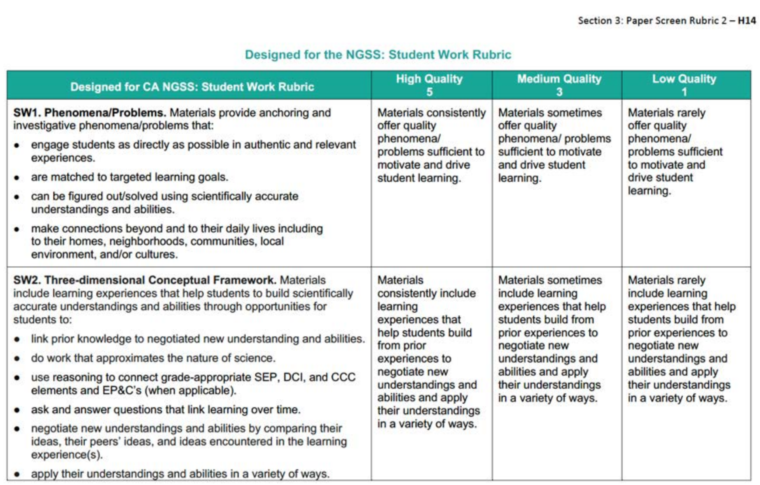
Part Groups should include evidence of how key learning experiences and the three-dimensionality help students’ understanding of phenomena or problems and afford students experiences to view science in a way that approximates the nature of science. They may also include evidence of how prior knowledge is utilized and how students develop metacognitive abilities. This allows the committee to get a sense of the incorporation of these key features throughout the unit. Parts Groups should refer to the chart they created as evidence when citing examples of how the features support learning. As the story is told, participants add thick, thin, or dotted arrows representing strengths and connections across chapters/investigations as well as to the phenomena/problems.



At this point, the committee should discuss the overall sequence of student learning as demonstrated in the unit.

Step 4: Consensus Scoring

Prior to consensus conversations and scoring, jigsaw the components of the "H14 – Designed for CA NGSS: Student Work Rubric" so that the committee has a common understanding of each component.



Section 3: Paper Screen Rubric 2 – **H14**

Designed for the NGSS: Student Work Rubric

Designed for CA NGSS: Student Work Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SW1. Phenomena/Problems. Materials provide anchoring and investigative phenomena/problems that: • engage students as directly as possible in authentic and relevant experiences. • are matched to targeted learning goals. • can be figured out/solved using scientifically accurate understandings and abilities. • make connections beyond and to their daily lives including to their homes, neighborhoods, communities, local environment, and/or cultures.	Materials consistently offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials sometimes offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials rarely offer quality phenomena/ problems sufficient to motivate and drive student learning.
SW2. Three-dimensional Conceptual Framework. Materials include learning experiences that help students to build scientifically accurate understandings and abilities through opportunities for students to: • link prior knowledge to negotiated new understanding and abilities. • do work that approximates the nature of science. • use reasoning to connect grade-appropriate SEP, DCI, and CCC elements and EP&C's (when applicable). • ask and answer questions that link learning over time. • negotiate new understandings and abilities by comparing their ideas, their peers' ideas, and ideas encountered in the learning experience(s). • apply their understandings and abilities in a variety of ways.	Materials consistently include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials sometimes include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials rarely include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.

Each group reads its assigned component to become familiar with indicators of the components and what constitutes the different quality levels as they relate the instructional materials.

- phenomena/problems
- three-dimensional conceptual framework
- prior knowledge
- metacognitive abilities
- equitable learning opportunities

The committee then scores one component at a time by sharing evidence from H13—Note Taking: Strengths and Limitations, the chapter/section paths of student thinking charts, unit "story" of all of the charts, and strength arrows between chapter "paths of student thinking" as well as strength arrows that indicate the relationship of student thinking to the phenomenon/problem.

Through a consensus process (see overview above) the committee determines a score which is entered on "H9 -- Designed for CA NGSS Score Sheet" and then summarizes the Strengths and Limitations of these materials for this rubric component on H15 (see below). This process is repeated until all components have been addressed.

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	SUM=	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	SUM=	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1. Phenomena/Problems		
SW 2. Three-Dimensional Conceptual Framework		
SW 3. Prior Knowledge		
SW 4. Metacognitive Abilities		
SW 5. Equitable Learning Opportunities		
TOTAL Student Work	SUM=	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	SUM=	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1. Phenomena/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	SUM=	x 1.00=
Grand Total (out of 100)		

Name of Instructional Materials _______________________________ Grade Level/Course _______ Unit/Module Title___________

Section 3: Paper Screen Rubric 2 – **H15**

Designed for CA NGSS: Student Work – Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Student Work Rubric" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
SW1. Quality of opportunities to explain phenomena/solve problems.		
SW2. Quality of building a three-dimensional conceptual framework. **SW3. Quality of leveraging student prior knowledge and experiences.**		
SW4. Quality of providing experiences that develop metacognition.		
SW5. Quality of providing equitable learning opportunities.		

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Step 5. Teacher Support

The Parts Groups will analyze the instructional materials for how well they support teachers in implementing CA NGGSS aligned instruction for all students. Individuals in the Parts Groups complete "H16 — Designed for CA NGSS Student Work Teacher Support" for use with Rubric 4.

Name of Instructional Materials _______________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name ____________________________

Section 3: Paper Screen Rubric 2 – **H16**

CA NGSS TIME Section 3: Paper Screen
Teacher Support Evidence Chart: Student Work

Key Features of Instructional Materials		Strong	Adequate	Weak
SW1. Phenomena/Problems. Provide support and strategies for how to help students figure out/solve authentic and relevant anchor and investigative phenomena/problems using the three-dimensions.				
SW2. Three-dimensional Conceptual Framework. Provide support and strategies for how teachers • help students develop a conceptual framework of scientifically accurate understandings and abilities related to:	DCIs, SEPs, and CCCs			
	NoS and Engineering			
	EP&Cs			
	ELA and Math			
• create a learning environment that values and leverages students' ideas, motivates learning, and helps students negotiate new meaning as they interact with others' ideas, new information, and new experiences.				
SW3. Prior Knowledge. Provide support and strategies to leverage students' prior knowledge and experiences to motivate learning.				
SW4. Metacognitive Abilities. Provide support and strategies for how to help students develop metacognitive abilities.				
SW5. Equitable Learning Opportunities. Provide support, strategies, and resources for how to ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences.				

Strengths related to these Teacher Supports	Limitations related to these Teacher Supports

CA NGSS TIME adapted from © 2018 BSCS Science Learning, developed in collaboration with the K-12 Alliance at WestEd and Achieve, Inc.

Step 6. Value of the Process

The committee reflects on the value of analyzing and evaluating instructional materials in terms of monitoring student progress. The committee also reflects on what they would like to remember and apply to their context through a quick write on sticky notes.

CA NGSS TIME

California Next Generation Science Standards Toolkit for Instructional Materials Evaluation

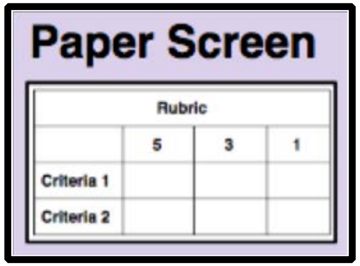
Section 3: Paper Screen
Rubric 2 Designed for CA NGSS: Student Work

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Acheive

Purpose & Outcomes

- Learn a process for analyzing instructional materials for CA NGSS.
- Apply the process and tools to help you:
  - Gain a shared understanding of the characteristics of high-quality instructional materials.
  - Use the process to inform the selection of instructional materials *and* to plan for classroom use.
  - Deepen your understanding of CA NGSS through professional learning experiences.

Paper Screen: You are Here



- Rubric 1: Foundations
  What are students going to learn?
- **Rubric 2: Student Work**
  How are students going to learn?
- Rubric 3: Monitoring Student Progress
  How are students assessed?
- Rubric 4: Teacher Supports
  How do the materials support teachers to facilitate student learning?

Rubric 2 Goals

Driving question:

How well do materials provide powerful learning experiences that engage and change student thinking about phenomena/problems?

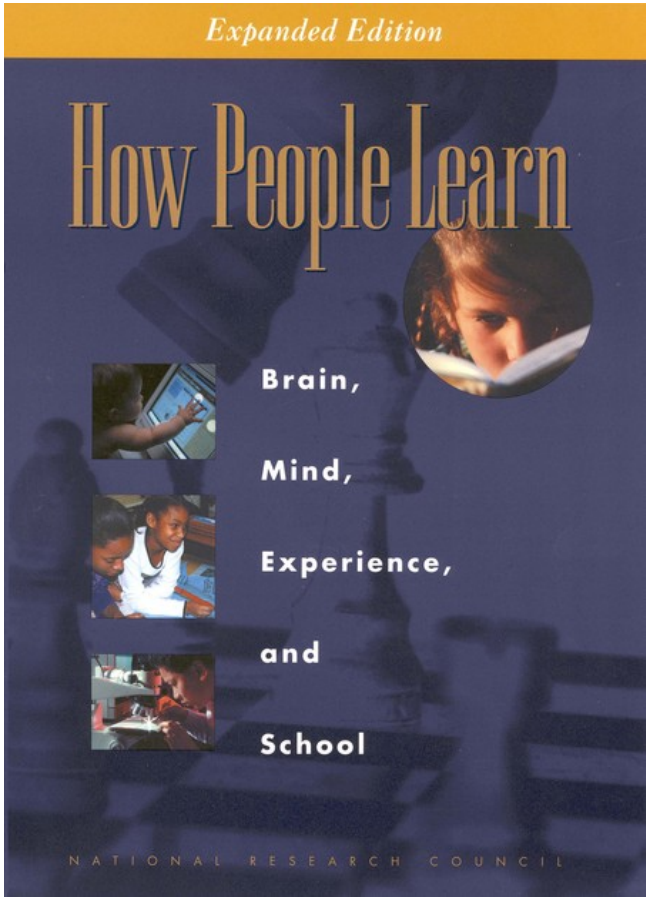
We will determine how well instructional materials align to CA NGSS to support this through:

- The *quality* of opportunities to explain phenomenon/solve problems.
- The *quality* of building a three-dimensional conceptual framework.
- The *quality* of leveraging student prior knowledge and experiences.
- The *quality* of providing experiences that develop metacognition.
- The *quality* of providing equitable learning opportunities for *all* students.

Essential Questions

- What would you expect to find in high quality instructional materials that make student thinking visible and provide powerful learning experiences that shift thinking?
- What is the <u>difference</u> between what students ***do*** and what they ***learn*** in a learning experience?
- How is what students do and learn related to the phenomenon/problem?

How People Learn – H11

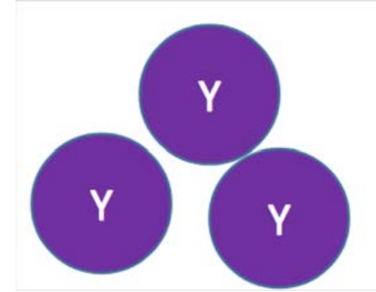


National Research Council (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition.* Washington, DC: The National Academies Press

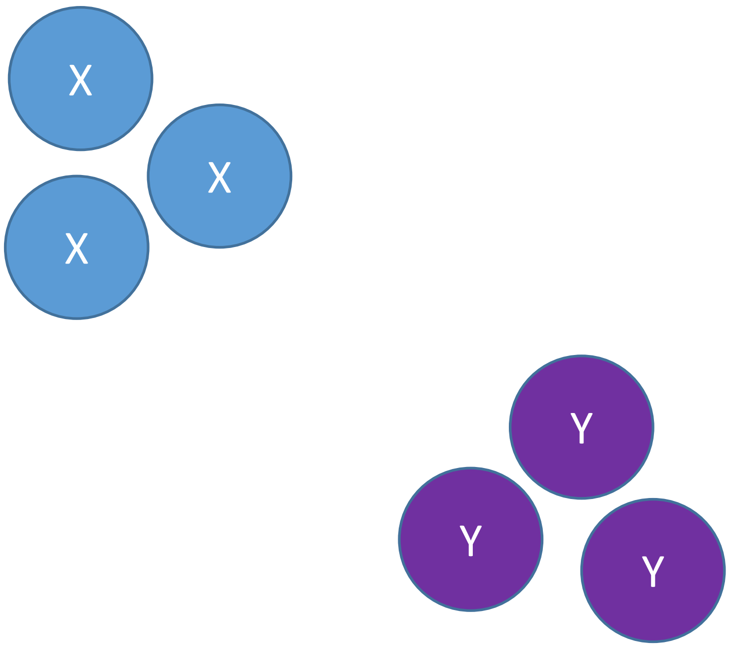
How People Learn Key Findings

- Prior Knowledge
- Conceptual Frameworks
- Metacognition

Transition



Sit in your **Parts Group** for this next activity.

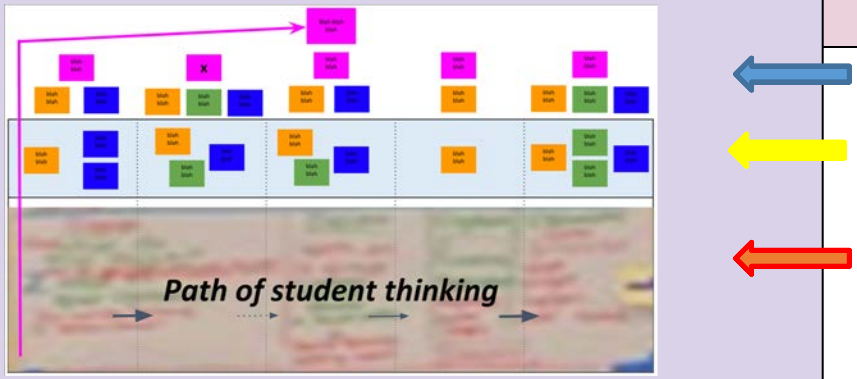


Gather Evidence & Go Visual: Overview

Gather Evidence

- The *quality* of opportunities to explain phenomenon/solve problems
- The *quality* of building a three-dimensional conceptual framework
- The *quality* of leveraging student prior knowledge and experiences
- The *quality* of providing experiences that develop metacognition
- The *quality* of providing equitable learning opportunities for *all* students

Go Visual

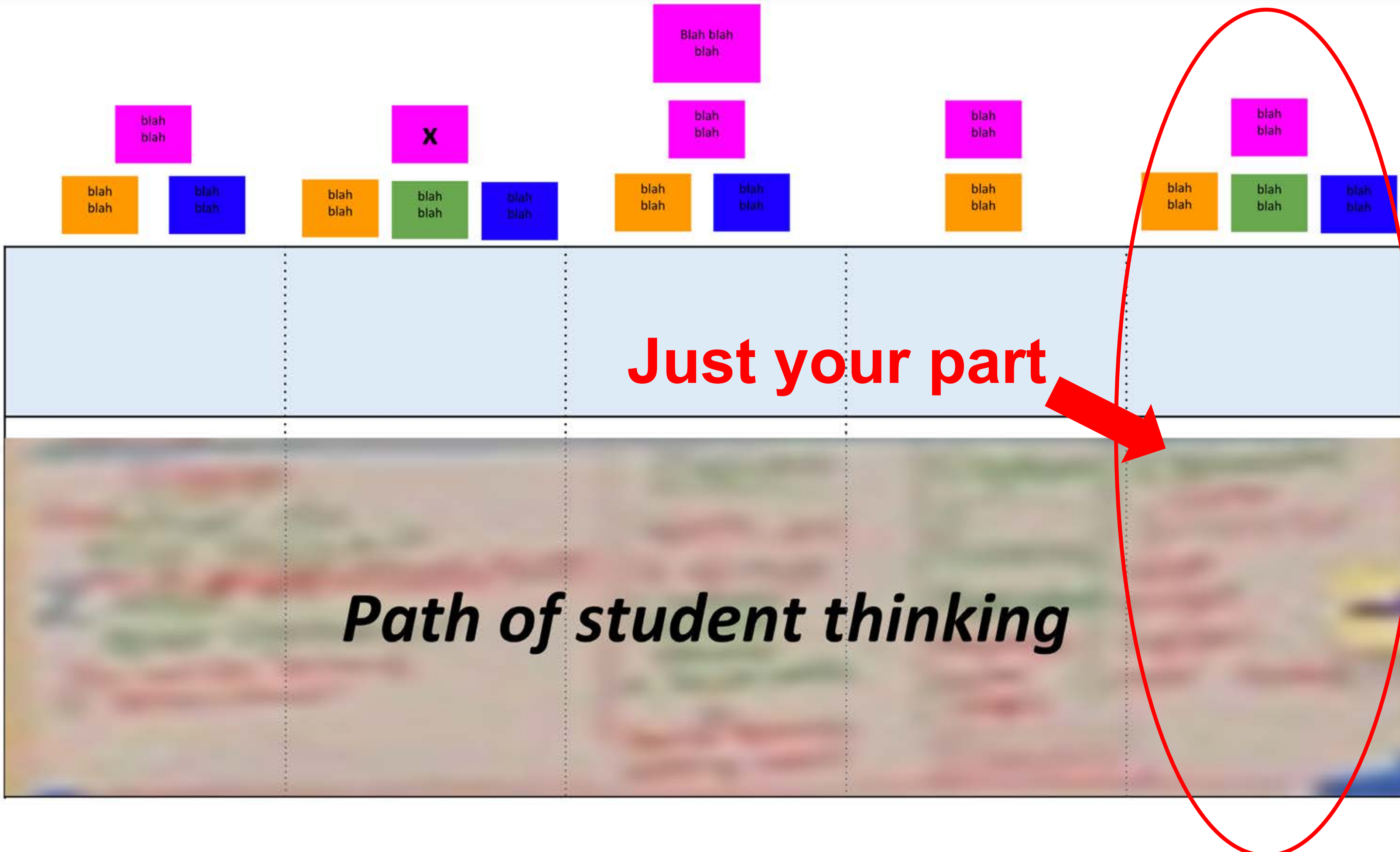


Gather Evidence & Go Visual: Initial Links to Phenomena

Gather Evidence

- What phenomena/problems students are figuring out (post phenomena using pink sticky notes)?
- What ideas and practices are students using to figure out the phenomena/problems?
  - DCI's - orange
  - SEP's - blue
  - CCC's - green

Go Visual


Blah blah blah
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blah blah
Just your part
Path of student thinking

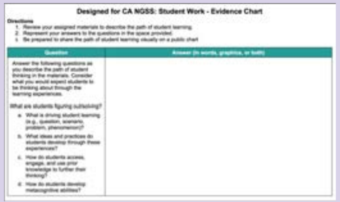
Gather Evidence & Go Visual: Path of Student Thinking

Gather Evidence

What are students figuring out/solving?

- What is *driving* student learning?
- What *ideas,* and *practices* do students develop?
- How do students access, engage, and use *prior knowledge* to further their thinking?
- How do students develop *metacognitive* abilities?

Discuss and record H12



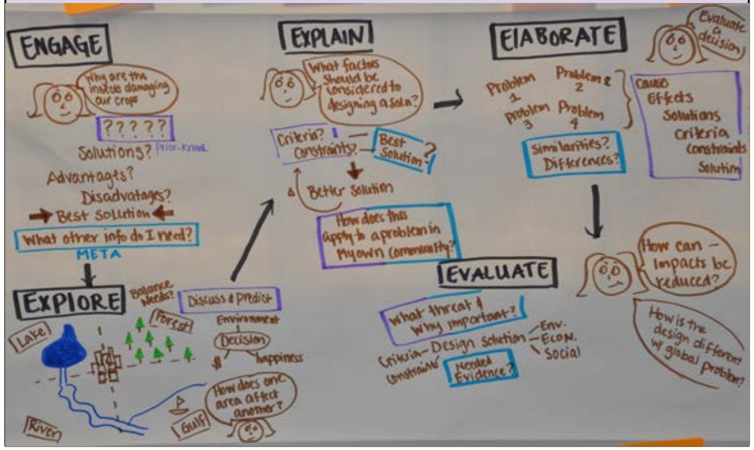
Designed for CA NGSS: Student Work - Evidence Chart

Directions

1. Review your assigned materials to describe the path of student learning.
2. Represent your answers to the questions in the space provided.
3. Be prepared to share the path of student learning visually on a public chart

Question	Answer (in words, graphics, or both)
Answer the following questions as you describe the path of student thinking in the materials. Consider what you would expect students to be thinking about through the learning experiences. What are students figuring out/solving? a. What is driving student learning (e.g., question, scenario, problem, phenomenon)? b. What ideas and practices do students develop through these experiences? c. How do students access, engage, and use prior knowledge to further their thinking? d. How do students develop metacognitive abilities?	

Then Go Visual



Note Taking: Strength and Limitations

- Discuss the evidence with your Parts Group
- As an individual, complete Note Taking Parts Group – Strengths and Limitations H13

Designed for CA NGSS: Student Work
Note Taking Part Group-Strengths and Limitations

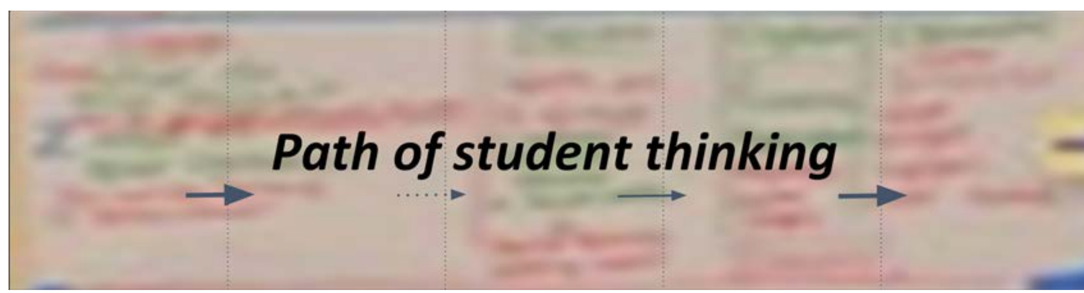
Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

Components	Strengths	Limitations
SW1Quality of opportunities to explain phenomena/solve problems		
SW2 Quality of building a three-dimensional conceptual framework		
SW3 Quality of leveraging student prior knowledge and experiences		
SW4 Quality of providing experiences that develop metacognition		
SW5 Quality of providing equitable learning opportunities		

Tell the Story

- Share the path of student thinking across the unit:
  - How do students’ ideas develop (from prior knowledge) and change over time (metacognition)?
  - How do students use all three dimensions to build understanding of phenomena/problems?
- Add strength arrows between chapters/sections to show connections.



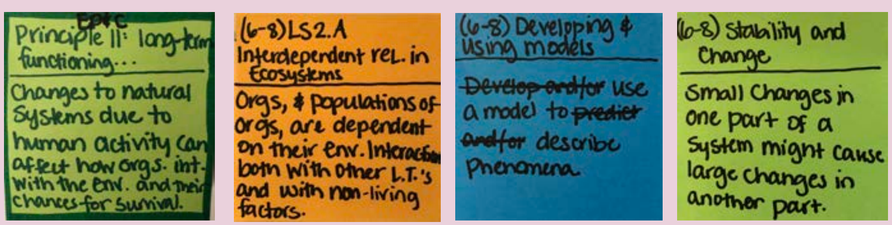
Gather Evidence & Go Visual: Dimensions Refined

Gather Evidence

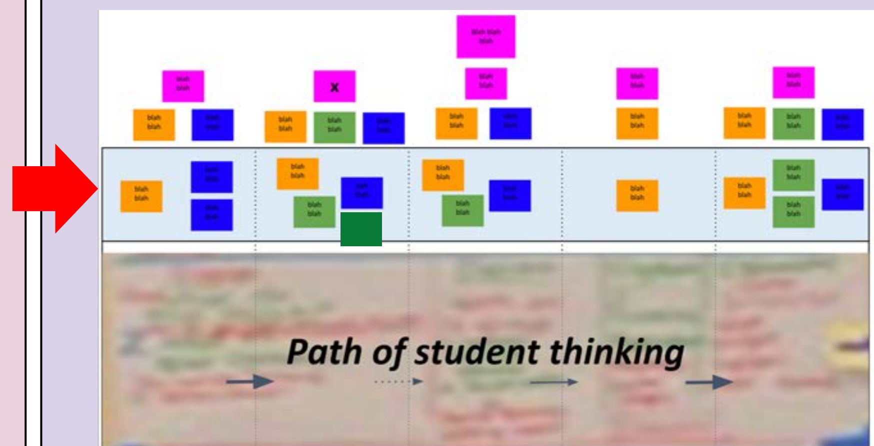
Identify the element level of each dimension in which students were engaged.

Rewrite the element level on a sticky note and compare to original sticky note

Identify how the dimensions build across the unit.



Go Visual



Note Taking:
Add to Strength and Limitations

- Discuss the evidence with your Parts Group
- As an individual, add to Note Taking Parts Group – Strengths and Limitations H13

Designed for CA NGSS: Student Work
Note Taking Part Group-Strengths and Limitations

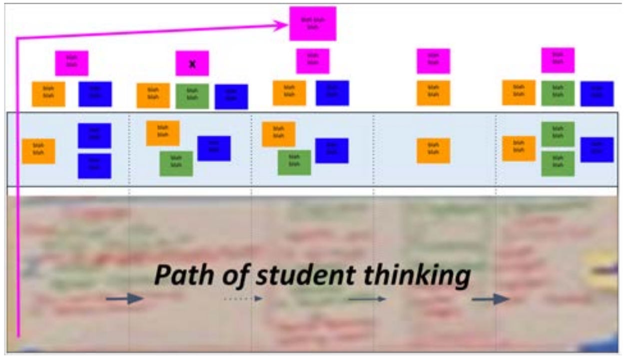
Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

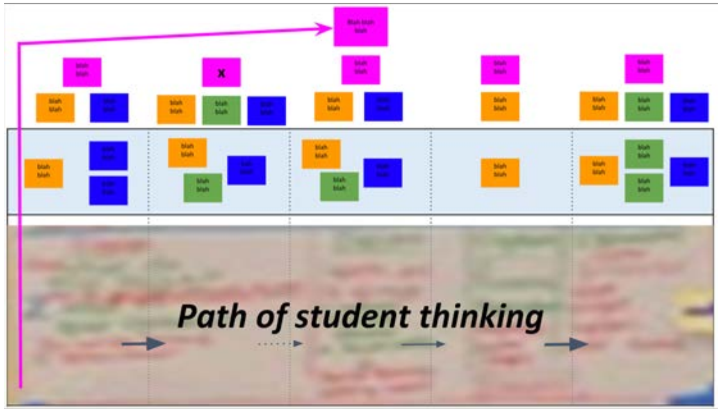
Components	Strengths	Limitations
Quality of opportunities to explain phenomena/solve problems		
Quality of building a three-dimensional conceptual framework		
Quality of leveraging student prior knowledge and experiences		
Quality of providing experiences that develop metacognition		
Quality of providing equitable learning opportunities		

Tell the Story Again

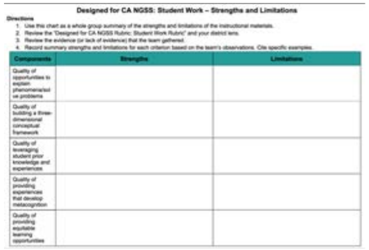
- Tell the story of student thinking across the unit/module.
- Focus on how the dimensions build on each other to support student understanding of the phenomenon/problem.
- Add strength arrows to show connections of the path of student thinking and the dimensions to the phenomenon/problem.



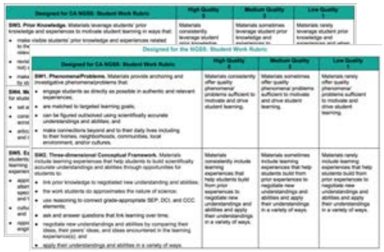
Scoring Process



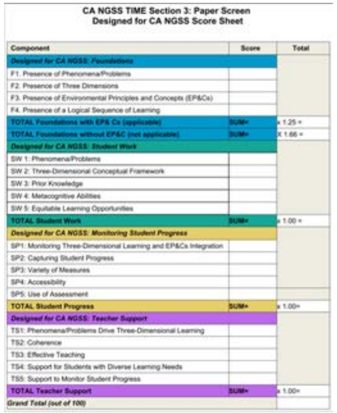
Evidence Chart



Whole Group
Strengths and Limitations (**H15**)



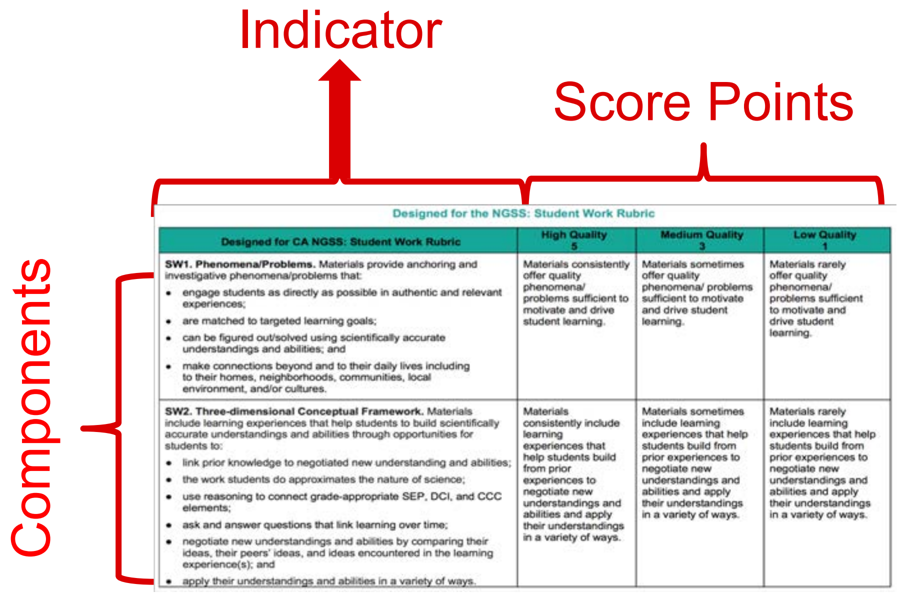
Student Work Rubric (**H14**)



Score Sheet (**H9**)

Understanding the Rubric

Recognize the format of the rubric: Components, indicators and score parts.



Designed for the NGSS: Student Work Rubric

Designed for CA NGSS: Student Work Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SW1. Phenomena/Problems. Materials provide anchoring and investigative phenomena/problems that: • engage students as directly as possible in authentic and relevant experiences; • are matched to targeted learning goals; • can be figured out/solved using scientifically accurate understandings and abilities; and • make connections beyond and to their daily lives including to their homes, neighborhoods, communities, local environment, and/or cultures.	Materials consistently offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials sometimes offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials rarely offer quality phenomena/ problems sufficient to motivate and drive student learning.
SW2. Three-dimensional Conceptual Framework. Materials include learning experiences that help students to build scientifically accurate understandings and abilities through opportunities for students to: • link prior knowledge to negotiated new understanding and abilities; • the work students do approximates the nature of science; • use reasoning to connect grade-appropriate SEP, DCI, and CCC elements; • ask and answer questions that link learning over time; • negotiate new understandings and abilities by comparing their ideas, their peers' ideas, and ideas encountered in the learning experience(s); and • apply their understandings and abilities in a variety of ways.	Materials consistently include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials sometimes include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials rarely include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.

What Would it Look Like?

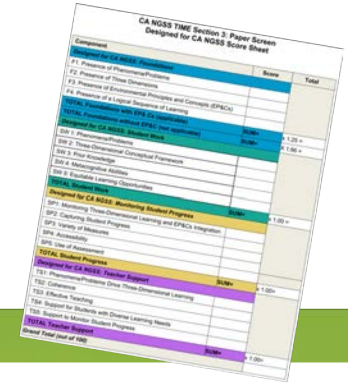
For each component of the rubric:

- Read and underline key words in the indicators.
- Read score points (5,3,1).
- Discuss what a “5” might look like in any instructional materials. What might the materials include? What evidence might be indicated on the evidence chart?

Scoring: Reaching Consensus

- All participants contribute ideas.
- View differences as helpful rather than as a hindrance; disagree publicly.
- Paraphrase the discussion when needed and seek to understand each other's point of view.
- Not a unanimous vote, but something the team can "live with".

Scoring Each Component



CA NGSS TIME Section 3: Paper Screen
Designed for CA NGSS Score Sheet

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP&Cs (applicable)	SUM=	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	SUM=	x 1.56 =
Designed for CA NGSS: Student Work		
SW 1: Phenomena/Problems		
SW 2: Three-Dimensional Conceptual Framework		
SW 3: Prior Knowledge		
SW 4: Metacognitive Abilities		
SW 5: Equitable Learning Opportunities		
TOTAL Student Work	SUM=	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1: Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2: Capturing Student Progress		
SP3: Variety of Measures		
SP4: Accessibility		
SP5: Use of Assessment		
TOTAL Student Progress	SUM=	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1: Phenomena/Problems Drive Three-Dimensional Learning		
TS2: Coherence		
TS3: Effective Teaching		
TS4: Support for Students with Diverse Learning Needs		
TS5: Support to Monitor Student Progress		
TOTAL Teacher Support	SUM=	x 1.00=
Grand Total (out of 100)		

1. Review and discuss component, indicators, and score points.
2. Discuss evidence from the evidence chart.
3. Share individual strengths and limitations (H13).
4. Share initial score.
5. Discuss evidence for score and reach consensus.
6. Complete the whole group strengths and limitations H15.
7. Record final score on H9.

Components to Score

SW1. Phenomena/Problems.

SW2. Three-Dimensional Conceptual Framework.

SW3. Prior Knowledge.

SW4. Metacognitive Abilities.

SW5. Equitable Learning Opportunities.

Total Score for Rubric 2: Student Work

Designed for CA NGSS: Student Work		
SW 1: Phenomena/Problems		
SW 2: Three-Dimensional Conceptual Framework		
SW 3: Prior Knowledge		
SW 4: Metacognitive Abilities		
SW 5: Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =

Teacher Support: Student Work

- Use evidence from Teacher Materials.
- Read through the Teacher Support Evidence Chart: Student Work (H16).
- Individually, place a check mark in the appropriate column for each feature.
- Document the strengths and limitations of these features.

You will use this analysis in Rubric 4.

Value of The Process

What is the value of Rubric 2 in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 3: Paper Screen Rubric 2: Designed for CA NGSS: Student Work Script (Facilitator Guide)

Purpose

To analyze instructional materials for how student thinking and engagement is addressed and to enable participants to apply “Rubric 2 – Designed for CA NGSS: Student Work” as part of the “CA NGSS TIME Paper Screen.”

Time: 4 hours

Part I	Introduction to “Rubric 2 – Designed for CA NGSS: Student Work”	30 minutes
Part II	Gather Evidence Materials for CA NGSS features	120 minutes
Part III	Score	90 minutes

Materials

Slides

S1	Title
S2	Purpose & Outcomes
S3	Paper Screen You Are Here
S4	Rubric 2 Goals
S5	Essential Questions
S6	How People Learn – H11
S7	How People Learn Key Findings
S8	Transition
S9	Gather Evidence & Go Visual: Overview
S10	Gather Evidence & Go Visual: Initial Links to Phenomenon
S11	Path of Student Thinking
S12	Gather Evidence & Go Visual: Path of Student Thinking
S13	Note Taking: Strengths and Limitations
S14	Tell the Story
S15	Gather Evidence & Go Visual: Dimensions Refined
S16	Note Taking: Add to Strengths and Limitations
S17	Tell the Story Again
S18	Scoring Process
S19	Understanding the Rubric

S20 What Would It Look Like?
S21 Scoring Reaching Consensus
S22 Scoring Each Component
S23 Components to Score
S24 Total Score for Rubric 2 Student Work
S25 Teacher Support Student Work
S26 Value of The Process

Handouts

H11 How People Learn Key Findings
H12 Designed for CA NGSS: Student Work Evidence Chart
H13 Note Taking Parts Strengths and Limitations
H14 Designed for CA NGSS: Student Work Rubric
H15 Designed for CA NGSS: Student Work - Strengths and Limitations
H16 Teacher Support Evidence Chart: Student Work

Resources for facilitators

R1 Brown, K., Burditt, T., Cerwin, K., Clark, J., Cochrane, C., DiRanna, K., Topps, J. (n.d.). Criteria for selecting useful phenomena. Retrieved from: https://sites.google.com/site/sciencephenomena/criteria

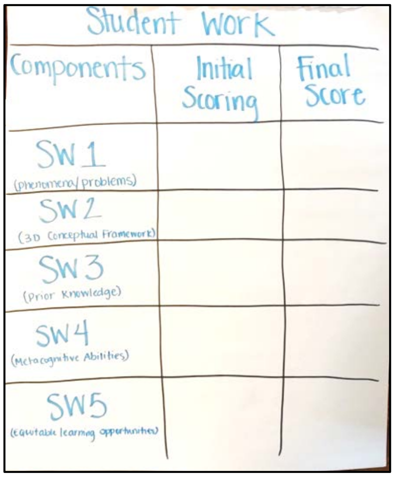
R2 California Department of Education (2016). *2016 Science Framework for California Public Schools Kindergarten through Grade 12.*, "Chapter 13 (Instructional Strategies)" Retrieved from: https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp

R3 National Research Council (2012). *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: National Academies Press. Retrieved from: https://doi org/1017226/13165

R4 National Research Council (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition.* "Chapter 1 (Learning: From Speculation to Science)." Washington, DC: National Academies Press. Retrieved from: https://doi org/1017226/9853

Charts

C6 Consensus Score



Supplies

- Chart Paper, markers, and painter's blue tape
- Sticky notes (3" x 3"): yellow, orange, green, blue, pink
- Sharpies (enough for each person to have one)
- Sets of instructional materials (Teacher Edition & Student Edition)
- 2 pieces of chart paper (per group)

Other

From "Section 3.1 Designed for CA NGSS: Foundations"

- Sets of instructional materials (Teacher Edition & Student Edition) Conceptual Flow
- Characteristics of High-quality Instructional Materials charts
- H9 – Designed for CA NGSS: Score Sheet
- C1 – Norms for Collaborative Work
- C2 –Conceptual Flow Key
- C3 – Consensus Building Strategies

Advance Preparation

1. Ensure adequate space for adding the charts for "Rubric 2: Designed for NGSS: Student Work" to the wall near the Conceptual Flow from "Rubric 1: Designed for NGSS: Foundations." If possible, keep the conceptual flow charts in unit order on one wall, and on another wall, build the charts for Rubric 2. If that is not possible, then the conceptual flow charts need to be raised on the wall, so that the rubric 2 charts

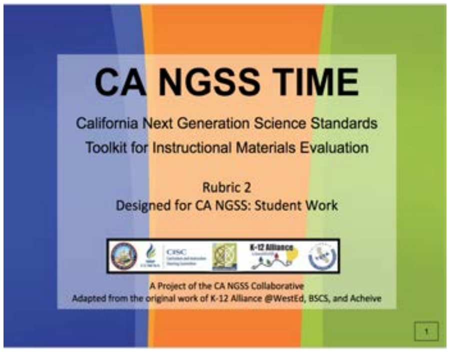
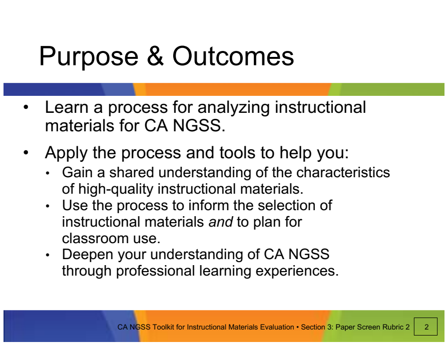
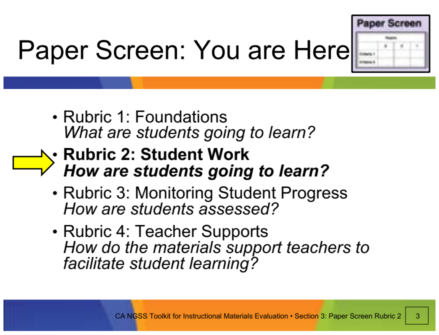
can be placed under the conceptual flow charts

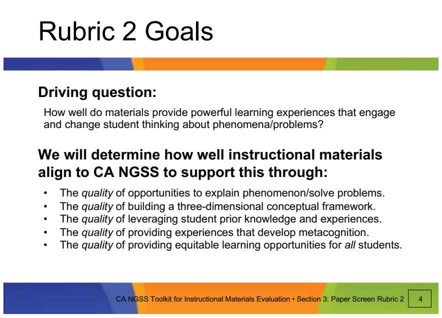
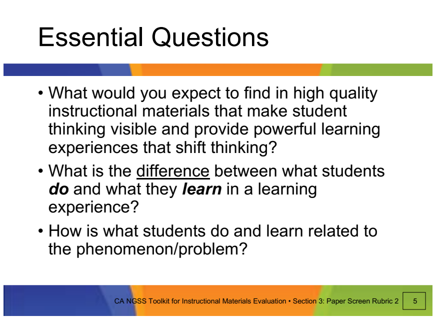
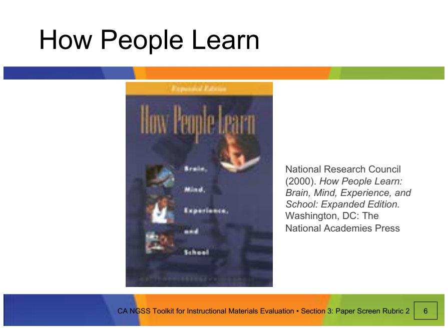
2. Duplicate Handouts **H11-16**

3. Create Chart **C-6 Consensus Scoring** (headers only) and post when ready to score

4. Read R1–R2 as preparation for this session

Part 1 – Introduction (30 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 1: Title Slide** a. Welcome participants to the session. Remind them of the norms **(C1)** b. Ask participants to share any reflections on using the Foundation Tools and Process from the previous session *Facilitator Note: if Rubric 1 and Rubric 2 are spaced with time in between them, use artifacts from Rubric 1 to remind participants of what they did.*
	**Slide 2: Purpose and Outcomes** a. Incorporate participants reflections from Rubric 1 and ask: What progress have we made so far toward the outcomes for CA NGSS TIME? b. Emphasize the last bullet on the slide.
	**Slide 3: Paper Screen: You Are Here** a. Explain to participants that they will continue with the paper screen process and tools, now learning and using Rubric 2 Designed for CA NGSS: Student Work b. Remind participants that in Rubric 1 they discussed the characteristics of high-quality materials and analyzed the materials for the **WHAT** of CA NGSS (i.e., presence of phenomena, dimensions, EP&Cs, and logical sequence). c. Tell participants that their focus for Rubric 2 is HOW materials engage and change student thinking about phenomenon/problems.

Slide	Slide Title and Facilitation Notes
	**Slide 4: Rubric 2 Goals** a. Ask participants to read the question and keep it in mind as they review materials. b. Explain that Rubric 2 addresses the *quality* of the materials to engage students in figuring out phenomena/problems. c. The Rubric addresses the *quality* of the learning experiences that moves student to cause them to change/modify/build on their original thoughts toward scientific or engineering explanations of the phenomenon/problem. d. The Rubric also addresses the quality of equitable opportunities for all students.
	**Slide 5: Essential Questions** a. Present each question one at a time using this pattern: ask participants to individually reflect, then share with their table group, and then share with the room. b. Chart ideas of the whole group for each question. c. Make connections to the components of Rubric 2 where appropriate (use of phenomenon/problems, three-dimensional conceptual framework, prior knowledge, metacognition, and equitable learning experiences for all students.)
	**Slide 6: How People Learn** a. Distribute H11 How People Learn, explain that this researched-based book is a compilation of what the field knows cognitively about how people learn. It is based on decades of educational research. b. Key findings from the research served as the basis for the development of the national *A Framework for K-12 Science Education.* This framework guided the development of the NGSS nationally and in California. c. Keys findings also inform the design of lessons and the impact on student learning/understanding.

Slide	Slide Title and Facilitation Notes
How People Learn Key Findings • Prior Knowledge • Conceptual Frameworks • Metacognition CA NGSS Toolkit for Instructional Materials Evaluation • Section 3: Paper Screen Rubric 2 7	**Slide 7: How People Learn Key Findings** a. Ask table groups to discuss the key words on this slide. What do those words mean to them? b. Ask several table groups to share their ideas about prior knowledge, then repeat with conceptual frameworks, and finally metacognition. *Facilitator Note: If necessary, use any of these ideas to support the conversation:* *<u>Prior knowledge</u>: what students bring to the new learning—their past experiences, knowledge, ideas, conceptions, misconceptions etc. In classrooms, we often elicit prior knowledge…and then go right on and teach what we planned! The goal instead would be to build on student prior knowledge as we facilitate bringing them to the scientific explanation of phenomena.* *<u>Conceptual Frameworks</u>: This is the idea that experts have a schema or way of thinking about a topic that is not focused on just the details or facts. Instead, experts have a broader view on which they can hang information. For example, an expert chess player sees several plays ahead; a chef can create meals from a variety of foods without using a recipe; a seasoned traveler knows how to navigate cancelled planes. In school we often focus on the bits and pieces. NGSS expects student to engage in big ideas—core ideas, practices, and cross cutting concepts.* *<u>Metacognition</u>: The importance of understanding how you come to know something. What did you think when you started? What ideas made you think differently? Why? What are you questioning now?* c. Ask participant to discuss what they would look for in instructional materials that meets this vision.

Slide	Slide Title and Facilitation Notes
	**Slide 8: Transition** Ask participants to move to their Parts Group where they will continue to focus on the part of the unit that they investigated for Rubric 1.

Part 2 – Gather Evidence (120 minutes)

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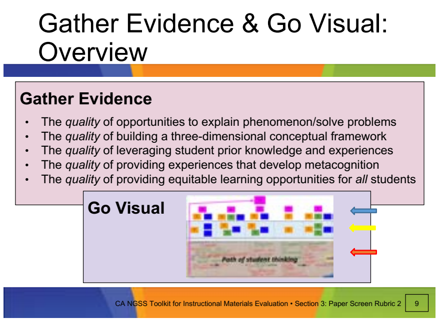

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Slide 9: Gather Evidence & Go Visual

a. Explain that Rubric 2 involves several passes through the materials to deepen their understanding of the quality of learning experiences that deepen (or not) students “figuring out” phenomenon/problems.

b. Explain that they will gather evidence in a chart that is modeled on this slide. This evidence builds on the evidence gathered in the conceptual flow charts from Rubric 1.

c. This is an animated slide. Explain that participants will conduct their evidence gathering in three steps.

d. Advance the slide to reveal the blue arrow. Explain that the first step involves transferring/rewriting the phenomenon and supporting dimensions from the conceptual flow to this chart.

e. Advance the slide to reveal the red arrow. Explain that the second step captures the depth of student thinking about the phenomenon/problem as they engage in learning activities that use appropriate dimensions to increase student understanding and approximate the nature of science. <u>This step is not about the activities, but about the path of student thinking!</u>

f. Advance the slide to reveal the yellow arrow. In step 3 participants refine the dimensions that enable students to figure out phenomenon/problems and compare the dimensions to the original ones from the conceptual flow.

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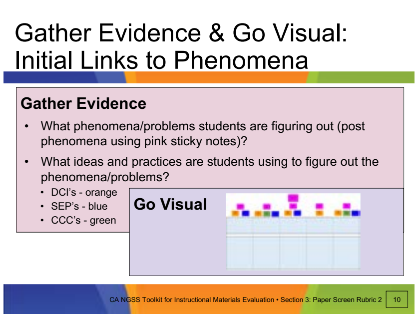

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Slide 10: Gather Evidence & Go Visual: Initial Links to Phenomena

a. Distribute 2 pieces of chart paper to each group. Ask groups to fold one piece of paper in half landscape to make a crease in the paper. Hang the sheet horizontally on the wall, or work at your table group and hang the chart later.

b. On the top half of the chart paper, ask Parts Groups to copy the phenomena/problems identified on their

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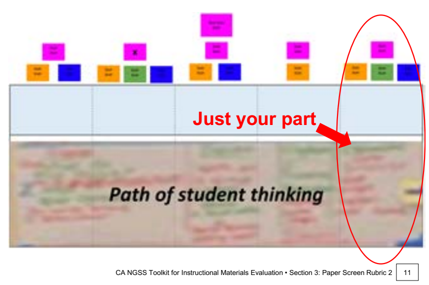
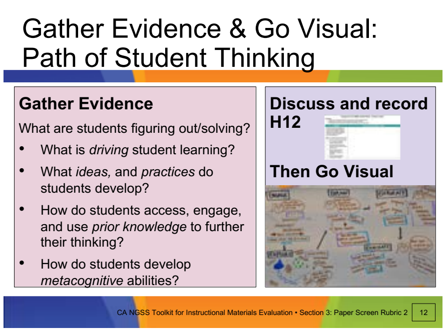
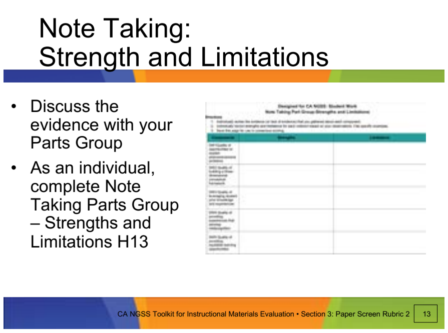
Slide	Slide Title and Facilitation Notes
	Conceptual Flow onto new pink sticky notes. If there is no phenomenon/problem in the chapter, post a pink sticky note with a large black X on it. *Facilitator Note: These phenomena can be either anchor or investigative. Ensure participants identify phenomena that is explicit in the materials, not assumed. For help with phenomena, visit https://ngss.sdcoe.net/Phenomena-and-the-NGSS/The-Importance-of-Phenomena* c. Ask groups to select the major dimensions that support the identified phenomena/problem. Copy the dimensions on the appropriate color sticky note (orange, DCI; blue, SEP; green, CCC; dark green EP&Cs) and post under the phenomenon on the chart.
	**Slide 11: Path of Student Thinking** a. Explain that this slide models step 2 in the process. Parts Groups will now do a deep analysis of the student learning experience to look for evidence of how the phenomenon guides the learning and how dimensions support changes in student thinking about the phenomenon over time. b. The visual on the slide shows the unit level path of student thinking. Each Parts Group will complete the chart for their chapter.
	**Slide 12: Gather Evidence & Go Visual: Path of Student Thinking** a. Ask groups to add the second sheet of chart paper, horizontally under the folded piece of chart paper. Remind participants that they can work at the wall, or on a table. b. Direct the Parts group to re-read their chapter/section with a focus on student thinking—not activities. Use the questions on **H12** (and also on the slide to guide their thinking). c. Ask the Parts group to discuss what they found and determine how best to document the path of student thinking in words and drawings. d. Ask the Parts group to create a poster to show the

Slide	Slide Title and Facilitation Notes
	path of thinking in their chapter/section. Ask them to use strength arrows (bold, strong connection; thin some connection; dotted weak or no connection) to show connections in student thinking.
	**Slide 13: Note Taking: Strengths and Limitations** **Individual** a. Distribute **H13 (Note Taking: Parts Group Strengths and Limitations)** for individuals to complete. b. Ask participants to reflect on the phenomena and the path of student thinking in the story they constructed for their chapter/section/etc. c. Have participants, as individuals, take a few moments to record strengths and limitations for student work, particularly SW1, SW3, SW4. Record evidence (e.g., page numbers; placement of phenomena sticky notes; path of student thinking with strength arrows). d. Remind participants that this is their thinking. They will use this data in the final scoring of Rubric 2.

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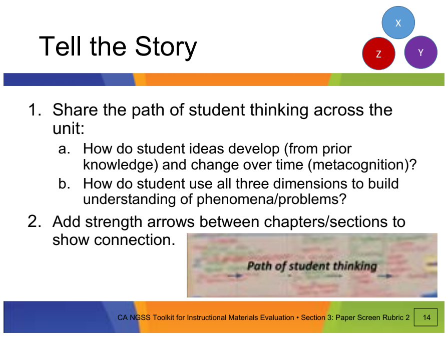

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Slide 14: Tell the Story

Whole Group

a. Conduct a whole group conversation about the path of student thinking across the unit. Have Parts Groups share their chapter/section story in order as presented in the materials.

b. Ask Parts Groups to focus on how students' ideas develop and change over time in their chapter/section.

c. Ask the whole group to listen carefully to the chapter stories to determine how well the path of student thinking is supported throughout the unit.

d. Ask the whole group to decide the strength of the connections between chapters and draw strength arrows to indicate the relationships (thick arrow-strong connection; thin arrow-some connection; dotted arrow-weak or no connection.

e. Ask participants to return to **H13 (Note Taking: Parts Group Strength and Limitations)** and determine if they want to add anything, based on the unit story, to their individual chapter/section strengths and limitation entries.

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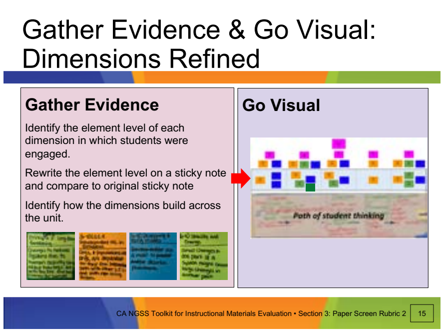

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Slide 15: Gather Evidence & Go Visual: Dimensions Refined

Parts Groups

a. Ask Parts Groups to revisit the 3 dimensions and EP&Cs found in their chapter. Review how these are used to help students better understand the phenomenon/problem.

b. Focus on the element level for each dimension that was actually used in the learning experience. Write/rewrite the element level on the appropriate colored

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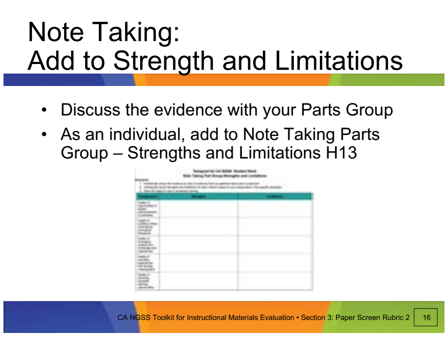
Slide	Slide Title and Facilitation Notes
	sticky note (orange-DCI; blue-SEP; green-CCC; dark green-EP&Cs. If the entire element was used, write the whole element; if only parts were used, write those parts with ellipses (…) c. If the element level used in the learning experience is not grade appropriate, indicate that on the sticky note. d. Post the sticky notes on the bottom half of the folded paper. e. Compare these sticky notes with the original ones that were pulled from the Conceptual Flow Chart. What do you notice? Were the original elements the same as the refined? Why? f. Discuss how the dimensions build (or don't build) on each other in the chapter/section (e.g., students build a model, refine it, and use it to make an explanation.)
	**Slide 16: Note Taking: Add to Strengths and Limitations** **Individual** a. Ask participants to return to **H13** and individually take a few moments to record strengths and limitations for student work, particularly SW2. Record evidence (e.g., page numbers; placement of dimensions sticky notes; element level of the dimensions). b. Ask participants to add any other notes to their handout for the other components. c. Remind participants that this is their thinking. They will use this data in the final scoring of Rubric 2.

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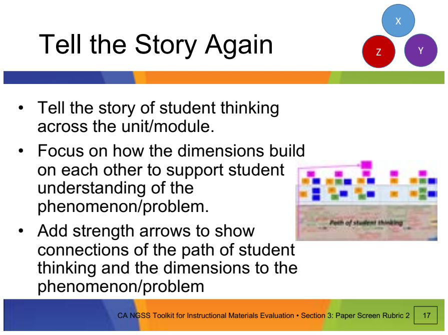

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Slide 17: Tell the Story Again

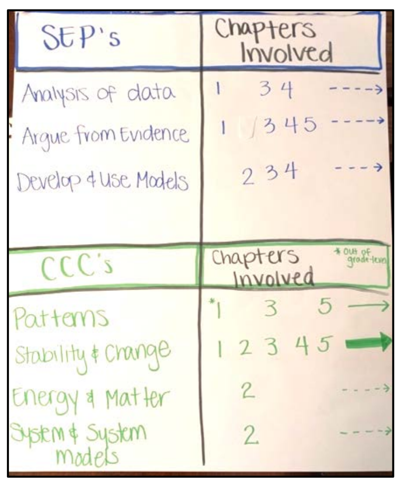
Whole Group

a. Explain that Parts Groups will share, in order, their findings on the use of the dimensions in their part.

b. First have the Parts Groups share how the SEPs are used in the chapter to support the DCIs and the understanding of the phenomenon/problem.

c. Ask the whole group to listen carefully for connections of the SEPS to what they noted in their chapter/section.

d. Have a whole group discussion about which practices are “foregrounded” in the materials and create a chart to record them. Then indicate the connection of these practices across the unit with strength arrows (thick-strong connection, thin-some connection, dotted-weak or no connection)



e. Repeat this process with the CCCs. Add information to the chart.

f. Repeat this process with EP&Cs if applicable and add information to the chart.

g. Finally, ask the whole group to reflect on the unit path of student thinking and how the dimensions are used to help students make sense of the phenomenon/problem. Add strength arrows to the chart to indicate the connections. (pink arrow)

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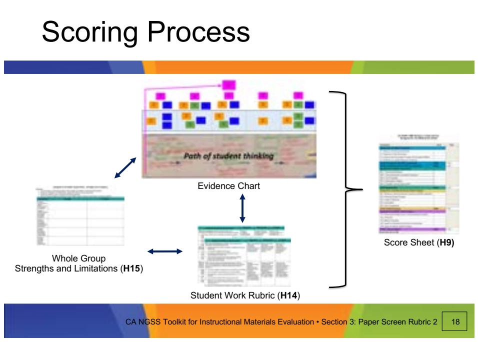
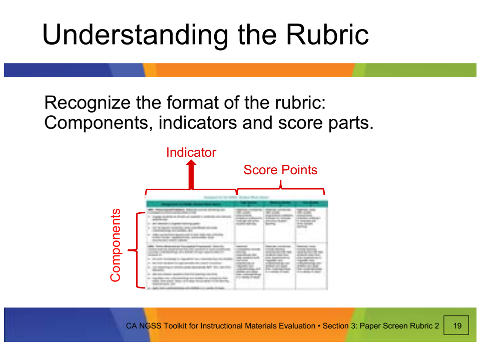
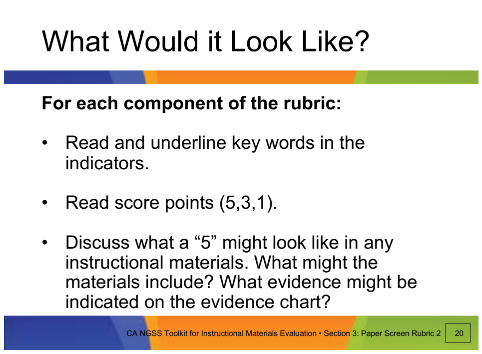
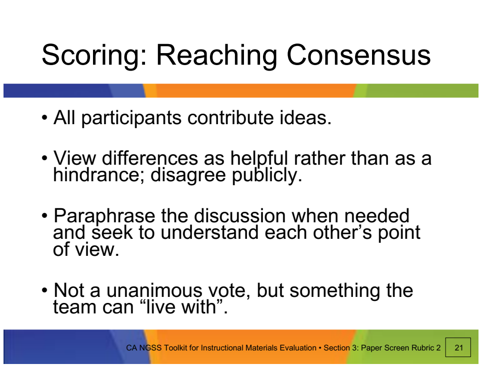
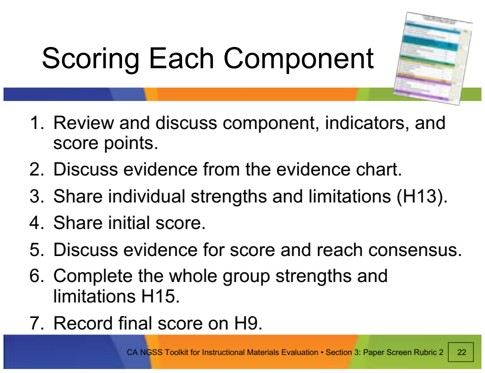
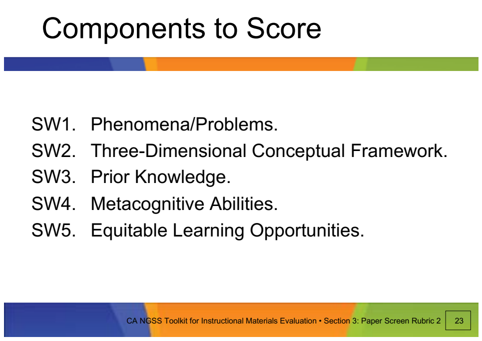
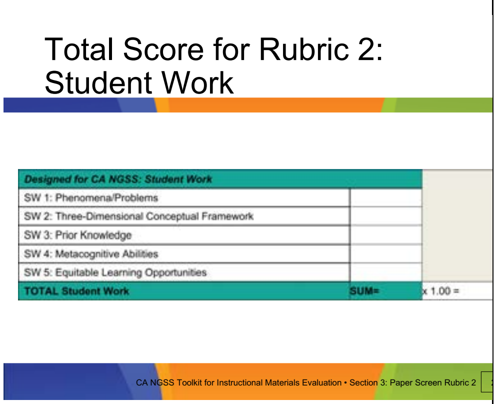
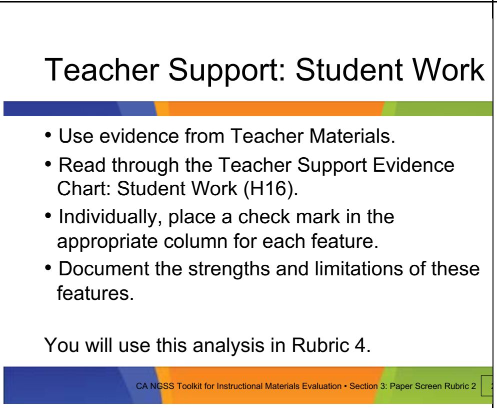
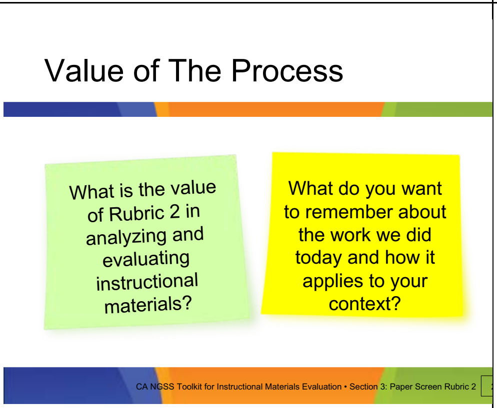
Part 3 – Score (90 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 18: Scoring Process** a. Remind participants that like in Rubric 1, they will use the evidence chart, rubric, and strength and limitations chart to evaluate and consensus score each component of the rubric. b. Explain that these resources serve as artifacts of the process and serve as evidence for decision-making and recommendations for adoption. Be detailed and keep good records.
	**Slide 19: Understanding the Rubric.** a. Distribute **H14** Designed for NGSS: Student Work Rubric. b. Ask participants to identify the components, indicators, and score points on this rubric. c. Ask participants what they remember about the indicators and score points? (Indicators help explain the components, and the score points help identify the degree to which the materials meet the criteria). *Facilitator Note: components are the numbered statements, the indicators are the bulleted statements which serve as criteria for the components and the score points identify the degree to which the materials meet the criteria.*
	**Slide 20: What Would It Look Like?** a. Ask participants to read the <u>first component</u> SW1 Phenomena/Problems. Have participants underline key words in the indicator that describe what they are looking for in the instructional materials. b. Have participants read the score points to see a description of the different quality levels for the phenomena indicator. c. Facilitate a discussion about what a level '5' might look like for phenomena in any instructional material. What might the materials include? (e.g., phenomena pictures; graphic of the relationships

Slide	Slide Title and Facilitation Notes
	between phenomena; graphic of how the dimensions support understanding the phenomena/problems). What evidence might be indicated on the path of student thinking charts? (e.g., pink sticky notes that indicate phenomena and other colored sticky notes that directly support learning related to that pink sticky note; strong connection arrow from the evidence to the phenomenon). *Facilitator Note: the purpose of this activity is to calibrate participants in their understanding of the component, indicator and score points. Once calibrated, participants can apply their understanding to any set of instructional materials.*
	**Slide 21** a. Remind participants that each CA NGSS TIME rubric is scored by reaching consensus. b. Review the bullet points that participants used in Rubric 1.
	**Slide 22: Scoring Each Component** a. Use this slide to provide an overview of what participants will do to score each component. b. Then ask participants to review and discuss SW1 Phenomena/Problems indicators and the score points. Underline any key words they want to remember. c. Have participants return to their path of student thinking charts to look for evidence in support of the indicators. d. Have individuals share the strengths and limitations for this component that they entered on **H13**. e. Ask the participants for their initial score by using the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by

Slide	Slide Title and Facilitation Notes
	raising 1, 3, or 5 fingers. f. Record the initial vote on Chart **C6 (Consensus Scoring)** ○ If the initial score is unanimous, move to **H15** to record summary strengths and limitation for this component. ○ If the initial score is not unanimous, facilitate a discussion to reach consensus. Start with these strategies: ▪ ask participants to provide evidence (from the path of student thinking charts, their **H13** notes on strengths and limitations, or those of others) to support their score ▪ ask participants who gave a score of ‘5’ to explain why they scored it a ‘5,’ relying on their evidence; have a “1’ explain why they scored it as a ‘1’ ▪ Discuss/debate and ask for a rescore using the fist of 5. Record the second score on Chart **C6 (Consensus Scoring).** *Facilitator Notes: Encourage full participation, ensure that discussions and decisions are based on evidence from the instructional materials. If necessary, use additional strategies found on **Chart C3 (Consensus Building Strategies)*** *Ultimately, the group will come to a decision, but there must be a critical mass, enough of the group to be in favor to get the decision carried out. (Definition modified from The Adaptive School: Developing and Facilitating Collaborative Groups by Robert Garmston and Bruce Wellman, 2000, Four Hats Seminars, El Dorado Hills, California.)* g. Based on the consensus conversation, complete **H15 (Designed for NGSS: Student Work - Strengths and Limitations)** as a summary of the discussion. This form will be used as an artifact of Rubric 2 to support the scoring decision, and to plan

Slide	Slide Title and Facilitation Notes
	professional learning if the materials are adopted. h. Record consensus score on **H9 (Paper Screen Score Sheet)** for SW1: Phenomena/Problems.
	**Slide 23: Components to Score** a. Review the next components to score. Ask participants to review and discuss SW2. Three-Dimensional Conceptual Framework, the indicators for that component and the score points. Underline any key words they want to remember. b. Toggle back to Slide 22 and repeat the process for SW2. c. After component SW2 is scored, ask participants to review and discuss SW3 Prior Knowledge indicators and the score points. Underline any key words they want to remember. d. Toggle back to Slide 22 and repeat the process for SW3. e. After component SW3 is scored, ask participants to review and discuss SW4. Metacognitive Abilities indicators and the score points. Underline any key words they want to remember, f. Toggle back to Slide 22 and repeat the process for SW4 g. After component SW4 is scored, ask participants to review and discuss SW5. Equitable Learning Opportunities indicators and the score points. Underline any key words they want to remember, h. Toggle back to Slide 22 and repeat the process for SW5. *Facilitator Note: At the end of the scoring process for all components, remind participants to keep the handouts with scores, strengths, and limitations.*

Slide	Slide Title and Facilitation Notes
	These are the data that will be used to support decision-making and recommendations for materials selection. Encourage participants to properly name and store these.
	**Slide 24: Total Score for Rubric 2: Student Work** a. Ask the group to enter the scores for each component on **H9**. b. Add the scores to arrive at a total.
	**Slide 25: Teacher Support: Student Work** a. Ask participants to notice key features on the chart. b. Explain that they have focused on the Student Edition as the main source of evidence for analysis. Now they will consider the support that is provided by the Teacher Materials. c. Ask participants to follow the directions on the slide to complete **H16**.
	**Slide 26: Value of The Process** a. Explain to participants that they have analyzed a unit through the perspective of **how** students learn as they engage in phenomena, use the three dimensions, and connect to the EP&Cs. In Rubric 3 they will build on this to consider **how** student progress is monitored. b. Invite participants to review the chart they made at the beginning highlighting the characteristic features and elements of high-quality instructional materials. Ask them to make additions to the chart in light of the learning they experienced during this process. c. Ask participants to do a quick write on two large

Slide	Slide Title and Facilitation Notes
	sticky notes to answer the prompts on the screen. d. Collect the value statements; ask participants to keep the remember statements. *Facilitator Note: Compile the value statements and create a summary statement on a large piece of paper that can be added to the left of the conceptual flow charts for the unit.* *Path of Student Thinking Charts created during this section will be used again. SAVE THEM! If the team is going to continue the next day in the same room they can stay on the walls. If not, tape the sticky notes onto the poster so that they stay in place when the posters are rolled up.*

How People Learn

In ***How People Learn*** *(National Research Council, 2000),* the authors summarize three key ideas about learning based on an exhaustive study of the research (p.14-19). These three findings about student learning have parallel implications for classroom instruction (p. 19-21), which then suggest a translation of those implications into curriculum materials. As the authors state, these three findings imply the following for students and teachers:

FIRST KEY FINDING
Prior Knowledge

Students come to the classroom with preconceptions about how the world works. If their initial knowledge is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test but never to their preconceptions outside the classroom.

SECOND KEY FINDING
Conceptual Frameworks

To develop competence in an area of a science discipline, students must, (a) have a deep foundation of usable knowledge, (b) understand facts and ideas in the context of a conceptual framework, and (c) be able to organize that knowledge in ways that facilitate retrieval and application.

THIRD KEY FINDING
Metacognition

Students must be taught explicitly to take control of their own learning by defining goals and monitoring their progress in achieving them.

Adapted from ***How People Learn*** (NRC, 2000)
Washington, D. C.: National Academy Press

Designed for CA NGSS: Student Work - Evidence Chart

Directions

1. Review your assigned materials to describe the path of student learning.
2. Represent your answers to the questions in the space provided.
3. Be prepared to share the path of student learning visually on a public chart

Question	Answer (in words, graphics, or both)
Answer the following questions as you describe the path of student thinking in the materials. Consider what you would expect students to be thinking about through the learning experiences. What are students figuring out/solving? a. What is driving student learning (e.g., question, scenario, problem, phenomenon)? b. What ideas and practices do students develop through these experiences? c. How do students access, engage, and use prior knowledge to further their thinking? d. How do students develop metacognitive abilities?	

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name _____________________________

Designed for CA NGSS: Student Work
Note Taking Parts Group – Strengths and Limitations

Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

Components	Strengths	Limitations
SW1. Quality of opportunities to explain phenomena/solve problems.		
SW2. Quality of building a three-dimensional conceptual framework.		
SW3. Quality of leveraging student prior knowledge and experiences.		
SW4. Quality of providing experiences that develop metacognition.		
SW5. Quality of providing equitable learning opportunities.		

Designed for the NGSS: Student Work Rubric

Designed for CA NGSS: Student Work Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SW1. Phenomena/Problems. Materials provide anchoring and investigative phenomena/problems that: ● engage students as directly as possible in authentic and relevant experiences. ● are matched to targeted learning goals. ● can be figured out/solved using scientifically accurate understandings and abilities. ● make connections beyond and to their daily lives including to their homes, neighborhoods, communities, local environment, and/or cultures.	Materials consistently offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials sometimes offer quality phenomena/ problems sufficient to motivate and drive student learning.	Materials rarely offer quality phenomena/ problems sufficient to motivate and drive student learning.
SW2. Three-dimensional Conceptual Framework. Materials include learning experiences that help students to build scientifically accurate understandings and abilities through opportunities for students to: ● link prior knowledge to negotiated new understanding and abilities. ● do work that approximates the nature of science. ● use reasoning to connect grade-appropriate SEP, DCI, and CCC elements and EP&C's (when applicable). ● ask and answer questions that link learning over time. ● negotiate new understandings and abilities by comparing their ideas, their peers' ideas, and ideas encountered in the learning experience(s). ● apply their understandings and abilities in a variety of ways.	Materials consistently include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials sometimes include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.	Materials rarely include learning experiences that help students build from prior experiences to negotiate new understandings and abilities and apply their understandings in a variety of ways.

Designed for CA NGSS: Student Work Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SW3. Prior Knowledge. Materials leverage students' prior knowledge and experiences to motivate student learning in ways that: • make visible students' prior knowledge and experiences related to the anchoring and investigative phenomena/problems and relevant SEPs, DCIs, and CCCs and EP&Cs (when applicable). • revisit students' early ideas to see how they have changed (or not) as they figure out phenomena/solve problems. • make explicit links to new ideas and practices being developed by students.	Materials consistently leverage student prior knowledge and experiences to motivate their learning.	Materials sometimes leverage student prior knowledge and experiences to motivate their learning.	Materials rarely leverage student prior knowledge and experiences and when included, they do not relate to the phenomena or problems.
SW4. Metacognitive Abilities. Materials include learning experiences for students to: • set and monitor their learning in light of the targeted learning goals. • consider, over time, **what** and **how** they have learned across the three dimensions. • articulate how the three dimensions helped them figure out anchor and investigative phenomena/solve problems.	The materials provide students with regular, explicit opportunities to consider how their learning experiences changed their thinking.	The materials provide students with some opportunities to consider how their learning experiences changed their thinking.	The materials provide few opportunities for students to consider how their learning experiences changed their thinking.
SW5. Equitable Learning Opportunities: Materials ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences, including: • appropriate reading, writing, listening, and/or speaking alternatives for students who are English language learners, have special needs, read below the grade level, or have high interest and have already met the intended learning goals. • culturally-relevant contexts and examples that support all students. • opportunities to cultivate interest and confidence as scientists and engineers for all students.	Most learning experiences in materials are designed such that students can engage meaningfully in a variety of ways, with multiple access points, and with supports for students.	Some learning experiences in materials are designed such that students can engage meaningfully in a variety of ways, with multiple access points, and with supports for students	Few learning experiences in materials are designed such that students can engage meaningfully in a variety of ways, with multiple access points, and with supports for students.

Designed for CA NGSS: Student Work – Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Student Work Rubric" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
SW1. Quality of opportunities to explain phenomena/solve problems.		
SW2. Quality of building a three-dimensional conceptual framework.		
SW3. Quality of leveraging student prior knowledge and experiences.		
SW4. Quality of providing experiences that develop metacognition.		
SW5. Quality of providing equitable learning opportunities.		

CA NGSS TIME Section 3: Paper Screen
Teacher Support Evidence Chart: Student Work

Key Features of Instructional Materials		Strong	Adequate	Weak
SW1. Phenomena/Problems. Provide support and strategies for how to help students figure out/solve authentic and relevant anchor and investigative phenomena/problems using the three-dimensions.				
SW2. Three-dimensional Conceptual Framework. Provide support and strategies for how teachers ● help students develop a conceptual framework of scientifically accurate understandings and abilities related to:	DCIs, SEPs, and CCCs			
	NoS and Engineering			
	EP&Cs			
	ELA and Math			
● create a learning environment that values and leverages students' ideas, motivates learning, and helps students negotiate new meaning as they interact with others' ideas, new information, and new experiences.				
SW3. Prior Knowledge. Provide support and strategies to leverage students' prior knowledge and experiences to motivate learning.				
SW4. Metacognitive Abilities. Provide support and strategies for how to help students develop metacognitive abilities.				
SW5. Equitable Learning Opportunities. Provide support, strategies, and resources for how to ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences.				

Strengths related to these Teacher Supports	Limitations related to these Teacher Supports

Section 3: Paper Screen Rubric 3 Designed for CA NGSS: Monitoring Student Progress

Time: 6 hours

Overview

In section 3 “Paper Screen Rubric 1: Foundations” the committee analyzed *what* the instructional materials provided for students to learn. In section 3 “Paper Screen Rubric 2: Student Work,” the committee looked at *how* the instructional materials suggested students would accomplish that learning. Using section 3 “Paper Screen Rubric 3: Monitoring Student Progress,” the committee will examine what opportunities are given in the instructional materials for monitoring student progress over time.

The committee will gather evidence to determine how well the instructional materials align to the CA NGSS by using tools and processes that reveal the quality of:

- supports for monitoring three-dimensional learning and EP&Cs (if applicable),
- capturing student progress over time,
- guidance and tools that use a variety of measures,
- support and strategies for ensuring equitable access, and
- use of formative and summative assessment

Advance Preparation

Ensure adequate space for adding charts below both the conceptual flow chart from Rubric 1 and the path of student thinking chart from Rubric 2.

Post C1-Norms, C2-Conceptual Flow Key, and C-3 Consensus scoring from Rubric 1.

Participants should continue in their Parts and Whole Groups formed in “Rubric 1: Designed for NGSS: Foundations.”

Prepare a score sheet chart for the work about to take place.

Action Step 3.3 – Rubric 3 Monitoring Student Progress

Setting the Stage:

Revisit the discussion from Action Step 3.1 about the importance of instructional materials containing learning goals that align to CA NGSS grade level expectations and the extent to which surpassing the grade level standards is or is not appropriate in your context. Remind committee members that students build full understanding of phenomena/problems through the use of the three dimensions of the CA NGSS, which culminates in the 9–12 grade band. Remind them that elementary and middle school grade bands include developmentally appropriate assessment boundaries (and thus, instructional targets) that were identified based on research showing that students' ability to conceptually understand certain ideas grows across grade-bands, increasing in abstraction as students mature. If your district has selected the Preferred Integrated Course Model for middle school, be sure to discuss what level of integration across and between the science domains you expect to see in assessments.

Overview of Gathering Evidence and Scoring

Rubric 3 has five components. Each is scored one at a time using the same process:

- Parts Groups gather evidence from their chapter/unit by identifying assessments in their chapter. Using "H17 Designed for CA NGSS: Monitoring Student Progress-Evidence Chart" to record evidence for selected assessments. Parts Groups tell the assessment story and use "H18 Note Taking: Part Group Strengths and Limitations" to individually record strengths and limitations.

- Whole Groups tell the story of the unit using the evidence (assessment story) from each Parts Group in the order that the publisher presents the materials.

- Whole Groups score by consensus using the rubric H19, sharing evidence from H18 Note Taking Parts Group Strengths and Limitations, chapter/section paths of student thinking and discussion.

- Scores are recorded on H9 Designed for CA NGSS Score Sheet, and summary strengths and limitations are recorded on H20 Designed for CA NGSS: Monitoring Student Progress-Strengths and Limitations.

- Then participants gather preliminary evidence for Teacher Support on H21 which is used in the Rubric 4 analysis of the instructional materials.

Consensus scoring is a keystone of the CA NGSS TIME process. Each person should share their score publicly. One way to do this is to have a *straw vote* where committee members show their score. Everyone should be able to defend their score selection with evidence from their documents ("H19 – Designed for CA NGSS: Monitoring Student Progress Rubric" and "H20 – Designed for CA NGSS: Monitoring Student Progress-Strengths and Limitations"*)* and the annotated assessment flow.

Committee members should read the descriptions of the score points and have evidence from the unit, their documentation and the flow to support their scores. People with different score points (1, 3, and 5) should share their thinking. A discussion among people with different scores in which they explain their evidence for their score will help the team come to consensus.

Consensus means all participants contribute ideas and encourage the use of one another's ideas and opinions. The committee members should view differences as helpful rather than as a hindrance. Everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue. Those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time. Finally, all share in the final decision. Consensus does not mean a unanimous vote, everyone's first choice, or that everyone agrees. As Facilitator, work to encourage participation, rely on evidence from the conceptual flows, and moderate discussions.

Ultimately, the group will come to a decision, but there must be a "critical mass," enough of the group to give a final score.

Once consensus has been reached the scores should be entered onto the "H9 – Designed for CA NGSS: Score Sheet."

Task 3.3a. – Review Materials for Assessment Opportunities

Step 1. Review Materials for the Presence and Quality of Performance Assessments

Prior to gathering evidence from the instructional materials, engage participants in a discussion about what constitutes a performance assessment. If definitions vary, one definition that aligns with the CA NGSS is: a performance assessment is a sequence of activities that are used to monitor student progress and learning. A performance assessment consists of an assessment task which is a discrete activity/experience combined with a rubric or scoring guide that monitors student learning. If further support is needed for this discussion, refer to chapter 9 of the *2016 CA Science Framework*.

Remind the committee that they will gather evidence in their Parts Group and share their findings and evidence with the Whole Group.

The handouts necessary for gathering, analyzing, and evaluating evidence for these passes through the instructional materials are:

H9 Designed for CA NGSS Score Sheet

H17 Designed for CA NGSS: Monitoring Student Progress-Evidence Chart

H18 Note Taking: Part Group Strengths and Limitations

H19 Designed for CA NGSS: Monitoring Student Progress Rubric

H20 Designed for CA NGSS: Monitoring Student Progress-Strength and Limitations

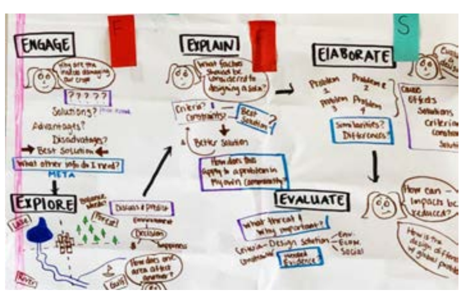
H21 Teacher Support Evidence Chart: Monitoring Student Progress

Instructional materials may not formally identify all assessments. The committee will need to identify and analyze both the labeled and unlabeled assessments to gain a complete picture of what the instructional materials offer to monitor student progress.

As the committee makes each pass through the materials, it is strongly recommended that they include short quotes from the materials as the evidence that can be shared with others. If the committee cannot find any evidence of one or more of the dimensions, ties to EP&Cs, or connection to a phenomenon, just indicate “not found.”

To gather evidence and go visual with their findings, the committee will make several passes through the materials in which they:

- Locate formative and summative assessments and place flags on the path of student thinking charts.



- Gather information on the assessments using H17.

Name of Instructional Materials ______________________________ Grade Level/Course ______ Unit/Module Title__________
Reviewer Name __________________________

Section 3: Paper Screen Rubric 3 – **H17**

Designed for CA NGSS: Monitoring Student Progress – Evidence Chart

Directions

1. For each identified assessment, complete this chart.

Assessment Evidence			
Page	Assessment Description	Purpose of Assessment ☐Formative ☐Summative	Format ☐Discussion ☐Performance task ☐Multiple choice ☐Other_________
What is the two-dimensional or three-dimensional learning goal that this assessment measures?		What phenomenon or design solution are students trying to understand?	
What does the task assess about SEPs?		What does the task assess about CCCs?	
What does the task assess about DCIs?		What does the task assess about the EP&Cs?	
Describe how each of the three-dimensions relates to each other in this assessment. (Do the DCIs, SEPs, and CCCs relate?)			

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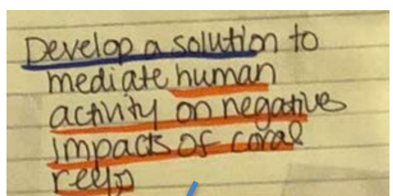
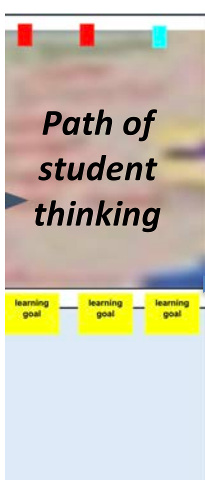
- Identify the learning goal of each assessment.

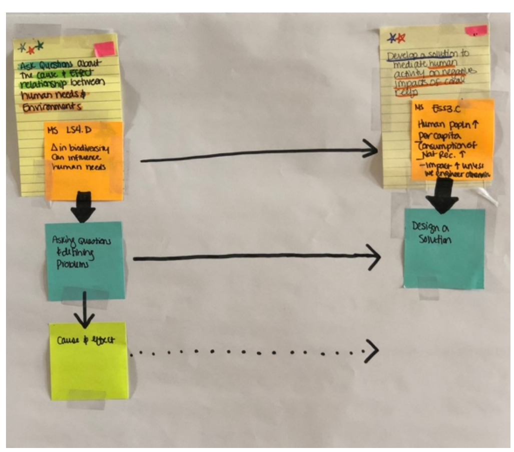




- Identify and analyze the use of the dimensions in the assessments including how each dimension builds (or not) and how well the dimensions work together to elicit student understanding.

- Determine if the assessment is truly 2- or 3-dimensional, how well the assessment monitors student progress toward understanding of the phenomena/problem; and finally, how coherent the assessments are across the chapter and the unit.

Once evidence is gathered the committee will go visual and represent their findings, using corresponding sticky notes to identify the element level of the DCIs, SEPs, CCCs, and EP&Cs that support the identified 2- or 3-dimensional learning goal. Add these artifacts to the assessment wall chart.



Complete “H18 Note Taking: Part Group Strengths and Limitations” as individuals as they reflect on the quality of:

- •supports for monitoring three-dimensional learning and EP&Cs (if applicable),
- •capturing student progress over time,
- •guidance and tools that use a variety of measures,
- •support and strategies for ensuring equitable access, and
- •use of formative and summative assessment

H18 will be used as evidence in the scoring process.

Name of Instructional Materials ______________________________ Grade Level/Course ______ Unit/Module Title__________
Reviewer Name ___________________________

Section 3: Paper Screen Rubric 3 – **H18**

Designed for CA NGSS: Monitoring Student Progress
Note Taking Parts Group – Strengths and Limitations

Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

Components	Strengths	Limitations
SP1. Quality of supports for monitoring 3D learning and EP&Cs integration.		
SP2. Quality of capturing student progress over time.		
SP3. Quality of guidance and tools that use a variety of measures.		
SP4. Quality of support and strategies for ensuring equitable access.		
SP5. Quality of use of formative and summative assessments.		

The committee uses their wall chart to share the dimensions and the assessment links to phenomena/problems to the Whole Group. The Whole Group analyzes the coherence of the assessments between chapters by creating an “assessment story” of how the formative and summative assessments measure student progress toward explaining the unit/module phenomenon or designing the solution to a problem.

Task 3.3b – Score Monitoring Student Progress

Step 1. Rubric Scores and Look at Strengths and Limitations

H19 Designed for CA NGSS: Monitoring Student Progress Rubric is used to consensus score the instructional materials. All committee members should have shared understanding of the rubric before attempting to apply it the gathered evidence.

Section 3: Paper Screen Rubric 3 – **H19**

Designed for CA NGSS: Monitoring Student Progress Rubric

Designed for CA NGSS: Monitoring Student Progress Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SP1. Monitoring Three-Dimensional Learning and EP&Cs If Applicable. Assessments are designed to • ensure that students use SEPs integrated with DCIs and CCCs to demonstrate their understanding of phenomena and/or design solutions to problems. • connect student learning experiences to the targeted learning goals. • elicit observable evidence of students' knowledge of and ability to use grade-level appropriate elements of the three-dimensions. • ensure that students use EP&Cs where applicable to demonstrate their understanding of environmental phenomenon/problem solution.	Assessments are consistently designed to connect to learning goals and prompt students to apply appropriate elements of the three dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are sometimes designed to connect to learning goals and prompt students to apply elements of two or three dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are either not connected to learning goals and/or they prompt students to apply elements of only one dimension to demonstrate their understanding of the phenomenon/problem solution. EP&Cs are not included, even where applicable.
SP2. Capturing Student Progress. The assessments within a unit: • include pre-, formative, summative, and self- or peer-assessment measures that assess three-dimensional learning; and • these different types of measures are connected to one another to demonstrate student progress over time.	There are multiple opportunities, using more than one type of measure, to demonstrate learning and these measures are strongly connected to show student progress both in and across the three dimensions.	There are multiple opportunities, using more than one type of measure, to demonstrate learning and these measures are connected to show student progress both in and across the three dimensions.	There is not an appropriate combination of measures for students to demonstrate progress both in and across the three dimensions.

Based on the consensus conversation, the committee completes H9 Paper Screen Score Sheet.

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1. Phenomena/Problems		
SW 2. Three-Dimensional Conceptual Framework		
SW 3. Prior Knowledge		
SW 4. Metacognitive Abilities		
SW 5. Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1. Phenomena/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**SUM=**	x 1.00=
Grand Total (out of 100)		

The committee will then summarize the strengths and limitations of the materials on "H20 Designed for CA NGSS: Monitoring Student Progress-Strength and Limitations" as a way to record the consensus conversations. This artifact will be used to support the scoring decision and plan for professional learning experiences, should the instructional materials be adopted.

Name of Instructional Materials ______________________________ Grade Level/Course _______ Unit/Module Title___________

Section 3: Paper Screen Rubric 3 – **H20**

Designed for CA NGSS: Monitoring Student Progress – Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Student Work Rubric" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Criteria	Strengths	Limitations
SP1. Quality of supports for monitoring 3D learning and EP&Cs integration.		
SP2. Quality of capturing student progress over time.		
SP3. Quality of guidance and tools that use a variety of measures.		
SP4. Quality of support and strategies for ensuring equitable access.		
SP5. Quality of use of formative and summative assessments.		

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Step 2. Review Materials for Presence of Teacher Support

The Parts Groups will analyze the instructional materials for how well they support teachers in implementing CA NGGSS aligned instruction for all students. Individuals in the Parts Groups complete "H21 — Designed for CA NGSS Monitoring Student Progress Teacher Support" for use with Rubric 4.

Name of Instructional Materials ______________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name ____________________________

Section 3: Paper Screen Rubric 3 – **H21**

CA NGSS TIME Section 3: Paper Screen
Teacher Support Evidence Chart: Monitoring Student Progress

Key Features of Instructional Materials	Strong	Adequate	Weak
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration. Provide support with a range of sample student responses and/or rubrics for interpreting evidence of student learning across the three dimensions and EP&Cs (where applicable) specific to the element of each dimension, and related to the phenomenon/problem that provides context for the student performance.			
SP2. Capturing Student Progress. The assessments within a unit include pre-, formative, summative, and self- or peer-assessment measures that assess three-dimensional learning, and these different types of measures are connected to one another to demonstrate student progress over time.			
SP3. Variety of Measures. Provide guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.			
SP4. Equitable Access. Provide support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.			
SP5. Use of Assessment. Provide guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; and prompting students to consider what and how they've learned.			

Strengths related to these Teacher Supports	Limitations related to these Teacher Supports

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Step 3. Value of the Process

The committee reflects on the value of analyzing and evaluating instructional materials in terms of monitoring student progress. The committee also reflects on what they would like to remember and apply to their context through a quick write on sticky notes.

CA NGSS TIME

California Next Generation Science Standards
Toolkit for Instructional Materials Evaluation

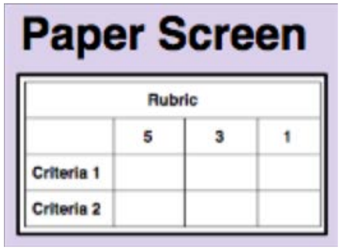
Section 3: Paper Screen
Rubric 3 Designed for CA NGSS: Monitoring Student Progress

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Acheive

Purpose & Outcomes

- Learn a process for analyzing instructional materials for CA NGSS.
- Apply the process and tools to help you:
  - Gain a shared understanding of the characteristics of high-quality instructional materials.
  - Use the process to inform the selection of instructional materials *and* to plan for classroom use.
  - Deepen your understanding of CA NGSS through professional learning experiences.

Paper Screen: You are Here



- Rubric 1: Foundations
  What are students going to learn?
- Rubric 2: Student Work
  How are students going to learn?
- **Rubric 3: Monitoring Student Progress**
  How are students assessed?
- Rubric 4: Teacher Supports
  How do the materials support teachers to facilitate student learning?

Rubric 3 Goals

Driving question:

How well do materials provide opportunities for monitoring student progress over time?

We will determine how well instructional materials align to CA NGSS to support this through:

- The *quality* of supports for monitoring three-dimensional learning and EP&Cs if applicable.
- The *quality* of capturing student progress over time.
- The *quality* of guidance and tools that use a variety of measures.
- The *quality* of support and strategies for ensuring equitable access.
- The *quality* of use of formative and summative assessments.

Essential Questions

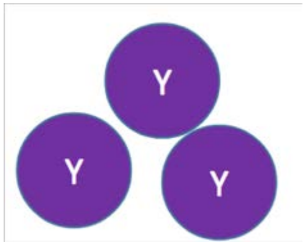
- What does monitoring student progress mean to you?
- What would you expect to see in instructional materials that would help monitor student progress?

What is a Performance Assessment?

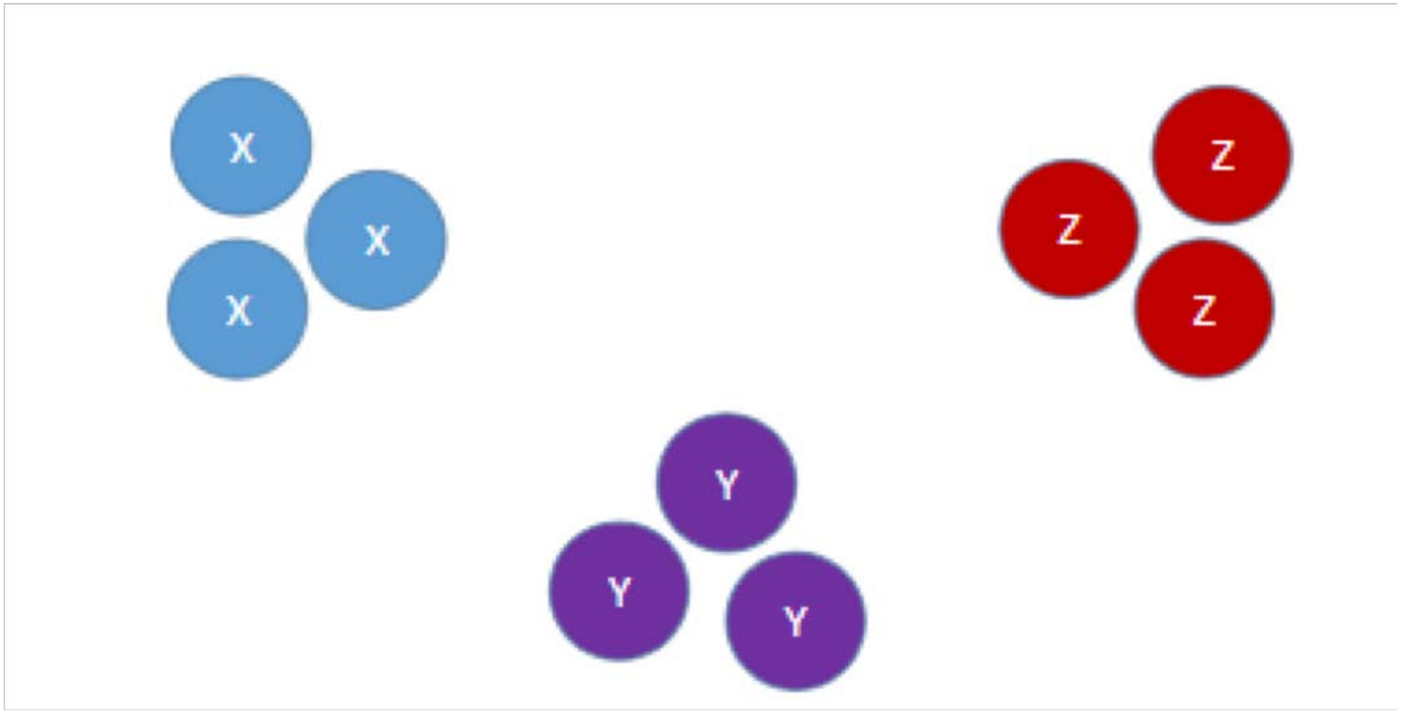
A performance assessment:

- Is a sequence of activities that are used to monitor student learning.
- Consists of an assessment task which is a discrete activity/experience combined with a rubric or scoring guide that monitors student learning.
- May have multiple components.

Transition



Sit in your **Parts Group** for this next activity.

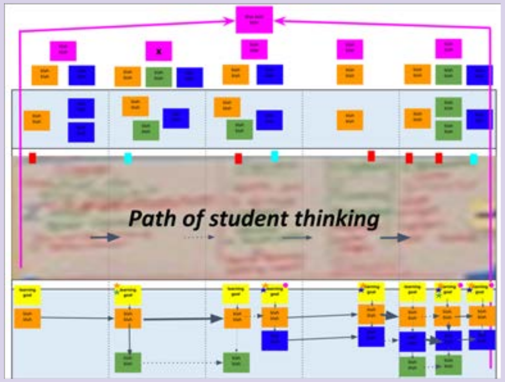


Gather Evidence & Go Visual: Overview

Gather Evidence

- The *quality* of supports for monitoring 3D Learning and EP&C if applicable.
- The *quality* of capturing student progress over time.
- The *quality* of guidance and tools that use a variety of measures.
- The *quality* of support and strategies for ensuring equitable access.
- The *quality* of use of formative and summative assessments.

Go Visual



Gather Evidence & Go Visual: Assessment Type and Location

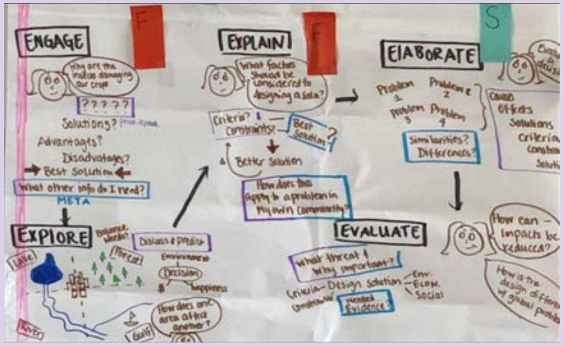
Gather Evidence

- Review materials for assessments **labeled** or **intended** as an assessment
- Add sticky-note flags to the top of the path of student thinking to identify types of assessment and location within your chapter/module:

F Red = Formative

S Teal = Summative

Go Visual



Monitoring Student Progress Evidence Chart **H17**

For **each assessment** identified in your chapter/module, complete an evidence chart.

Designed for CA NGSS: Monitoring Student Progress – Evidence Chart

Directions

1. For each identified assessment, complete this chart.

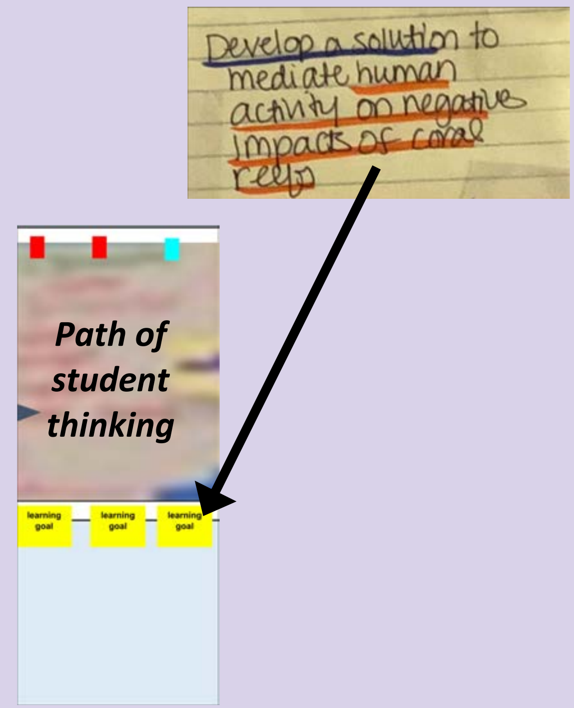
Assessment Evidence			
Page	Assessment Description	Purpose of Assessment ☐Formative ☐Summative	Format ☐Discussion ☐Performance task ☐Multiple choice ☐Other__________
What is the two-dimensional or three-dimensional learning goal that this assessment measures?		What phenomenon or design solution are students trying to understand?	
What does the task assess about SEPs?		What does the task assess about CCCs?	
What does the task assess about DCIs?		What does the task assess about the EP&Cs?	
Describe how each of the three dimensions relates to each other in this assessment. (Do the DCIs, SEPs, and CCCs relate?)			

Gather Evidence & Go Visual: Analyze Assessment Tasks, Step 1

Gather Evidence

- Transfer each 2- or 3-dimensional learning goal for the assessments identified in the chapter/module onto a large yellow sticky note.
- Color code the part of the goal that represents each dimension.
- Place each learning goal in the appropriate location below the path of student thinking.

Go Visual



Gather Evidence & Go Visual: Analyze Assessment Tasks, Step 2

Gather Evidence

- Create a sticky note to specify each of the three-dimensional assessment components and organize below the yellow assessment learning goal in the following order (skip any missing):
  - DCI (orange sticky)
  - SEP (blue sticky)
  - CCC (green sticky)
  - EP&Cs (dark green sticky)

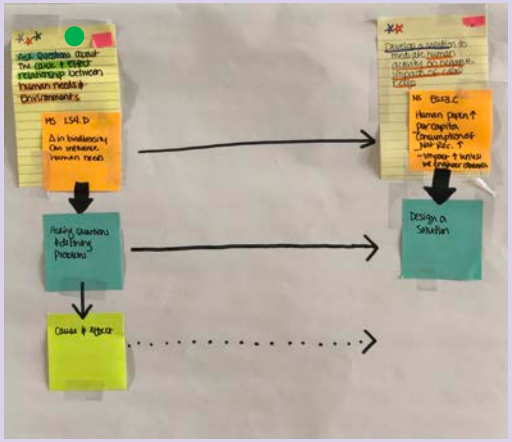
Go Visual

Gather Evidence & Go Visual: Analyze Assessment Tasks, Step 3

Gather Evidence

- Focus on how each dimension captures student understanding across the chapter/section. Add strength arrows.
- Focus on how well the dimensions work together to measure student understanding of each assessment learning goal?
  - Add arrows to show strength of connection
  - Add stars if assessment is truly 2- or 3D
  - Add a green dot if EP&Cs are addressed in assessment
- Do assessments measure student understanding of phenomena? Add pink dots.

Go Visual



Strongly

Moderately

weakly or not at all

Note Taking:
Strength and Limitations

- Discuss the evidence with your Parts Group
- As an individual, complete Note Taking Parts Group – Strengths and Limitations (H18)

Designed for CA NGSS: Monitoring Student Progress
Note Taking Part Group-Strengths and Limitations

Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

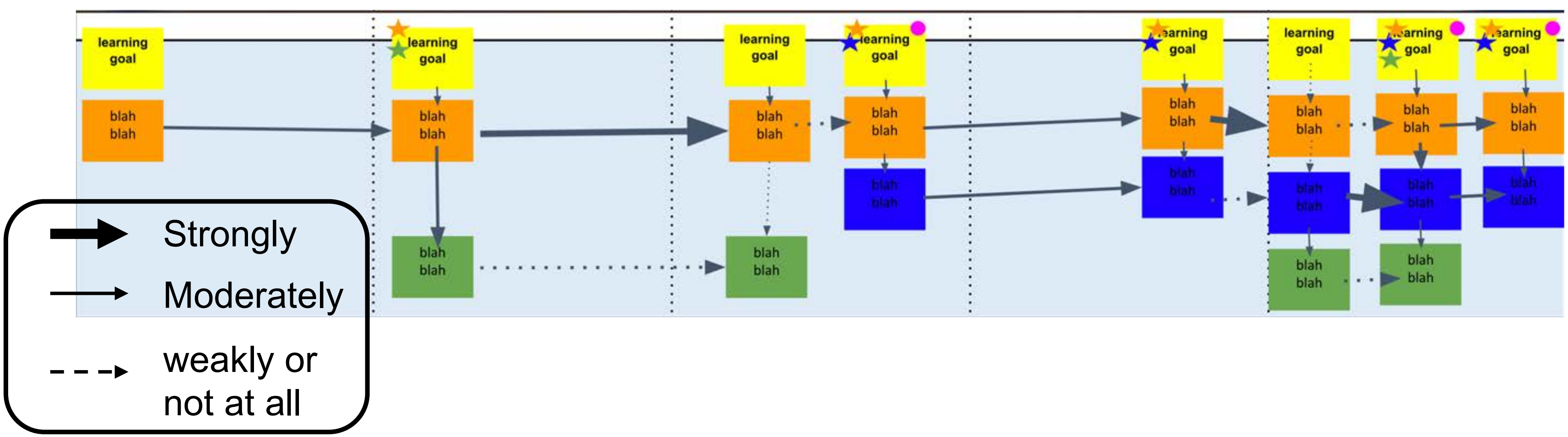
Components	Strengths	Limitations
Quality of supports for monitoring 3D learning and EPC integration		
Quality of capturing student progress over time		
Quality of guidance and tools that use a variety of measures		
Quality of support and strategies for ensuring equitable access		
Quality of use of formative and summative assessments		

Tell the Story: Dimension Connections

Share the assessment story across the unit

How well do assessments measure student understanding of targeted DCIs, SEPs, and CCCs over time?

Add arrows between DCIs, SEPs and CCCs to show strength of connection.



Tell the Story: Assessment Links to Phenomena/Problems

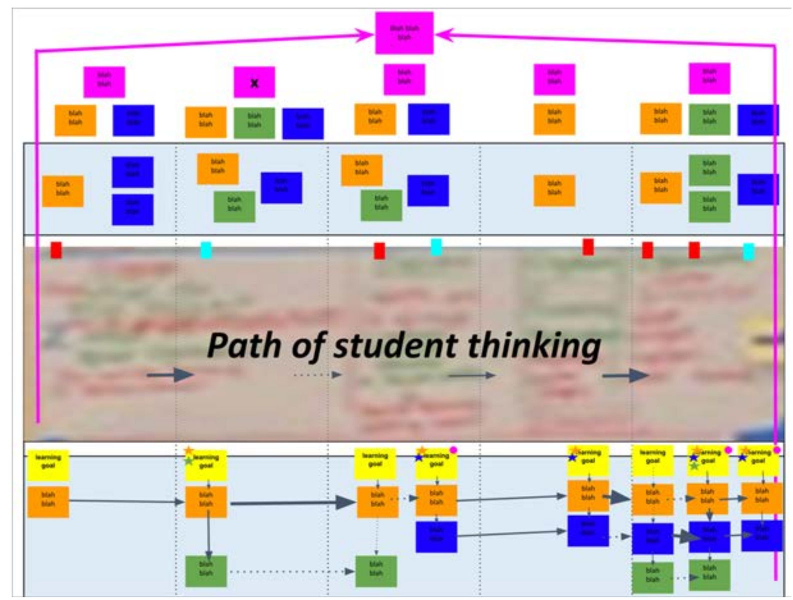
- Share the story of how well all assessments measure student ability to explain phenomena/solve problems.

- Add a strength arrow between the assessments and phenomena.

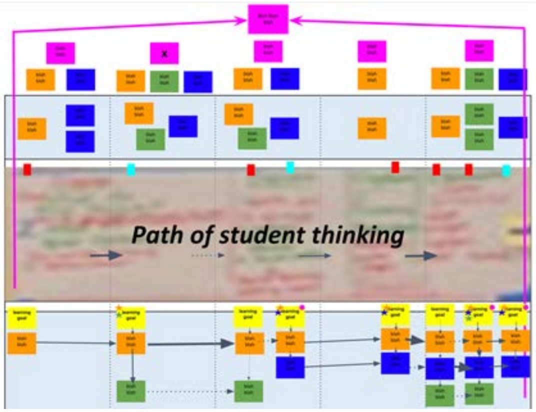
Strongly

Moderately

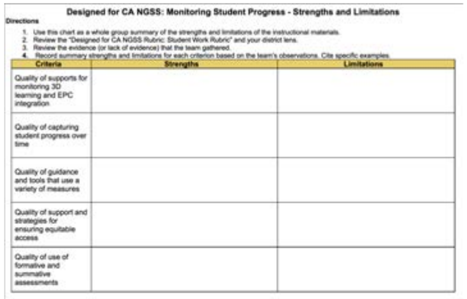
weakly or not at all



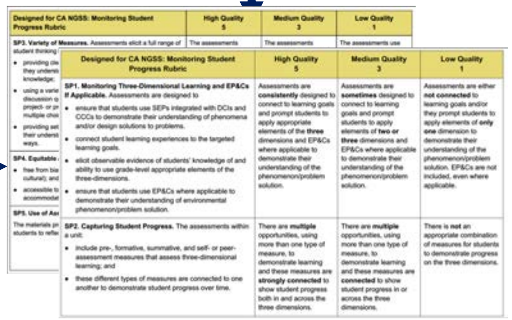
Scoring Process



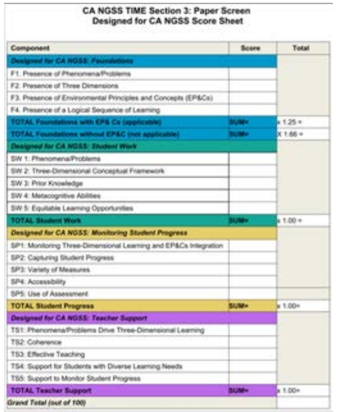
Evidence Chart



Whole Group
Strengths and Limitations (**H20**)



Monitoring Student Progress Rubric (**H19**)



Score Sheet (**H9**)

Understanding the Rubric

Recognize the format of the rubric: Components, indicators and score parts.

Indicator

Score Points

Components

Designed for CA NGSS: Monitoring Student Progress Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SP1. Monitoring Three-Dimensional Learning and EP&Cs If Applicable. Assessments are designed to • ensure that students use SEPs integrated with DCIs and CCCs to demonstrate their understanding of phenomena and/or design solutions to problems. • connect student learning experiences to the targeted learning goals. • elicit observable evidence of students' knowledge of and ability to use grade-level appropriate elements of the three-dimensions. • ensure that students use EP&Cs where applicable to demonstrate their understanding of environmental phenomenon/problem solution.	Assessments are **consistently** designed to connect to learning goals and prompt students to apply appropriate elements of the **three** dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are **sometimes** designed to connect to learning goals and prompt students to apply elements of **two or three** dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are either **not connected** to learning goals and/or they prompt students to apply elements of **only one** dimension to demonstrate their understanding of the phenomenon/problem solution. EP&Cs are not included, even where applicable.
SP2. Capturing Student Progress. The assessments within a unit: • include pre-, formative, summative, and self- or peer-assessment measures that assess three-dimensional learning; and • these different types of measures are connected to one another to demonstrate student progress over time.	There are **multiple** opportunities, using more than one type of measure, to demonstrate learning and these measures are **strongly connected** to show student progress both in and across the three dimensions.	There are **multiple** opportunities, using more than one type of measure, to demonstrate learning and these measures are **connected** to show student progress in or across the three dimensions.	There is **not** an appropriate combination of measures for students to demonstrate progress on the three dimensions.

What Would it Look Like?

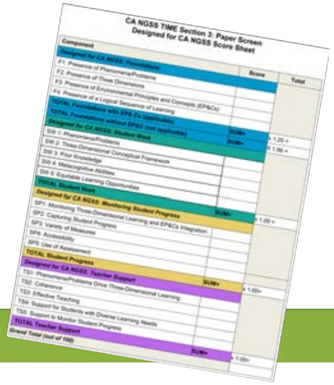
For each component of the rubric:

- Read and underline key words in the indicators.
- Read score points (5,3,1).
- Discuss what a “5” might look like in any instructional materials. What might the materials include? What evidence might be indicated on the evidence chart?

Scoring: Reaching Consensus

- All participants contribute ideas.
- View differences as helpful rather than as a hindrance; disagree publicly.
- Paraphrase the discussion when needed and seek to understand each other’s point of view.
- Not a unanimous vote, but something the team can “live with.”

Scoring Each Component


CA NGSS TIME Section 3: Paper Screen
Designed for CA NGSS Score Sheet

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	SUM=	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	SUM=	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1: Phenomena/Problems		
SW 2: Three-Dimensional Conceptual Framework		
SW 3: Prior Knowledge		
SW 4: Metacognitive Abilities		
SW 5: Equitable Learning Opportunities		
TOTAL Student Work	SUM=	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1: Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2: Capturing Student Progress		
SP3: Variety of Measures		
SP4: Accessibility		
SP5: Use of Assessment		
TOTAL Student Progress	SUM=	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1: Phenomena/Problems Drive Three-Dimensional Learning		
TS2: Coherence		
TS3: Effective Teaching		
TS4: Support for Students with Diverse Learning Needs		
TS5: Support to Monitor Student Progress		
TOTAL Teacher Support	SUM=	x 1.00=
Grand Total (out of 100)		

1. Review and discuss component, indicators, and score points.
2. Discuss evidence from the evidence chart.
3. Share individual strengths and limitations (H13).
4. Share initial score.
5. Discuss evidence for score and reach consensus.
6. Complete the whole group strengths and limitations H20.
7. Record final score on H9.

Components to Score

SP1. Monitoring Three-Dimensional Learning and EP&Cs if Applicable.

SP2. Capturing Student Progress.

SP3. Variety of Measures.

SP4. Equitable Access.

SP5. Use of Assessment.

Total Score for Rubric 3: Monitoring Student Progress

Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00=

Teacher Support: Monitoring Student Progress

- Use evidence from Teacher Materials.
- Read through the Teacher Support Evidence Chart: Monitoring Student Progress (H21).
- Individually, place a check mark in the appropriate column for each feature.
- Document the strengths and limitations of these features.

You will use this analysis in Rubric 4.

Value of The Process

What is the value of Rubric 3 in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 3: Paper Screen Rubric 3 Designed for CA NGSS: Monitoring Student Progress Script (Facilitator Guide)

Purpose

To analyze instructional materials for how monitoring student progress is addressed and to enable participants to apply Monitoring Student Progress Rubric to the Paper Screen.

Time: 6 hours

Part I	Introduction to Rubric 3 Monitoring Student Progress	25 minutes
Part II	Student Progress	250 minutes
Part III	Closing and Next Steps	15 minutes

Materials

Slides

S1	Title Slide
S2	Purpose and Outcomes
S3	Paper Screen: You Are Here
S4	Rubric 3 Goals
S5	Essential Questions
S6	What is a Performance Assessment?
S7	Transition
S8	Gather Evidence & Go Visual: Overview
S9	Gather Evidence & Go Visual: Assessment Type and Location
S10	Monitoring Student Progress Evidence Chart
S11	Gather Evidence & Go Visual: Analyze Assessment Tasks Step 1
S12	Gather Evidence & Go Visual: Analyze Assessment Tasks Step 2
S13	Gather Evidence & Go Visual: Analyze Assessment Tasks Step 3
S14	Note Taking: Strengths and Limitations
S15	Tell the Story: Dimension Connections
S16	Tell the Story: Assessment Links to Phenomena/Problem
S17	Scoring Process
S18	Understanding the Rubric

S19 What Would It Look Like?
S20 Scoring: Reaching Consensus
S21 Scoring Each Component
S22 Components to Score
S23 Total Score for Rubric 3 Monitoring Student Progress
S24 Teacher Support: Monitoring Student Progress
S25 Value of the Process

Handouts

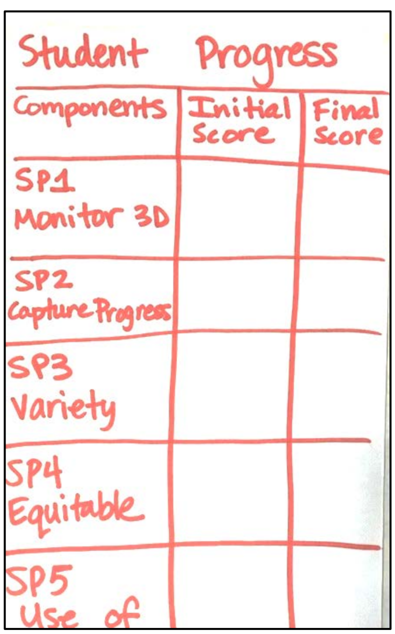
H17 Designed for CA NGSS: Monitoring Student Progress - Evidence Chart
H18 Note Taking: Parts Group Strengths and Limitations
H19 Designed for CA NGSS: Monitoring Student Progress Rubric
H20 Designed for CA NGSS: Monitoring Student Progress - Strength and Limitations
H21 Teacher Support Evidence Chart: Monitoring Student Progress

Resources for Facilitators:

R1 Read Chapter 9 (Assessment of Student Learning) of the California Science Framework (2016): https://www.cde.ca.gov/ci/sc/cf/scifwprepubversion.asp

Charts

C7 Consensus Score



Supplies:

- Chart Paper, markers, and blue tape
- Sticky notes (3” x 3”): orange, green, blue
- Sticky notes red, and teal, small portrait orientation;
- Sticky notes: large yellow
- Sharpies (enough for each person to have one)
- Sets of instructional materials (Teacher Edition & Student Edition)
- Pink dots (medium); dark green dots (small)
- 1 piece of chart paper for each Parts Group

Other

From “Section 3.1 Designed for CA NGSS: Foundations”

- Sets of instructional materials (TE & SE) Conceptual Flow
- Characteristics of high-quality instructional materials charts
- **H9** – Designed for CA NGSS: Score Sheet
- **C1** – Norms for Collaborative Work
- **C2** – Conceptual Flow Key
- **C3** – Consensus-Building Strategies

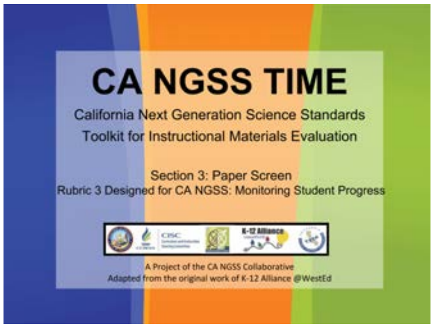
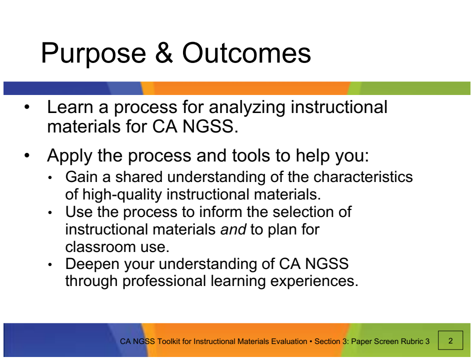
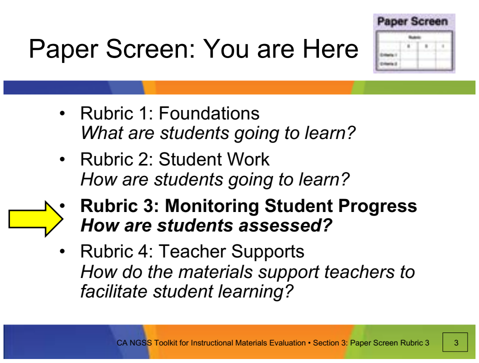
From “Section 3.2 Designed for CA NGSS: Student Work”

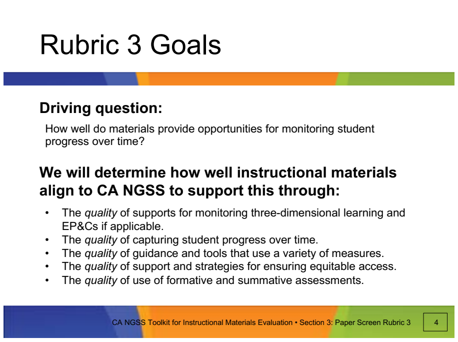
- Path of Student Thinking Wall Chart

Advance Preparation:

- Create C7 Consensus Score and post when ready to score
- Duplicate handouts (H17–H21). Multiple copies of H17 will be needed for each person.
- If this session does not immediately follow Rubric 2, find and post conceptual flow charts from Foundations and path of student thinking charts from Student Work in the order of the chapters/sections/etc.

Part 1 – Introduction to Monitoring Student Progress (25 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 1: Title** a. Welcome participants to the session. Remind them of the norms **(C1).** b. Ask participants to share any reflections on using the Student Work Tools and Process from the previous session. *Facilitator Note: if Rubric 2 and Rubric 3 are spaced with time in between them, use artifacts from Rubric 2 to remind participants of what they did.*
	**Slide 2: Purpose and Outcomes** a. Incorporate participants reflections from Rubric 2 and ask: What progress have we made so far toward the outcomes for CA NGSS TIME? b. Emphasize the last bullet on the slide.
	**Slide 3: Paper Screen** a. Explain to participants that they will continue with the paper screen process and tools, now learning and using Rubric 3 Designed for NGSS: Monitoring Student Progress. b. Remind participants that in Rubric 1 they analyzed the materials for the WHAT of CA NGSS, and in Rubric 2 they analyzed materials for the HOW of CA NGSS. In Rubric 3 they will analyze the instructional materials for the quality of the assessment in monitoring student progress.



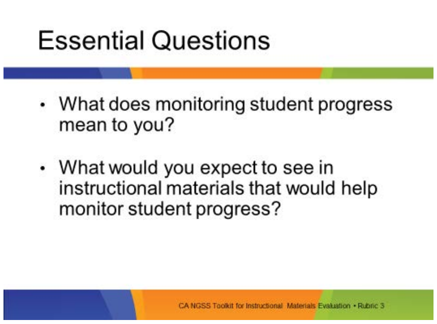
Slide 4: Rubric 3 Goals

a. Ask participants to read the question and keep it in mind as they review materials.

b. Explain that Rubric 3 addresses the *quality* of the materials to monitor student progress.

c. The Rubric addresses the *quality* of the assessment to monitoring three-dimensional learning and progress over time using a variety of measures, including formative and summative assessments.

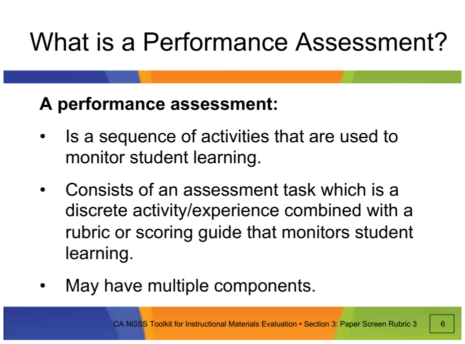
d. It also includes the *quality* of support and strategies for ensuring equitable access.



Slide 5: Essential Questions (10 minutes)

1. Ask participants to review the questions and jot down their own ideas.
2. Ask them to discuss their thoughts in a think-pair-share with a partner and invite them to add any ideas to their initial list.
3. Whip around the room to have participants share their thoughts. Record their brainstorm on a chart and post for use towards the end of the session.

Facilitator Note: Participants will refer to this chart later in the session.



Slide 6: What is a Performance Assessment?

a. Explain that NGSS is organized around performance expectations—an assessment statement that details the practice, core idea and crosscutting concept that students use to demonstrate their understanding.

b. Explain that a performance assessment is designed to measure this type of understanding.

c. Ask participants to read the slide with a partner. Then ask several partners to share their ideas of examples of a performance assessment.

Facilitator note: A performance assessment is not necessarily synonymous with a performance task. A performance assessment is larger—and may consists of multiple assessment types, e.g., multiple choice, constructed response, performance task.

Part 2: Gathering Evidence in Expert Groups (250 minutes)

<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td>

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Slide 7: Transition

Ask participants to move into their Parts group where they will examine what opportunities to assess student learning are in the curriculum.

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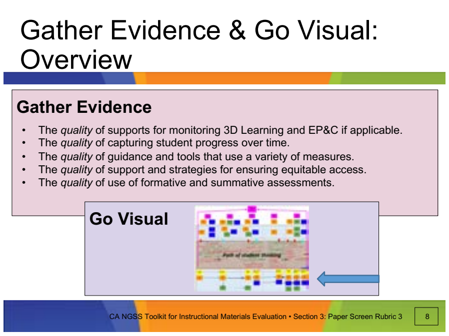

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Slide 8: Gather Evidence & Go Visual: Overview

a. Direct participants to the blue arrow. This “row” of chart paper captures the evidence of the assessments.

b. To gather evidence participants will make several passes through the instructional materials in which they:

- Locate formative and summative assessment in their chapter/section/etc.
- Identify the learning goal of each assessment.
- Identify and analyze the use of the dimensions in the assessments, including how each dimension builds (or not) and how well the dimensions work together to elicit student understanding.
- Determine if the assessment is truly 2 or 3 dimensional and finally how well the assessment monitors student progress toward understanding the phenomena/problem.
- Use strength arrows to indicate how coherent the assessments are within the chapter/section/etc.

Facilitator Notes: Encourage participants to identify just the primary assessment tasks, because they will do an in-depth analysis of each one. Some chapter sections may not include an assessment. We would expect two to a max of four or five assessments across a chapter.

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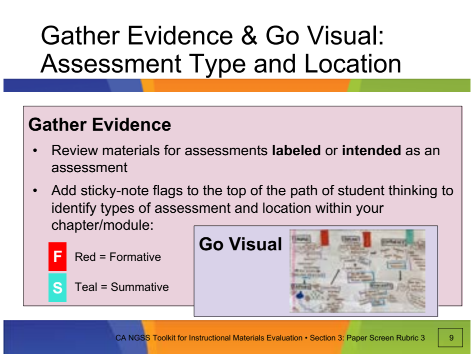

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Slide 9: Gather Evidence & Go Visual: Assessment Type and Location

a. Ask participants to re-read the materials, looking for labeled assessments or those activities that are intended as assessments.

b. Determine if the assessment is formative (assessment for learning) or summative (assessment of learning) and use the appropriate colored sticky note to label the assessment and place it above the path of student thinking as it occurs in the chapter/section/etc.

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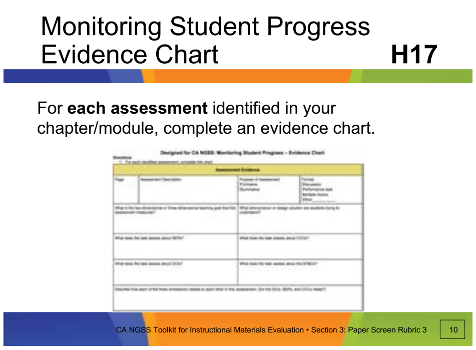
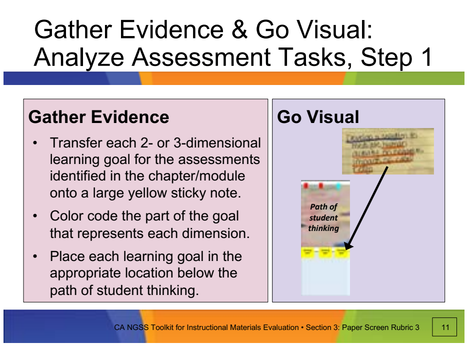
<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td></td><td>Facilitator Notes: Encourage participants to identify just the primary assessment tasks, because they will do an in-depth analysis of each one. Some chapter sections may not include an assessment. We would expect two to a max of four or five assessments across a chapter.</td></tr>
<tr><td>
</td><td>Slide 10: Monitoring Student Progress Evidence Chart
<ol type="a">
Make available multiple copies of “H17 – Designed for CA NGSS: Monitoring Student Progress Evidence Chart” to participants.
Explain to participants that they should complete one table for each assessment they identified.
</td></tr>
<tr><td>
</td><td>Slide 11: Gather Evidence & Go Visual: Analyze Assessment Tasks, Step 1
<ol type="a">
As participants are completing the evidence chart, ask them to also write the two- or three-dimensional goal(s) on a large sticky note and color code the dimensions. Note that some assessments might be one-dimensional and should be recorded as such on the chart and the sticky note.
Distribute a piece of chart paper to each group and ask them to tape it horizontally below their path of student thinking chart.
Ask participants to post their assessment learning goal (large yellow sticky note) on the chart paper in line with the assessment flags identified in Slide 9.
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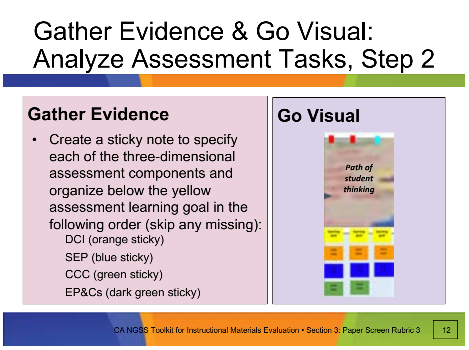
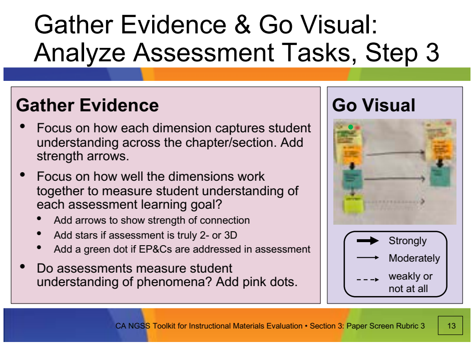
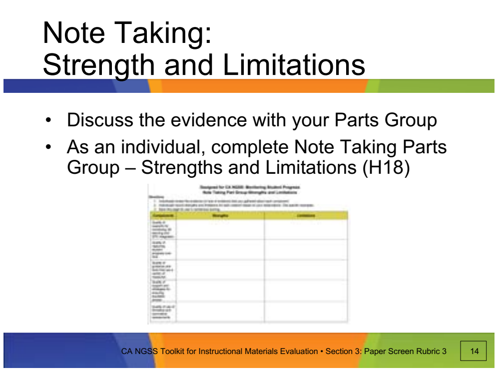
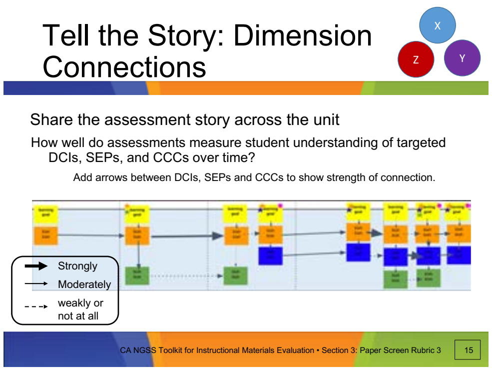
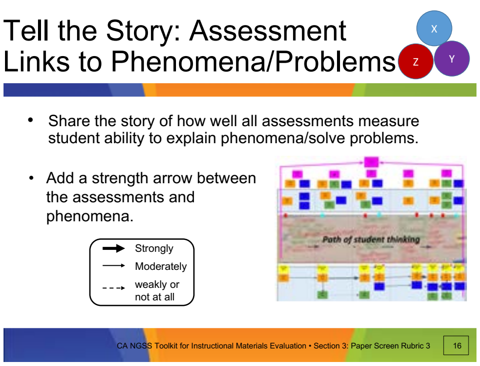
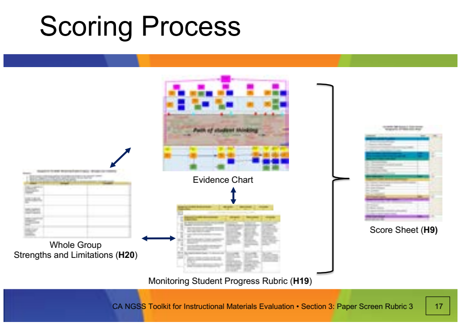
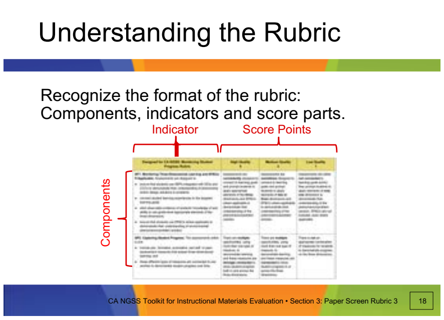
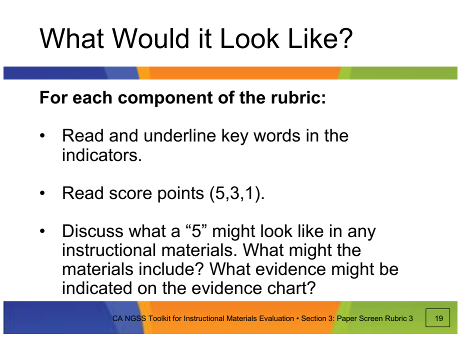
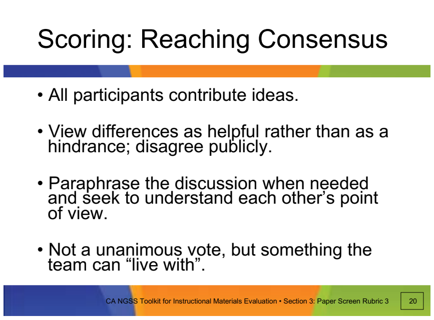
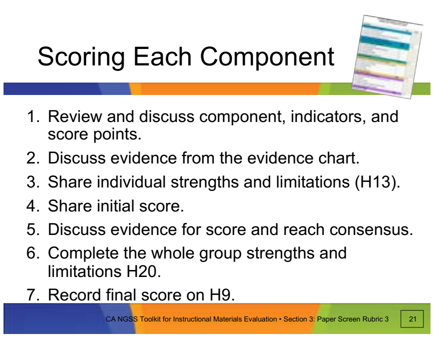
<tr><td>
</td><td>Slide 12: Gather Evidence and Go Visual: Analyze Assessment Tasks, Step 2
<ol type="a">
Using information from H17, create a sticky note, on the appropriate color, for any of the dimensions and EP&Cs (if applicable).
Place the sticky notes in the order shown on the slide. If a dimension is not apparent, leave a blank space.
</td></tr>
</table>

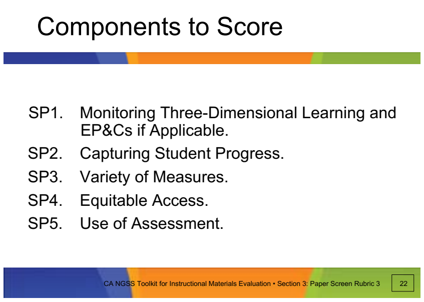
Slide	Slide Title and Facilitation Notes
	**Slide 13: Gather Evidence & Go Visual: Analyze Assessment Tasks, Step 3** a. Explain that participants will analyze how the dimensions are used in the assessments in two ways: 1) how well do the dimensions build on and support one another in the chapter (horizontal row), and 2) how well do the dimensions work together to assess student understanding of the phenomenon/problem. b. Ask participants to follow the directions on the slide, remembering to draw strength arrows for the horizontal row, as well as strength arrows vertically. c. Based on their discussion and the strength arrows, ask participants to determine if the 2- or 3-dimensional learning goal was in fact addressed. If so, ask them to star the learning goal for 2 or 3 dimensions as appropriate. If not, only draw stars for what is addressed (e.g., 1 star if only 1 dimensional). d. Distribute green dots and ask participants to place it on the yellow sticky note where they recorded the learning goal if the EP&Cs were used in the assessment. If not, do not place a green dot. e. Distribute pink dots. Ask participants to determine if the assessment truly addresses student understanding of the phenomenon/problem. If so, place a pink dot on the yellow sticky note where they recorded the learning goal. If not, do not place a pink dot. *Facilitator Notes: This might be a good point for a short Reflection to help participants step back and consider the power of telling the assessment story.*
	**Slide 14: Note Taking: Strengths and Limitations** **Individual** a. Distribute **H18 (Note Taking: Part Group Strengths and Limitations)** for individuals to complete. b. Ask participants to reflect on the assessment analysis. c. Have participants, as individuals, take a few moments to record strengths and limitations for monitoring student progress particularly SP1, SP2, S5. Record evidence (e.g., page numbers; horizontal and vertical strength arrows, number of stars on the learning goal, pink dot on learning goal) d. Remind participants that this is their thinking. They

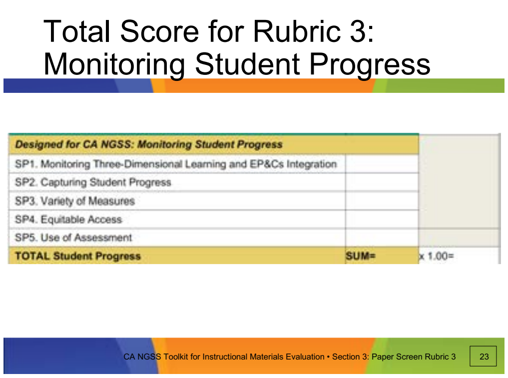
Slide	Slide Title and Facilitation Notes
	will use this data in the final scoring of Rubric 3.
	**Slide 15: Tell the Story: Dimension Connections** **Whole Group** a. Explain that just like the sequence of learning experiences, the sequence of assessment tasks should also be coherent. b. Ask each Parts Group to share their assessment story for each dimension. c. Ask the whole group to listen carefully for connections to their chapter/section/etc. assessments. d. When the groups have finished sharing (or as groups are reporting) draw strength arrows (thick for -strong connection; thin some connection; dotted for weak or no connection) between chapters/sections/etc. for assessments.
	**Slide 16: Tell the Story: Assessment Links to Phenomena/Problems** **Whole Group** a. Ask each Parts Group to share the strength of their assessments to the phenomena/problems in their chapter/section/etc. Ask them to share which of the learning goals (large yellow sticky note) have a pink dot. b. After all groups have shared, ask the whole group to think about how well the assessments support students' 3-dimensional understanding of the phenomena/problems. c. Draw strength arrows from the assessment to the unit/module phenomenon/problem if there is one, or to the chapter/section phenomenon/problem. d. Ask the group to return to their High-Quality Assessment Chart they created earlier in the session and review the list. Using a different colored maker, edit the list by adding new ideas or crossing out or modifying existing ideas. *Facilitator Note: If necessary, emphasize that participants should NOT be discussing what students are doing in the assessment tasks, but how the tasks evaluate student understanding as they progress through the path of thinking.*

Slide	Slide Title and Facilitation Notes
	**Slide 17: Scoring Process** a. Remind participants that like in Rubric 2, they will use the evidence chart, rubric, and strengths and limitations chart to evaluate and consensus score each component of the rubric. b. Explain that these resources serve as artifacts of the process and serve as evidence for decision-making and recommendations for adoption. Be detailed and keep good records.
	**Slide 18: Understanding the Rubric** a. Distribute **H19** Designed for NGSS: Monitoring Student Progress Rubric. b. Ask participants to identify the components, indicators, and score points on this rubric. c. Ask participants what they remember about the indicators and score points? (Indicators help explain the components, and the score points help identify the degree to which the materials meet the criteria). *Facilitator Note: The components are the numbered statements, the indicators are the bulleted statements which serve as criteria for the components and the score points identify the degree to which the materials meet the criteria.*
	**Slide 19: What Would It Look Like?** a. Ask participants to read the first component SP1 Monitoring Three-Dimensional Learning and EP&Cs if applicable. Have participants underline key words in the indicator that describe what they are looking for in the instructional materials. b. Have participants read the score points to see a description of the different quality levels for the phenomena indicator. **c.** Facilitate a discussion about what a level '5' might look like for assessment that monitors 3-dimensional learning in any instructional material. What might the

Slide	Slide Title and Facilitation Notes
	materials include? (e.g., flow charts of the dimensions as they are assessed, graphic of how the dimensions support understanding the phenomena/problems). What evidence might be indicated on the path of student thinking charts? (e.g., Strength arrows between dimensions and strength arrows to the phenomenon/problem; number of 2-3 dimensional assessments). *Facilitator Note: the purpose of this activity is to calibrate participants in their understanding of the component, indicator and score points. Once calibrated, participants can apply their understanding to any set of instructional materials.*
	**Slide 20 Scoring: Reaching Consensus** a. This is an animated slide. b. Remind participants that each CA NGSS TIME rubric is scored by reaching consensus. Ask participants what they remember about consensus scoring. c. Advance slide several times. Ask participants to relate their ideas with those on the slide.
	**Slide 21: Scoring Each Component** a. Use this slide to provide an overview of what participants will do to score each component. b. Then ask participants to review and discuss SP1 Monitoring Three-Dimensional Learning and EP&Cs if applicable for indicators and the score points. Underline any key words they want to remember. c. Have participants return to assessment charts to look for evidence in support of the indicators. d. Have individuals share the strengths and limitations for this component that they entered on **H18.** e. Ask the participants for their initial score by using the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by raising 1, 3, or 5 fingers.

Slide	Slide Title and Facilitation Notes
	f. Record the initial vote on Chart **C7 (Consensus Scoring)** o If the initial score is unanimous, move to **H20** to record summary strengths and limitation for this component. o If the initial score is not unanimous, facilitate a discussion to reach consensus. Start with these strategies: ▪ ask participants to provide evidence (from the path of student thinking charts, their **H18** notes on strengths and limitations, or those of others) to support their score ▪ ask participants who gave a score of ‘5’ to explain why they scored it a ‘5,’ relying on their evidence; have a “1’ explain why they scored it as a ‘1’ ▪ Discuss/debate and ask for a rescore using the fist of 5. Record the second score on Chart **C7 (Consensus Scoring).** *Facilitator Notes: Encourage full participation, ensure that discussions and decisions are based on evidence from the instructional materials. If necessary, use additional strategies found on **Chart C3 (Consensus Building Strategies)*** *Ultimately, the group will come to a decision, but there must be a critical mass, enough of the group to be in favor to get the decision carried out. (Definition modified from The Adaptive School: Developing and Facilitating Collaborative Groups by Robert Garmston and Bruce Wellman, 2000, Four Hats Seminars, El Dorado Hills, California.)* g. Based on the consensus conversation, complete **H20 (Designed for NGSS: Foundations Strengths and Limitations)** as a summary of the discussion. This form will be used as an artifact of Rubric 3 to support the scoring decision, and to plan professional learning if the materials are adopted. h. Record consensus score on **H9 (Paper Screen Score Sheet)** for SP1: Monitoring Three-

Slide	Slide Title and Facilitation Notes
	Dimensional Learning and EP&Cs if applicable.
	**Slide S22: Components to Score** a. Review the next components to score. Ask participants to review and discuss SP2. Capturing Student Progress, the indicators for that component and the score points. Underline any key words they want to remember. b. Toggle back to Slide 21 and repeat the process for SP2. c. After component SP2 is scored, ask participants to review and discuss SP3 Variety of Measures, indicators and the score points. Underline any key words they want to remember. d. Toggle back to Slide 21 and repeat the process for SP3. e. After component SP3 is scored, ask participants to review and discuss SP4 Equitable Access, indicators and the score points. Underline any key words they want to remember. f. Toggle back to Slide 21 and repeat the process for SP4. g. After component SP4 is scored, ask participants to review and discuss SP5 Use of Assessments, indicators and the score points. Underline any key words they want to remember. h. Toggle back to Slide 21 and repeat the process for SP5. *Facilitator Note: At the end of the scoring process for all components, remind participants to keep the handouts with scores, strengths, and limitations. These are the data that will be used to support decision-making and recommendations for materials selection. Encourage participants to properly name and store these.*

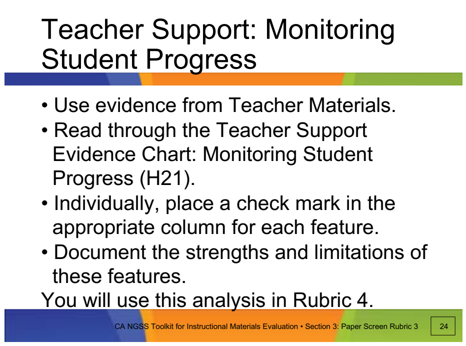
<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td>


</td><td>

Slide 23: Total Score for Rubric 3: Monitoring Student Progress

a. Ask the group to enter the scores for each component on **H9**.

b. Add the scores to arrive at a total.

</td></tr>
<tr><td>


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Slide 24: Teacher Support: Monitoring Student Progress

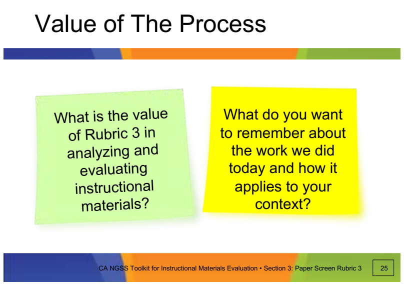
a. Ask participants to notice key features on the chart.

b. Explain that they have focused on the Student Edition as the main source of evidence for analysis. Now they will consider the support that is provided by the Teacher Materials.

c. Ask participants to follow the directions on the slide to complete H21.

</td></tr>
</table>

Part 3 – Closing and Next Steps (10 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 25: Value of The Process** a. Explain to participants that in Rubric 2, they analyzed a unit through the perspective of **how** students learn as they engage in phenomena, use the three dimensions, and connect to the EP&Cs. In Rubric 3 they built on this to consider **how** student progress is monitored. b. Invite participants to review the chart they made at the beginning highlighting the characteristic features and elements of high-quality instructional materials. Ask them to make additions to the chart in light of the learning they experienced during this process. c. Ask participants to do a quick write on two large sticky notes to answers the prompts on the screen. d. Collect the value statements; ask participants to keep the remember statements. *Facilitator Note: Compile the value statements and create a summary statement on a large piece of paper that can be added to the left of the conceptual flow charts for the unit.* *Assessment Charts created during this section will be used again. SAVE THEM! If the team is going to continue the next day in the same room they can stay on the walls. If not, tape the sticky notes onto the poster so that they stay in place when the posters are rolled up.*

Designed for CA NGSS: Monitoring Student Progress – Evidence Chart

Directions

1. For each identified assessment, complete this chart.

Assessment Evidence			
Page	Assessment Description	Purpose of Assessment ☐Formative ☐Summative	Format ☐Discussion ☐Performance task ☐Multiple choice ☐Other__________
What is the two-dimensional or three-dimensional learning goal that this assessment measures?		What phenomenon or design solution are students trying to understand?	
What does the task assess about SEPs?		What does the task assess about CCCs?	
What does the task assess about DCIs?		What does the task assess about the EP&Cs?	
Describe how each of the three-dimensions relates to each other in this assessment. (Do the DCIs, SEPs, and CCCs relate?)			

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________
Reviewer Name ____________________________

Designed for CA NGSS: Monitoring Student Progress
Note Taking Parts Group – Strengths and Limitations

Directions

1. *Individually* review the evidence (or lack of evidence) that you gathered about each component.
2. *Individually* record strengths and limitations for each criterion based on your observations. Cite specific examples.
3. Save this page for use in consensus scoring.

Components	Strengths	Limitations
SP1. Quality of supports for monitoring 3D learning and EP&Cs integration.		
SP2. Quality of capturing student progress over time.		
SP3. Quality of guidance and tools that use a variety of measures.		
SP4. Quality of support and strategies for ensuring equitable access.		
SP5. Quality of use of formative and summative assessments.		

Designed for CA NGSS: Monitoring Student Progress Rubric

Designed for CA NGSS: Monitoring Student Progress Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SP1. Monitoring Three-Dimensional Learning and EP&Cs If Applicable. Assessments are designed to ● ensure that students use SEPs integrated with DCIs and CCCs to demonstrate their understanding of phenomena and/or design solutions to problems. ● connect student learning experiences to the targeted learning goals. ● elicit observable evidence of students' knowledge of and ability to use grade-level appropriate elements of the three-dimensions. ● ensure that students use EP&Cs where applicable to demonstrate their understanding of environmental phenomenon/problem solution.	Assessments are consistently designed to connect to learning goals and prompt students to apply appropriate elements of the three dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are sometimes designed to connect to learning goals and prompt students to apply elements of two or three dimensions and EP&Cs where applicable to demonstrate their understanding of the phenomenon/problem solution.	Assessments are either not connected to learning goals and/or they prompt students to apply elements of only one dimension to demonstrate their understanding of the phenomenon/problem solution. EP&Cs are not included, even where applicable.
SP2. Capturing Student Progress. The assessments within a unit: ● include pre-, formative, summative, and self- or peer-assessment measures that assess three-dimensional learning; and ● these different types of measures are connected to one another to demonstrate student progress over time.	There are multiple opportunities, using more than one type of measure, to demonstrate learning and these measures are strongly connected to show student progress both in and across the three dimensions.	There are multiple opportunities, using more than one type of measure, to demonstrate learning and these measures are connected to show student progress both in and across the three dimensions.	There is not an appropriate combination of measures for students to demonstrate progress both in and across the three dimensions.

Designed for CA NGSS: Monitoring Student Progress Rubric	High Quality 5	Medium Quality 3	Low Quality 1
SP3. Variety of Measures. Assessments are matched to targeted learning goals and elicit a full range of student thinking by ● providing clear expectations (e.g., rubric) to students so they understand how they can demonstrate their knowledge. ● using a variety of measures (e.g., performance tasks, discussion questions, constructed response questions, project- or problem-based tasks, portfolios, and justified multiple choice). ● providing set(s) of tasks so that students can demonstrate their understanding of the same learning goals in multiple ways.	The assessments include a wide variety of formats with clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.	The assessments include some variety of formats with clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.	The assessments use just one format and/or the expectations for students to demonstrate their knowledge are absent or unclear.
SP4. Equitable Access. Assessments are designed to be ● free from bias (e.g., gender, racial, socioeconomic status, cultural). ● accessible to all students (e.g., reading level, accommodations).	Most assessments are free from bias and are accessible.	Some assessments are free from bias and are accessible.	Few assessments are free from bias and are accessible.
SP5. Use of Assessment. The materials provide self- or peer-assessments that allow students to reflect on and monitor their learning over time.	The materials miss few or no opportunities to encourage self- or peer-assessments that allow students to reflect on and monitor their progress.	The materials miss some opportunities to encourage self- or peer-assessments that allow students to reflect on and monitor their progress.	The materials miss all or most opportunities to encourage self- and peer-assessments that allow students to reflect on and monitor their progress.

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________

Designed for CA NGSS: Monitoring Student Progress – Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Student Work Rubric" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Criteria	Strengths	Limitations
SP1. Quality of supports for monitoring 3D learning and EP&Cs integration.		
SP2. Quality of capturing student progress over time.		
SP3. Quality of guidance and tools that use a variety of measures.		
SP4. Quality of support and strategies for ensuring equitable access.		
SP5. Quality of use of formative and summative assessments.		

CA NGSS TIME Section 3: Paper Screen
Teacher Support Evidence Chart: Monitoring Student Progress

Key Features of Instructional Materials	Strong	Adequate	Weak
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration. Provide support with a range of sample student responses and/or rubrics for interpreting evidence of student learning across the three dimensions and EP&Cs (where applicable) specific to the element of each dimension, and related to the phenomenon/problem that provides context for the student performance.			
SP2. Capturing Student Progress. The assessments within a unit include pre-, formative, summative, and self- or peer-assessment measures that assess three-dimensional learning, and these different types of measures are connected to one another to demonstrate student progress over time.			
SP3. Variety of Measures. Provide guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.			
SP4. Equitable Access. Provide support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.			
SP5. Use of Assessment. Provide guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; and prompting students to consider what and how they've learned.			

Strengths related to these Teacher Supports	Limitations related to these Teacher Supports

Section 3: Paper Screen Rubric 4 Designed for CA NGSS: Teacher Support

Time: 1 hour 15 minutes

Overview

"Rubric 4 – Designed for CA NGSS: Teacher Support" is an analysis of the Teacher Support Material in one unit of the instructional materials. Rubric 4 relies on the preliminary findings of strengths and limitations for teacher support from Rubrics 1–3. Rubric 4 focuses on elements that contribute to a holistic view of how instructional materials support teachers to deliver high-quality instruction. The components address ideas that cut across and blend parts of the three previous rubrics. These include:

- TS1: Phenomenon/Problem/3D
- TS2: Coherence
- TS3: Effective Teachers
- TS4: Support for Diverse Learner Needs
- TS5: Support to Monitor Student Progress

In previous rubrics, the analysis was done primarily on student materials. In Rubric 4, the analysis is done primarily on teacher support materials.

Advance Preparation

Post C1-Norms, C3- Consensus scoring from Rubric 1.

Participants should continue in their Parts and Whole Groups formed in "Rubric 1: Designed for NGSS: Foundations."

Make sure Parts Groups have H10, H16, and H21 from the previous rubrics.

Prepare a consensus score chart and a rank order list.

Action Step 3.4 – Rubric 4: Teacher Support

Task 3.4a: Introduction

The facilitation guide and presentation for “Rubric 4: Designed for CA NGSS: Teacher Support” provide a shared professional learning experience and calibration activities for each step in the process. After all Action Step 3 Tasks have been experienced once by the adoption committee, the committee can then return to “Rubric 4: Designed for CA NGSS: Teacher Support” and begin the process for instructional materials under review.

The components of Rubric 4 are:

- use phenomena/problems to drive three-dimensional learning,
- build coherence throughout learning experiences,
- use of effective teaching strategies,
- support students with diverse learning needs, and
- monitor student progress over time

Setting the Stage:

Engage the committee in a conversation about what would they expect to see in instructional materials that support teachers to facilitate phenomenon-based/problem solution-based three-dimensional learning for ALL students. This discussion will help the committee be more aware of what they expect and desire to see when reviewing materials.

Overview of Gathering Evidence and Scoring

Rubric 4 uses data from the teacher support component of each of the previous rubrics**:** section 3: Paper Screen Rubric 1 Teacher Support Evidence Chart: Foundations*;* section 3: Paper Screen Rubric 2 Teacher Support Evidence Chart: Student Work; section 3: Paper Screen Rubric 3 Teacher Support Evidence Chart: Monitoring Student Progress, and provides a process to holistically analyze how the materials support teachers in components that cut across and blend parts of all three previous rubrics.

Rubric 4 has 5 components:

TS1: Phenomenon/Problem/Three Dimensional Learning

TS2: Coherence

TS3: Effective Teaching

TS4: Support for Diverse Learning Needs

TS5: Support to Monitor Student Progress

The Whole group is introduced to the rubric (H22) and discusses what a “5” might look like in instructional materials and in the evidence that has been gathered. Then Parts Groups review their evidence from the other 3 rubrics citing strengths and limitations. The Parts Groups share evidence from one component with the Whole Groups which then consensus score that component and enter summary strengths and limitations for that component.

The process repeats for the next 4 components.

Consensus scoring is a keystone of the CA NGSS TIME process. Participants will use the same processes they used to reach consensus in the previous portions of the Paper Screen process. Remind participants what consensus means: all participants contribute ideas and encourage the use of one another’s ideas and opinions; the group views differences as helpful rather than as a hindrance; everyone can paraphrase the issue at hand, and everyone has a chance to describe their feelings about the issue; those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time; all share in the final decision. Consensus does not mean a unanimous vote, everyone’s first choice, or that everyone agrees.

After consensus has been reached for a component, enter the score on “H9 – Designed for CA NGSS: Score Sheet.”

The committee will go through the process of reaching consensus five times.

Task 3.4a: Rubric Introduction

- Introduce the Whole Group to “H22 – Designed for CA NGSS: Teacher Support Rubric.” (i.e., the components, indicators, and score points). Note that one difference in this rubric as compared to those used previously is that each row refers to specific sources of evidence from the previous rubrics 1–3 that address teacher support.

- To increase shared understanding of the characteristics of high-quality instructional materials designed for the NGSS and to calibrate scoring across groups, conduct a discussion about what a ‘5’ might look like for each component in the instructional materials.
- The section 3 “Paper Screen Rubric 4 Facilitator Guide” provides guidance for multiple whole groups as well as having only one group.

Section 3: Paper Screen Rubric 4 – **H22**

Designed for CA NGSS: Teacher Support Rubric

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomena/Problems Driven Three-Dimensional Learning. Teacher materials provide • background information about the phenomena or problems included in the learning sequence and across sequences. • an explanation of the role of phenomena or problems in driving student learning. • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

CA NGSS TIME adapted from © 2018 BSCS Science Learning, developed in collaboration with the K-12 Alliance at WestEd and Achieve, Inc.

Task 3.4b: Gathering Evidence and Scoring

Step 1: Parts Groups review evidence and discuss

- Parts Groups review their Teacher Support Evidence Charts from Rubric 1 (H10), Rubric 2 (H16), and Rubric 3 (H21).

Step 2: Sharing Evidence

- Parts Groups share evidence with Whole Groups—one component at a time.

Step 3: Scoring

- Whole Groups score by consensus using the rubric record score on H9.

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	x 1.66 =
Designed for CA NGSS: Student Work		
SW 1. Phenomena/Problems		
SW 2. Three-Dimensional Conceptual Framework		
SW 3. Prior Knowledge		
SW 4. Metacognitive Abilities		
SW 5. Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1. Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2. Capturing Student Progress		
SP3. Variety of Measures		
SP4. Equitable Access		
SP5. Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1. Phenomena/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**SUM=**	x 1.00=
Grand Total (out of 100)		

- Whole Group decide on summaries for strengths and limitations on H23.

Name of Instructional Materials ______________________________ Grade Level/Course ______ Unit/Module Title__________

Section 3: Paper Screen Rubric 4 – **H23**

Designed for CA NGSS: Teacher Support - Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Teacher Support" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
TS1. Phenomena/problems Driven Three-Dimensional Learning.		
TS2. Coherence.		
TS3. Effective Teaching.		
TS4. Support for Students with Diverse Learning Needs.		
TS5. Support to Monitor Student Progress.		

Step 4. Reflection

Have the committee reflect on the value of the experience by responded to the following prompts: What is the value of Rubric 4 in analyzing and evaluation instructional materials? What do you want to remember about the work you did today and how it applies in your context?

This completes the scoring for all four rubrics in the Paper Screen process.

Task 3.4c: Rank Order and Make Pilot Materials Decision

In this section, the scores from Rubrics 1–4 are totaled for each program evaluated during the Paper Screen process and the instructional materials are ranked based on their scores. The top ranked programs should go forward to section 4: Pilot Materials. It is highly recommended that districts complete section 4: Pilot Materials to ensure that the instructional materials work well in classrooms with students and teachers. Two options are provided to guide the district in the decision of what programs move forward to section 4: Pilot Materials.

Option #1: When a limited number of programs are clearly a match to the district's high-quality criteria and needs defined in section 1: Develop District Lens, teams may choose to go directly to section 4: Pilot Materials.

Option #2: District teams may decide to use section 3 "Paper Screen Rubric 5 Designed for NGSS: Program Evaluation" when more information is needed about materials to be selected for Section 4: Pilot Materials. Rubric 5 provides districts the opportunity to synthesize Rubrics 1–4 with a 'snapshot' look of two or three other units in the program to determine if high quality is consistent throughout.

Once the adoption committee chooses an option, proceed accordingly.

CA NGSS TIME

California Next Generation Science Standards
Toolkit for Instructional Materials Evaluation

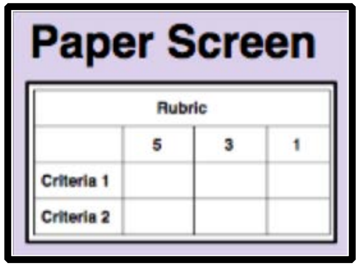
Section 3: Paper Screen
Rubric 4 Designed for CA NGSS: Teacher Support

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

Purpose & Outcomes

- Learn a process for analyzing instructional materials for CA NGSS.
- Apply the process and tools to help you:
  - Gain a shared understanding of the characteristics of high-quality instructional materials.
  - Use the process to inform the selection of instructional materials *and* to plan for classroom use.
  - Deepen your understanding of CA NGSS through professional learning experiences.

Paper Screen You Are Here



- Rubric 1: Foundations
  What are students going to learn?
- Rubric 2: Student Work
  How are students going to learn?
- Rubric 3: Monitoring Student Progress
  How are students assessed?
- **Rubric 4: Teacher Supports**
  How do the materials support teachers to facilitate student learning?

Rubric 4 Goals

Driving question:

How well do materials support teachers to facilitating student learning?

We will determine the *quality* of teacher support in aligning instruction to CA NGSS by including:

- Using phenomena/problems to drive three-dimensional learning.
- Building coherence throughout learning experiences.
- Using effective teaching strategies.
- Supporting students with diverse learning needs.
- Monitoring student progress over time.

Synthesize final scores and rank order programs

Essential Questions

- What resources do teachers need to be able to effectively facilitate and assess phenomenon/problem-driven three-dimensional learning opportunities for all students?
- What are the features of teacher resources that make them likely to be used by teachers?

Rubric 4: Teacher Support

Teacher materials…	Strong	Adequate	Weak
F1. Presence of Phenomena/Problem. Identify and provide background information about the phenomena/problems in the unit and how they match the targeted learning goals.			
F2. Presence of Three Dimensions. Identify and provide background information about each of the three dimensions in the unit. Also take note of any support for engineering, technology, and applications of science. the SEPs			
the DCIs			
the CCCs Engineering			
F3. Presence of Environmental Principles and Concepts (EP&Cs). Identify and provide background information about California's EP&Cs in the unit and how they match the learning opportunities for students.			
F4. Presence of Logical Sequence of Learning. Identify and provide background information on the sequence of learning in the			
Strengths re			

Foundations: H10

What students learn

Teacher materials…	Strong	Adequate	Weak
SW1. Phenomena/Problems. Provide support and strategies for how to help students figure out/solve authentic and relevant phenomena/problems using the three dimensions.			
SW2. Three-dimensional Conceptual Framework. Provide support and strategies for how teachers help students develop a conceptual framework of scientifically accurate understandings and abilities related to the DCIs, SEPs, and CCCs (*also* NoS, ELA, and math); and create a learning environment that values students' ideas, motivates learning, and helps students negotiate new meaning as they interact with others' ideas, new information, and new experiences.			
SW3. Prior Knowledge. Provide support and strategies to leverage students' prior knowledge and experiences to motivate learning.			
SW4. Metacogn metacognitive a			
SW5. Equitable students, includ the targeted lea			
Stre			

Student Work: H16

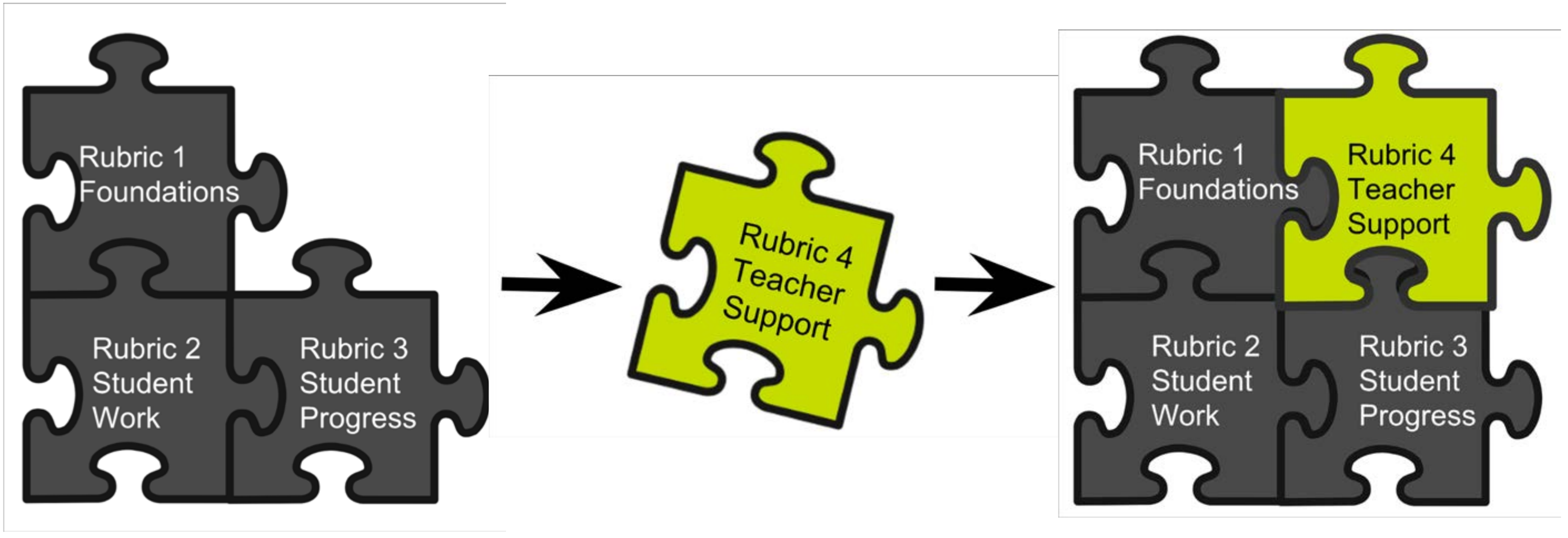
How students learn

Teacher materials…	Strong	Adequate	Weak
SP1. Three-dimensional Performances. Provide support with a range of sample student responses and/or rubrics for interpreting evidence of student learning across the three dimensions, specific to the element of each dimension, and related to the phenomenon/problem that provides context for the student performance.			
SP2. Variety of Measure. Provide guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.			
SP3. Student Progress Over Time. Provide guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; prompting students to consider what and how they've learned.			
SP4. Equitable Access. Provide support and strategies for ensuring that assessments			

Student Progress: H21

How students are assessed

Rubric 4 Components



Designed for CA NGSS: Teacher Support Rubric

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomena/Problems Driven Three-Dimensional Learning. Teacher materials provide • background information about the phenomena or problems included in the learning sequence and across sequences. • an explanation of the role of phenomena or problems in driving student learning. • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs where appropriate to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

Transition

- Move to your Parts Groups.
- Bring H10, H16, and H21 with you.

Gather Evidence: Discussing Strengths and Limitations

1. In your parts group, share and discuss your individual ratings, and strengths and limitations from **H10** (Foundations).
2. Determine whether you want to add to your chart based on the discussion.

Repeat process for:

- **H16** (Student Work)
- **H21** (Monitoring Student Progress)

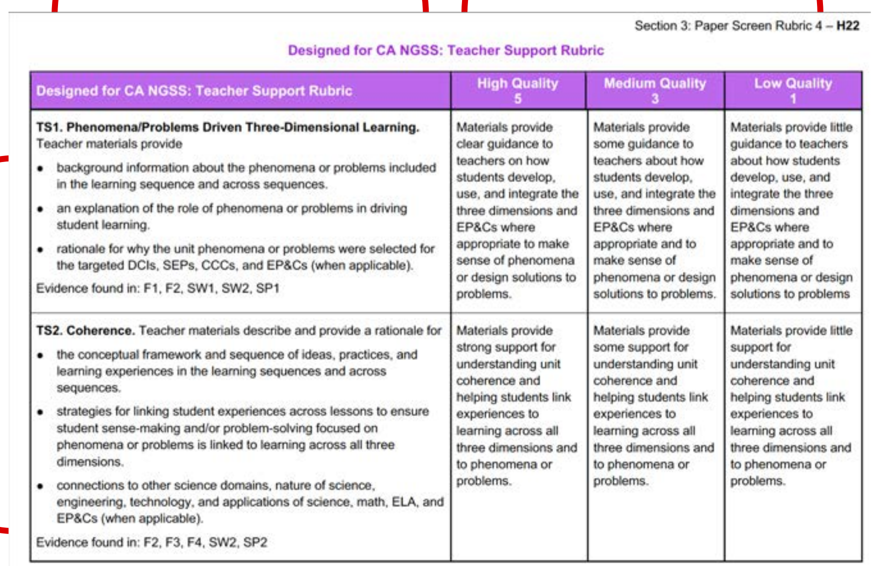
Understanding the Rubric

Recognize the format of the rubric: Components, indicators and score parts.

Indicator

Score Points

Components



Section 3: Paper Screen Rubric 4 – **H22**

Designed for CA NGSS: Teacher Support Rubric

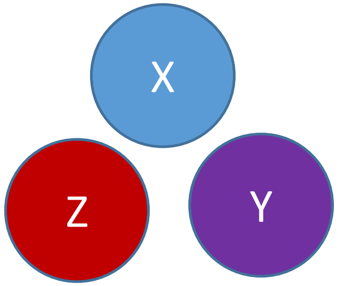
Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomena/Problems Driven Three-Dimensional Learning. Teacher materials provide • background information about the phenomena or problems included in the learning sequence and across sequences. • an explanation of the role of phenomena or problems in driving student learning. • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs where appropriate to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

What Would It Look Like?

For each component of the rubric:

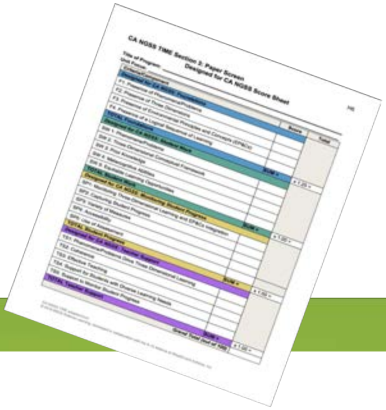
- Read and underline key words in the indicators.
- Read score points (5,3,1).
- Discuss what a “5” might look like in any instructional materials. What might the materials include? What evidence might be indicated on the evidence chart?

Scoring:
Reaching Consensus



- All participants contribute ideas.
- View differences as helpful rather than as a hindrance; disagree publicly.
- Paraphrase the discussion when needed and seek to understand each other’s point of view.
- Not a unanimous vote, but something the team can “live with”.

Scoring Each Component



1. Review and discuss component, indicators and score points.
2. Discuss evidence from the conceptual flow graphic
3. Share individual strengths and limitations (H23).
4. Share initial score.
5. Discuss evidence for score and reach consensus.
6. Complete whole group strengths and limitations (H8).
7. Record final score on H9.

Components to Score

TS1. Phenomena/Problems Driven Three-Dimensional Learning.

TS2. Coherence.

TS3. Effective Teaching.

TS4. Support for Students with Diverse Learning Needs.

TS5. Support to Monitor Student Progress.

Total Score for Rubric 4: Teacher Support

Designed for CA NGSS: Teacher Support	
TS1: Phenomena/Problems Drive Three Dimensional Learning	
TS2: Coherence	
TS3: Effective Teaching	
TS4: Support for Students with Diverse Learning Needs	
TS5: Support to Monitor Student Progress	
TOTAL Teacher Support	**SUM =**

Bringing It Together

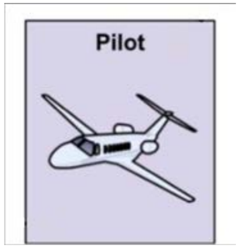
CA NGSS TIME Section 3: Paper Screen
Designed for CA NGSS Score Sheet

Component	Score	Total
Designed for CA NGSS: Foundations		
F1. Presence of Phenomena/Problems		
F2. Presence of Three Dimensions		
F3. Presence of Environmental Principles and Concepts (EP&Cs)		
F4. Presence of a Logical Sequence of Learning		
TOTAL Foundations with EP& Cs (applicable)	**SUM=**	x 1.25 =
TOTAL Foundations without EP&C (not applicable)	**SUM=**	X 1.66 =
Designed for CA NGSS: Student Work		
SW 1: Phenomena/Problems		
SW 2: Three-Dimensional Conceptual Framework		
SW 3: Prior Knowledge		
SW 4: Metacognitive Abilities		
SW 5: Equitable Learning Opportunities		
TOTAL Student Work	**SUM=**	x 1.00 =
Designed for CA NGSS: Monitoring Student Progress		
SP1: Monitoring Three-Dimensional Learning and EP&Cs Integration		
SP2: Capturing Student Progress		
SP3: Variety of Measures		
SP4: Accessibility		
SP5: Use of Assessment		
TOTAL Student Progress	**SUM=**	x 1.00=
Designed for CA NGSS: Teacher Support		
TS1: Phenomena/Problems Drive Three-Dimensional Learning		
TS2: Coherence		
TS3: Effective Teaching		
TS4: Support for Students with Diverse Learning Needs		
TS5: Support to Monitor Student Progress		
TOTAL Teacher Support	**SUM=**	x 1.00=
Grand Total (out of 100)		

- Total the scores for each rubric
- Rank order instructional materials which warrant further review
- You are now finished with the Paper Screen process

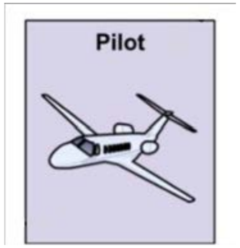
Options After Paper Screening

1. **Rubric 1-4 (Paper Screen Score)** →

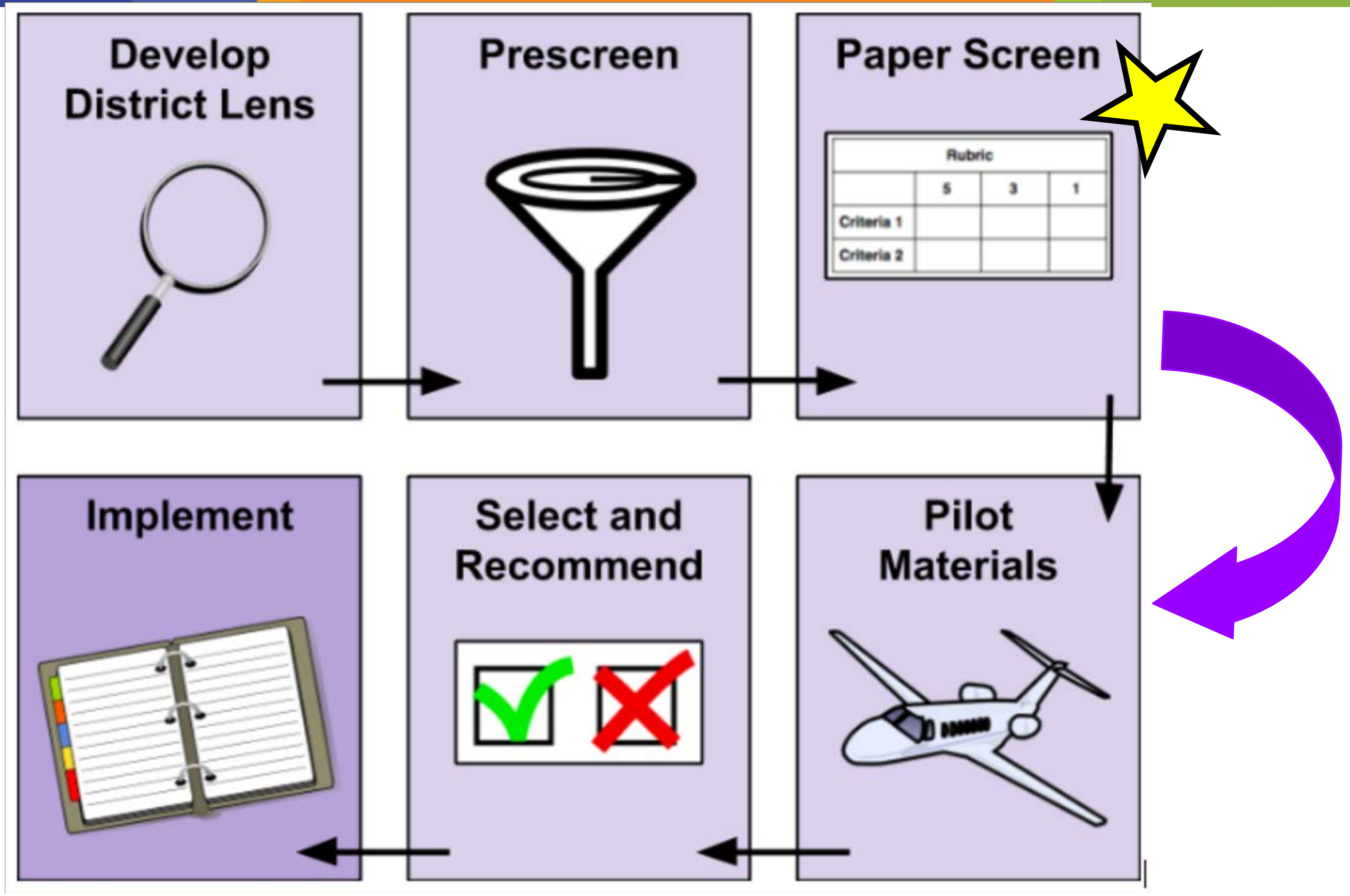


OR

2. **Rubric 1-4 (Paper Screen Score)** → **5. Program Evaluation Rubric** →



CA NGSS TIME Road Map



Value of The Process

What is the value of Rubric 4 in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 3: Paper Screen Rubric 4 Designed for CA NGSS: Teacher Support Script (Facilitator Guide)

Purpose

“Rubric 4: Teacher Support” provides an analysis of the Teacher Support Material in one unit of the instructional materials. In prior rubrics, participants have analyzed student materials for NGSS design, student thinking, and assessment of learning. In this session, they will analyze teacher support materials and synthesize the teacher support strengths and limitations handouts from rubrics 1–3 to evaluate the unit.

Time: 1 hour 15 minutes

Part I	Introduction	10 minutes
Part II	Teacher Support Review Evidence, Analyze Evidence, & Score Components	60 minutes
Part III	Closure	5 minutes

Materials

Slides

S1	Title Slide
S2	Purpose & Outcomes
S3	Paper Screen You Are Here
S4	Rubric 4 Goals
S5	Essential Questions
S6	Rubric 4: Teacher Support
S7	Rubric 4 Components
S8	Designed for NGSS: Teacher Support - Rubric 4
S9	Transition
S10	Gather Evidence: Discuss Strengths and Limitations
S11	Understanding the Rubric
S12	What Would It Look Like?
S13	Scoring: Reaching Consensus
S14	Scoring Each Component
S15	Components to Score

S16	Total Score for Rubric 4 Teacher Support
S17	Bringing it Together
S18	Options after Paper Screening
S19	CA NGSS TIME Road Map
S20	Value of The Process

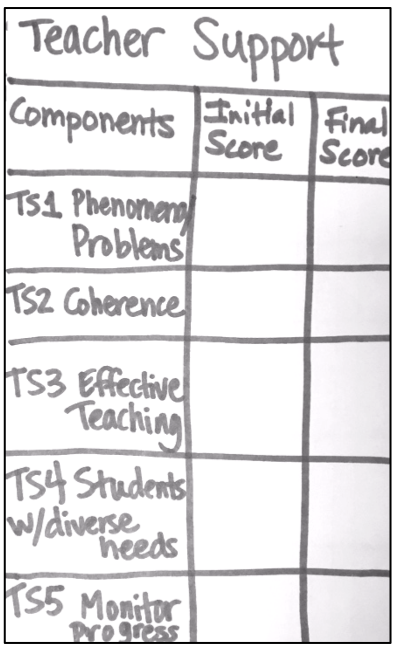
Handouts

H22 – Designed for CA NGSS: Teacher Support Rubric

H23 – Designed for CA NGSS: Teacher Support Strengths and Limitations

Charts

C8 Consensus Scoring



Supplies

- Chart Paper, markers, and blue tape

From "Section 3 - Rubric 1 - Designed for CA NGSS: Foundations"

- Sets of instructional materials (TE & SE)
- Conceptual Flows
- Characteristics of High-Quality Instructional Materials" chart

- **H9** – Designed for CA NGSS: Score Sheet
- **H10** – Teacher Support Evidence Chart: Foundations
- **C1** – Norms for Collaborative Work
- **C2-**- Conceptual Flow Key
- **C3** – Consensus Building Strategies

From "Section 3 – Rubric 2 – Designed for CA NGSS: Student Work"

- Path of Student Thinking Wall Chart s
- **H16** – Teacher Support Evidence Chart: Student Work

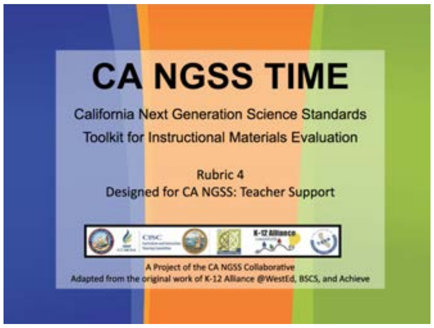
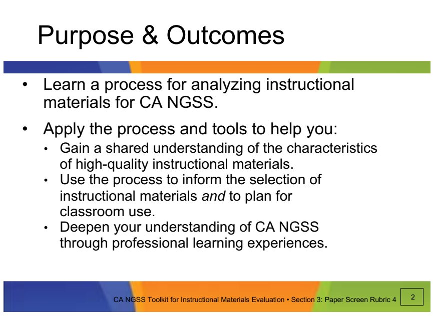
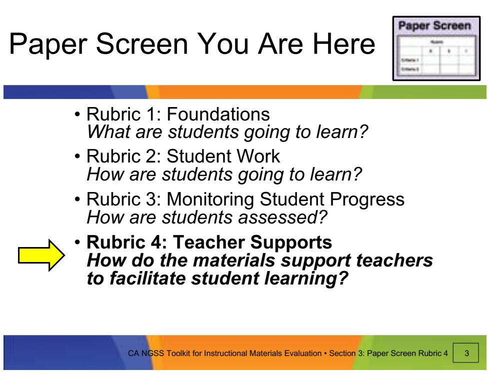
From "Section 3 – Rubric 3 –Designed for CA NGSS: Monitoring Student Progress"

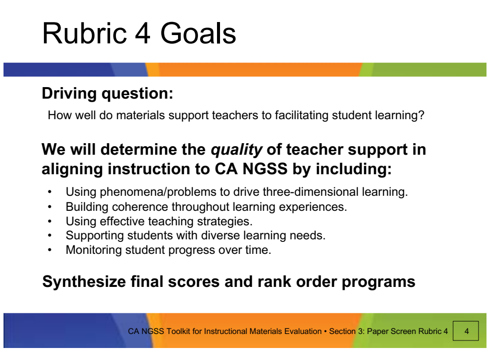
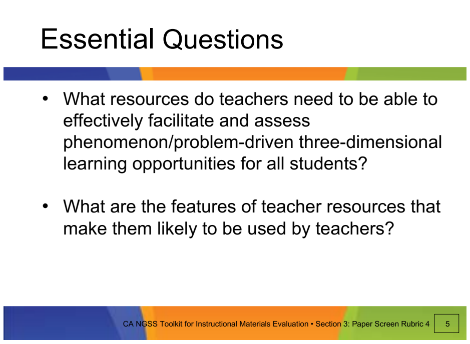
- Assessment Story Charts
- **H21** Teacher Support Evidence Chart: Monitoring Student Progress

Advance Preparation

1. Prepare copies of **H22** for each person and **H23** for the Whole Group.
2. Create **Chart C8** Consensus Scoring and post when ready to score.
3. Locate the chart paper with high-quality criteria for instructional materials and conceptual flow chart from Rubric 1; path of student thinking charts from Rubric 2; and, assessment story from Rubric 3.
4. Display conceptual flow, path of student thinking and assessment in the order found in the instructional materials.
5. Secure the materials/handouts from the supply list.

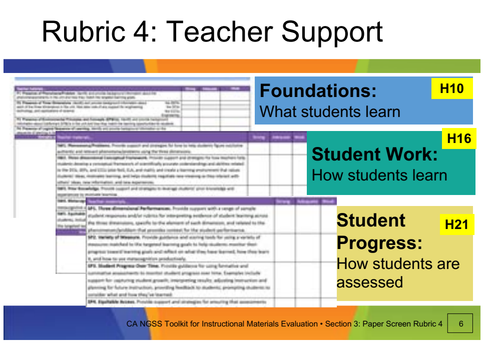
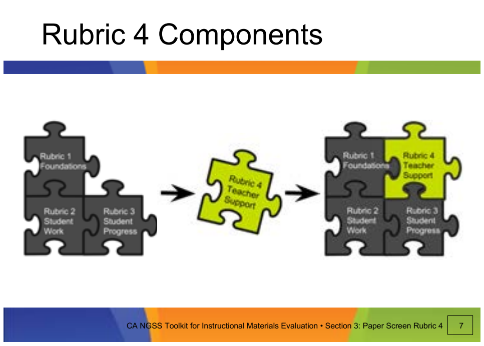
Part 1 – Introduction (15 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 1 Title** a. Welcome participants to the session. Remind them of the norms **(C1)** b. Ask participants to share any reflections on using the Monitoring Student Progress Tools and Process from the previous session. *Facilitator Note: if Rubric 3 and Rubric 4 are spaced with time in between them, use artifacts from Rubric 1, 2, and 3 to remind participants of what they did*.
	**Slide 2: Purpose & Outcomes** a. Incorporate participants reflections from Rubric 3 and ask: What progress have we made so far toward the outcomes for CA NGSS TIME? b. Emphasize the last bullet on the slide.
	**Slide 3 Paper Screen You Are Here** a. Explain that Rubric 4 focuses on Teacher Support which is a compilation of evidence from Rubrics 1-3. *Facilitator Note: if the group is engaging in this work chunked over several days, use the artifacts from Rubric 1, 2, and 3 to remind participants that they have analyzed the materials for: what phenomenon and dimensions are present in the materials; how students come to understand phenomena/problems through the dimensions; and how student progress is measured over time.*

Slide	Slide Title and Facilitation Notes
	**Slide 4: Rubric 4 Goals** a. Ask participants to read the question and keep it in mind as they review materials. b. Explain that Rubric 4 addresses the *quality* of the materials to assist teachers in: ○ using phenomena/problems to drive 3-dimensional learning; ○ building coherence for students throughout the learning experience; ○ using effective teaching strategies including providing support for diverse learning need; ○ using assessments to monitor student progress over time. c. Point out that in prior rubrics, participants have primarily analyzed student materials. Rubric 4 is a synthesis of how the instructional materials support teachers (Rubrics 1,2,3) in providing high-quality CA NGSS-aligned instruction. In this rubric they will analyze teacher materials. *Facilitator Note: This session should go fairly fast as most of the work collecting evidence has been done by participants in the previous rubrics.*
	**Slide 5: Essential Questions (This slide is animated)** a. Briefly explain that the essential questions focus on *teacher support* for what students will learn, how they will learn, how they are assessed, and how the teacher support resources are likely to be used. b. In a think-pair share, ask participants to discuss the first question. c. Whip around the room to have participants share some thoughts. Record their brainstorm on a chart.

Slide	Slide Title and Facilitation Notes
	d. Repeat the process for the second question. e. Whip around the room to have participants share some thoughts. f. Return to the brainstorm chart. Explain that the CA NGSS vision includes some novel goals that may be new to many teachers and/or have not been addressed in their previous pre-service and in-service professional learning experiences. Completing this rubric asks them to consider how teacher resources can support teachers as they grapple with these ideas, as well as other important attributes of high-quality instructional materials.

Part II – Gathering Evidence in Parts Groups (60 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 6: Rubric 4: Teacher Support** a. Ask participants to get their section 3: Paper Screen “Designed for CA NGSS: Teacher Support - Evidence Charts” from the previous three rubrics. (Handouts **10, 16,** and **21**). *Facilitator Notes: Note that the evidence collected and recorded on these pages will be analyzed using “Rubric 4: Teacher Support.”*
	**Slide 7: Rubric 4 Components** a. Explain that Rubric 4 focuses on elements that contribute to a holistic view of how instructional materials support teachers. b. Explain the puzzle piece analogy: The previous three rubrics are like puzzle pieces. Each rubric piece has its own characteristics, but only provides part of the picture for teacher support. The whole picture comes together when the pieces are joined together through Rubric 4. c. The rubric 4 puzzle piece completes the picture by combining data from different rubrics to address five components on the rubric. *Facilitator Note: advance the slide quickly to move to the components on the rubric.*

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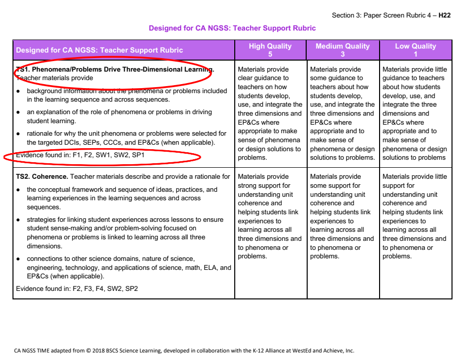

Section 3: Paper Screen Rubric 4 – **H22**

Designed for CA NGSS: Teacher Support Rubric

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomena/Problems Drive Three-Dimensional Learning. Teacher materials provide • background information about the phenomena or problems included in the learning sequence and across sequences. • an explanation of the role of phenomena or problems in driving student learning. • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs where appropriate to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs where appropriate and to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

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Slide 8: Designed for NGSS: Teacher Support Rubric 4

a. Distribute **H22** – Designed for CA NGSS: Teacher Support Rubric.

b. This is an animated slide. Orient the participants to the components of the rubric:

TS1: Phenomena/Problems Driven Three-Dimensional Learning
TS2: Coherence
TS3: Effective Teaching
TS4: Support for Students with Diverse Learning Needs
TS5: Support to Monitor Student Progress

c. Advance the slide to call attention to the first component. Like other rubrics, the components have indicators listed for each component.

d. Advance the slide. Unlike other rubrics, Rubric 4 refers to specific sources of evidence from the previous rubrics 1–3 that address teacher support.

Facilitator Notes: The five components may be confusing to participants. Remind them that these components cut across and blend parts of the previous rubrics to provide a holistic approach to analyzing teacher support.

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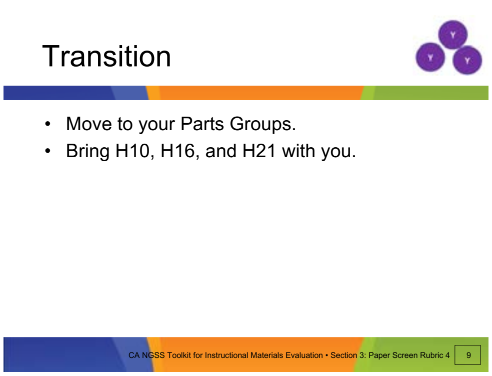

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Slide 9: Transition

a. Explain that before participants can score the instructional materials using Rubric 4, they need to re-acquaint themselves with the evidence from the other rubric teacher support evidence sheets.

b. Explain that after they have reviewed their evidence, they will come back to Rubric 4 with their Whole Group.

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c. Ask groups to transition to their Parts Groups to discuss their evidence.
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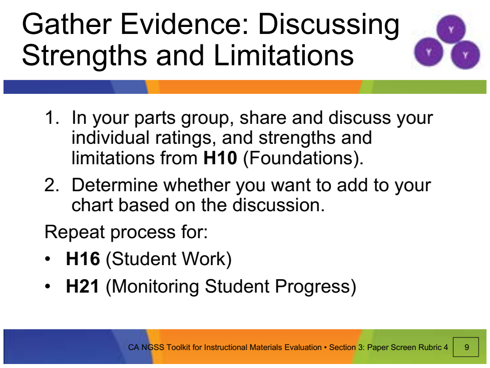

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Slide 10: Gather Evidence: Discussing Strengths and Limitations

Parts Groups

a. Explain that in order to use Rubric 4 for scoring, participants first need to review any evidence they gathered from Rubrics 1-3 in their Teacher Support Evidence Charts.

b. Ask groups to review each person's individual data from Rubric 1 Foundations **(H10).** Discuss how they ranked it and the strengths and limitations.

c. Ask groups to add to their own **H10** anything that they heard from their group that they thought was important.

d. Repeat this process with Rubric 2 Student Work **H16** and Rubric 3 Monitoring Student Progress **H21**.

e. Remind groups that these data sheets will be used in scoring Rubric 4.

f. Ask Parts Groups to return to their Whole Groups.
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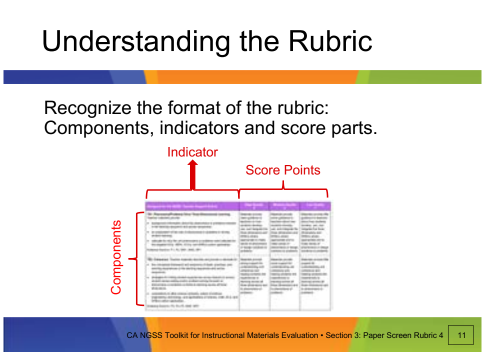

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Slide 11 Understanding the Rubric

Whole Group

a. In table groups, ask participants to identify the components, indicators, and score points on this rubric.

b. Ask participants what they remember about the indicators and score points? (Indicators help explain the components, and the score points
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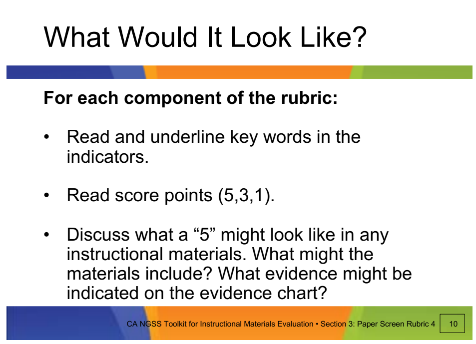
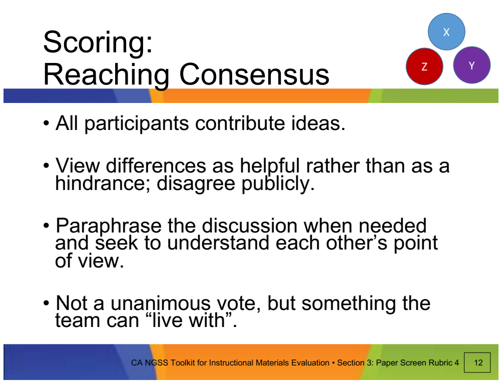
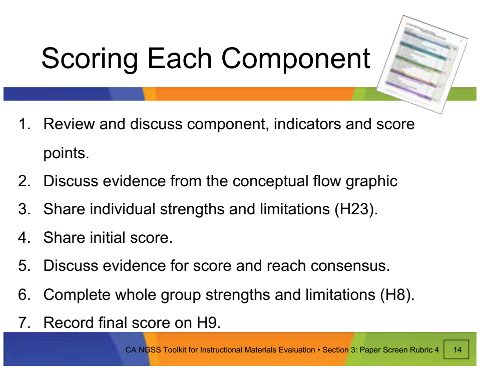
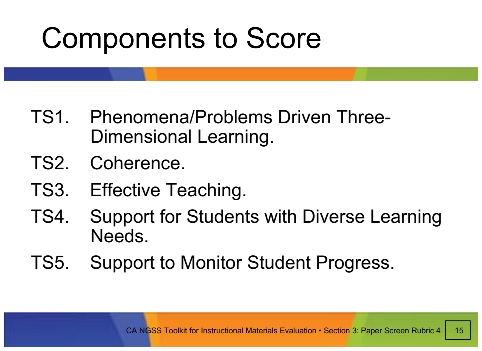
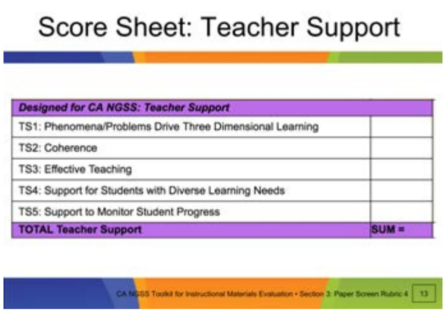
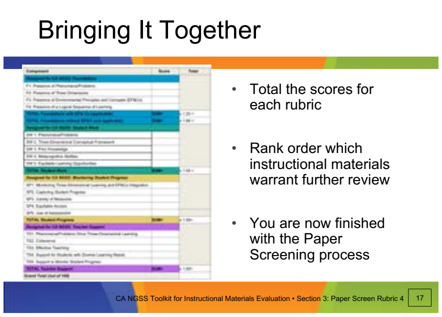
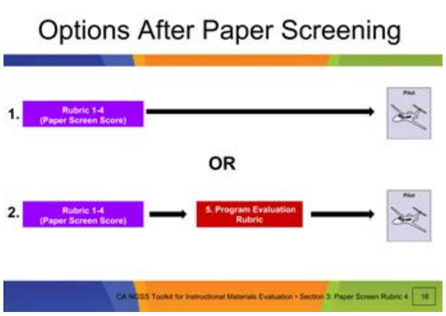
Slide	Slide Title and Facilitation Notes
	help identify the degree to which the materials meet the criteria). c. Ask participants to find the “evidence sources” for each component of the rubric. What do they notice? *Facilitator Note: “Evidence sources” direct participants to the handouts they previously used to gather evidence and should now be used to help in their score of each component on the Teacher Support Rubric.*
	**Slide 12: What Would It Look Like?** a. Ask participants to read the <u>first component</u> TS1 (Phenomenon/Problem/3-D). Have participants underline key words in the indicator that describe what they are looking for in the instructional materials. b. Have participants read the score points to see a description of the different quality levels for the phenomena indicator. **c.** Facilitate a discussion about what a level ‘5’ might look like for teacher support that monitors phenomenon-based, three-dimensional learning in any instructional material. What might the materials include? (e.g., teacher background information on phenomenon; teaching strategies for differentiated learning; suggestions for instructional interventions based on student assessment data). What evidence might be indicated on the Teacher Support Strengths and Limitations from Rubric 1 H10; Rubric 2 H16; Rubric 3 H21? (e.g., ratings; number of strengths vs. number of limitations; can the limitations be addressed?) d. Continue with each component. If the group is large enough, jigsaw the four remaining components and then have each component group share their ideas of what a 5-would be for

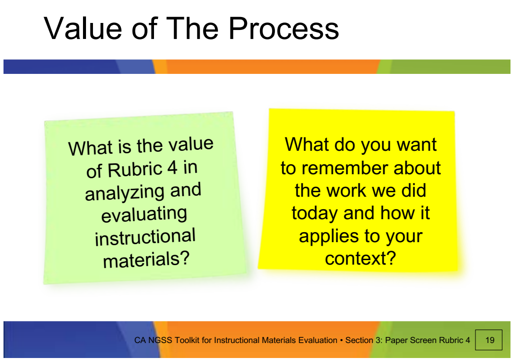
Slide	Slide Title and Facilitation Notes
	their component. e. If the group is small but can be divided so that participants work in partners or triads, assign partners/triads to different components. Then have the partners/triads share their ideas of what a 5 would be for their component. *Facilitator Note: the purpose of this activity is to calibrate participants in their understanding of the component, indicator and score points. Once calibrated, participants can apply their understanding to any set of instructional materials.*
	**Slide 13 Scoring: Reaching Consensus** a. This is an animated slide. b. Remind participants that each CA NGSS TIME rubric is scored by reaching consensus. Ask participants what they remember about consensus scoring. c. Advance slide several times. Ask participants to relate their ideas with those on the slide.
	**Slide 14: Scoring Each Component** a. Use this slide to provide an overview of what participants will do to score each component. b. Then ask participants to review and discuss TS1: Phenomena/Problems Driven Three-Dimensional Learning for indicators and the score points. Underline any key words they want to remember. c. Have participants return to their individual **H10, H16, H21** to look for evidence in support of the indicators. d. Have individuals share the strengths and limitations for this component**.** e. Ask the participants for their initial score by using

Slide	Slide Title and Facilitation Notes
	the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by raising 1, 3, or 5 fingers. f. Record the initial score on Chart **C8 (Consensus Scoring)** o If the initial score is unanimous, move to **H23** to record summary strengths and limitation for this component. o If the initial score is not unanimous, facilitate a discussion to reach consensus. Start with these strategies: ▪ ask participants to provide evidence (**H10, H16, H21**) to support their score. ▪ ask participants who gave a score of '5' to explain why they scored it a '5,' relying on their evidence; have a "1' explain why they scored it as a '1' ▪ Discuss/debate and ask for a rescore using the fist of 5. Record the second score on Chart **C8 (Consensus Scoring).** *Facilitator Notes: Encourage full participation, ensure that discussions and decisions are based on evidence from the instructional materials. If necessary, use additional strategies found on* ***Chart C3 (Consensus Building Strategies)*** *Ultimately, the group will come to a decision, but there must be a critical mass enough of the group to be in favor to get the decision carried out. (Definition modified from The Adaptive School: Developing and Facilitating Collaborative Groups by Robert Garmston and Bruce Wellman, 2000, Four Hats Seminars, El Dorado Hills, California.)* g. Based on the consensus conversation, complete

Slide	Slide Title and Facilitation Notes
	H23 (Designed for NGSS: Teacher Support Strengths and Limitations) as a summary of the discussion. This form will be used as an artifact of Rubric 4 to support the scoring decision, and to plan professional learning if the materials are adopted. h. Record consensus score on **H9 (Paper Screen Score Sheet)** for TS1: Phenomena/Problems Driven Three-Dimensional Learning.
	**Slide 15: Components to Score** a. Review the next components to score. Ask participants to review and discuss TS2. Coherence, the indicators for that component and the score points. Underline any key words they want to remember. b. Toggle back to Slide 14 and repeat the process for TS2. c. After component TS2 is scored, ask participants to review and discuss TS 3 Effective Teaching indicators and the score points. Underline any key words they want to remember. d. Toggle back to Slide 14 and repeat the process for TS3. e. After component TS3 is scored, ask participants to review and discuss TS4 Support for Students with Diverse Learning Needs, indicators and the score points. Underline any key words they want to remember. f. Toggle back to Slide 14 and repeat the process for TS4. g. After component TS4 is scored, ask participants to review and discuss TS5 Support to Monitor Student Progress, indicators and the score

Slide	Slide Title and Facilitation Notes
	points. Underline any key words they want to remember. h. Toggle back to Slide 14 and repeat the process for TS5. DISTRICT APPLICATION: At the end of the scoring process for all components, remind participants to keep the handouts with scores, and strengths and limitations. This data will be used to support decision-making and recommendations for materials selection. Encourage participants to properly name and store these tools.
	**Slide 16: Total Score for Rubric 4: Teacher Support** a. Ask the group to enter the scores for each component on H9 Designed for CA NGSS: Score Sheet. b. Add the scores for the final total. c. Complete or add to H23 for the summary strengths and limitations.
	**Slide 17: Bringing it Together** a. Explain that entering the scores for Rubric 4 completes the Paper Screen entries for Rubrics 1–4. b. Explain that participants will now rank order the total scores. Record the total scores for each instructional material that has been analyzed using Rubrics 1-4. c. Use the totals to organize a list from the highest scoring materials to the lowest. d. Determine the "cut point"—the number above which the instructional materials move forward in the review process.

Slide	Slide Title and Facilitation Notes
	Facilitator Note: It is recommended that the cut point be the top two to three programs.
 	**Slide 18: Options After Paper Screening** Explain that there are two options for the committee to consider: • Option #1: District teams may choose to go directly to planning the pilot when a limited number of programs are clearly a match to the district's high-quality criteria. • Option #2: District teams may decide to use Rubric 5 when more information is needed about materials to be selected for pilot. Rubric 5 synthesizes the first 4 rubrics with a 'snapshot' look of 2–3 other units in the program for Program Evaluation. *Facilitator Note: Option #2 is not needed if the Instructional Materials evaluation team is large enough to include multiple units or multiple grade level evaluations of a program. Option #2 is needed if the team is not sure of the consistency across the program or if there are too many programs to pilot.*
 	**Slide 19: CA NGSS TIME Road Map (This slide is animated)** a. This slide is animated. b. Congratulate participants on completing the Paper Screen professional learning session. *Facilitator Note: if the professional learning sessions continue to the next set of tools, sxplain that participants will go either to the Pilot process, or complete "Section 3 – Paper Screen Rubric 5: Program Evaluation."* DISTRICT APPLICATION Remind the committee that

Slide	Slide Title and Facilitation Notes
	they have worked hard on reaching consensus with and are now ready to apply the Paper Screen process to the instructional materials their district identified during Section 2: Prescreen as meeting the district needs identified in Section 1: Develop District Lens.
	**Slide 20: Value of The Process** a. Explain to participants that Rubric 1 concentrated on what students should experience; Rubric 2 concentrated on how students learn; Rubric 3 concentrated on how students are assessed and how their progress is monitored; and Rubric 4 concentrated on the quality of Teacher Support to facilitate learning that is aligned to CA NGSS. b. Invite participants to review the chart they made at the beginning of the Paper Screen process highlighting the characteristic features and elements of high-quality instructional materials. Ask them to make additions to the chart in light of the learning they experienced during this process. c. Ask participants to do a quick write on two large sticky notes to answers the prompts on the screen. d. Collect the value statements; ask participants to keep the remember statements. *Facilitator Note: Compile the value statements and create a summary statement on a large piece of paper that can be added to the left of the conceptual flow charts for the unit.*

Designed for CA NGSS: Teacher Support Rubric

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomena/Problems Driven Three-Dimensional Learning. Teacher materials provide ● background information about the phenomena or problems included in the learning sequence and across sequences. ● an explanation of the role of phenomena or problems in driving student learning. ● rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for ● the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. ● strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. ● connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS3. Effective Teaching. Teacher materials support the use of and provide a rationale and evidence of effectiveness for strategies that ● support students in learning through authentic and meaningful phenomena or design problems. ● support student learning across the three dimensions. ● make student thinking visible; promote reasoning, sense-making, and problem-solving; challenge student thinking; and develop metacognitive abilities. Evidence found in: SW1, SW2, SW3, SW4, SP3	Materials provide rationale and robust support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide some rationale and support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide little rationale and support for teachers to implement strategies that enhance student performances, thinking, and metacognition.
TS4. Support for Students with Diverse Learning Needs. Teacher materials provide an array of strategies ● to support student access to the targeted learning goals, experiences, and performances. ● that help teachers differentiate instruction. Evidence found in: SW5, SP4	Materials include robust and comprehensive strategies for supporting learners with diverse needs.	Materials include some robust strategies for supporting learners with diverse needs.	Materials include few robust strategies for supporting learners with diverse needs.
TS5. Support to Monitor Student Progress. Materials provide support for teachers to ● monitor student learning and progress over time. ● make decisions about instruction and provide feedback to students. Evidence found in: SW3, SW4, SP1, SP2, SP3	Materials provide robust support for interpreting and using data generated from assessments.	Materials provide some support for interpreting and using data generated from assessments.	Materials provide little support for interpreting and using data generated from assessments.

Name of Instructional Materials ______________________________ Grade Level/Course ______ Unit/Module Title__________

Designed for CA NGSS: Teacher Support - Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the “Designed for CA NGSS Rubric: Teacher Support” and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each criterion based on the team’s observations. Cite specific examples.

Components	Strengths	Limitations
TS1. Phenomena/problems Driven Three-Dimensional Learning.		
TS2. Coherence.		
TS3. Effective Teaching.		
TS4. Support for Students with Diverse Learning Needs.		
TS5. Support to Monitor Student Progress.		

Section 3: Paper Screen Rubric 5 Designed for CA NGSS: Program Evaluation

Time: 90 minutes

Overview

Rubric 5 Designed for CA NGSS: Program Evaluation is a process that districts may choose to complete between section 3: Paper Screen and section 4: Pilot Materials. Rubric 5 enables a committee to determine if high-quality is consistent across a grade level (e.g., across modules; chapters; units) or between grade level progressions.

Action Step 3.5 – Rubric 5: – Program Evaluation

Task 3.5a: Introduction

The introduction is a review of the section 3: Paper Screen process and the rank scoring of the instructional materials as a result of the Paper Screen. The goals for Rubric 5 are to provide a process to analyze an instructional program across units or across grade levels to determine the consistency of high-quality NGSS materials; and to look at the program in its entirety to add to the decision (from the Paper Screen) as to which programs will be piloted. The introduction ends with an overview of Rubric 5.

The facilitation guide and presentation for "Rubric 5: Designed for CA NGSS: Program Evaluation" provide a shared professional learning experience and calibration activities for each step in the process. After all Action Step 3.5 tasks have been experienced once by the adoption committee, the committee can then return to "Rubric 5: Designed for CA NGSS: Program Evaluation" and begin the process for instructional materials under review.

The Handouts necessary for the tools and processes relevant to Rubric 5 are:

- H24 Designed for CA NGSS: Program Evaluation-Progressions of Learning
- H25 Designed for CA NGSS: Program Evaluation-Unit to Unit
- H26 Designed for CA NGSS: Program Evaluation Program Assessment System
- H27 Sampling Techniques
- H28 Designed for CA NGSS: Program Evaluation Rubric
- H29a Designed for CA NGSS: Program Evaluation-Strengths and Limitations Unit A
- H29b Designed for CA NGSS: Program Evaluation- Strengths and Limitations Unit B
- H30 Designed for CA NGSS: Program Evaluation- Summary Strengths and Limitations

Setting the Stage:

Start by having a conversation about what the committee would expect to see in instructional materials that would suggest the entire program will support three-dimensional phenomena/problem focused teaching and learning. Discuss what characteristics and features of high-quality science instructional materials they expect to see. This conversation will help the committee be more aware of what they expect and desire to see when reviewing materials. Remember that Rubric 5 is about consistency across the instructional materials.

Action Step 3.5b: Program Evaluation: Review and Analyze Evidence and Score Components

Step 1. Learning the Rubric Components and Descriptors.

Refer the committee to "H28 – Designed for CA NGSS: Program Evaluation Rubric." Orient the groups to the whole rubric (i.e., the components, indicators, and scoring descriptors). The Program Evaluation Rubric combines an in-depth look from one unit and a "dipstick" look at 2-3 additional units in the program to determine the consistency of quality across a program. It is the summation of 3-4 units that allows a "birds-eye" view of the program to refine the selection of materials to pilot.

Step 2. What Should it Look Like?

Conduct a discussion about what each component might look like in an entire program. The discussion helps to increase shared understanding of the characteristics of high-quality instructional materials designed for the CA NGSS and to calibrate scoring across groups. Note that this is particularly important since the group will analyze different units from the program using this same rubric. Remind participants to take notes.

Step 3: Gather Evidence

Note: How you gather evidence for the Program Evaluation Rubric will depend on a variety of factors. You could invite everyone to gather evidence using the evidence charts for each of the three rows of the rubric or you could jigsaw the gathering of evidence.

The materials under review will also make a difference. As the facilitator, you will likely need to make at least an initial pass through of the program being considered before asking your committee to complete this task so that you are ready to provide additional guidance to your team(s).

Review which programs the teams will be analyzing using Rubric 5.

Explain that the review will be done on 2 additional units from the instructional materials. The first unit is the one that comes before the unit that was paper screened. It will be called Unit A. The second unit is the one that comes after the unit that was paper screened. It will be called Unit B.

Explain that the team will consider one program at a time, and then repeat the process of any other programs that need to be analyzed using Rubric 5.

Remind participants which instructional materials are being review and which 2 units (the one before-Unit A and one after-Unit B the unit that was paper screened) are to be analyzed.

1. If conducting this review in a jigsaw, distribute H24, H25, H26 and H27 to the appropriate groups.
2. Ask groups to read their component and indicators and underline any key words they want to remember.

Provide time for the component groups to analyze Unit A to determine if the materials are strong, adequate or weak and record strengths and limitations (H24, H25, H26**)** for use during the final scoring.

Next have the committee get in their component groups to gather evidence on Unit B. Explain that they will record their findings on their second copy of H24, H25, H26. Provide time for groups to gather evidence.

1. Review the scores on Unit A and Unit B on **C9.**
2. Conduct a discussion about how the 3 units (Unit A, unit that was paper screened, and Unit B) align in quality.
3. Use consensus scoring to determine a final score for the Program Evaluation and record on **H9.**

Use evidence from H29a and H29b to Complete H30 (Designed for CA NGSS: Program Evaluation Summary Strengths and Limitations).

Step 4. Reaching Consensus and Scoring

Participants will use the same processes they used to reach consensus in the Paper Screen. Remind participants what consensus means: all participants contribute ideas and encourage the use of one another’s ideas and opinions; the group views differences as helpful rather than as a hindrance; everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue; those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time; all share in the final decision. Consensus does not mean a unanimous vote, everyone’s first choice, or that everyone agrees.

Step 5: Which materials should be piloted?

Conduct an evidence-based discussion that addresses these considerations:

- Review the Paper Screen rank order of instructional materials.
- Consider the “program evaluation score” for these materials.
- How do the program evaluation scores support the Paper Screen rank order?
- Determine which materials should be piloted?

Discuss whether or not the program evaluation scores support the Paper Screen rank order, citing evidence from the Program Evaluation Rubric. If the program evaluation supports the paper screen, then the top ranked programs move forward to the pilot. If the program evaluation does not support the paper screen, the committee would need to consider if there are other materials from the paper screen that were close to the cut point that should undergo a Rubric 5 analysis.

Step 6: Reflection

Have the committee reflect on the value of using Rubric 5 to analyze and evaluate instructional materials. Also have the committee reflect on what they want to remember form this experience as it applies to their context.

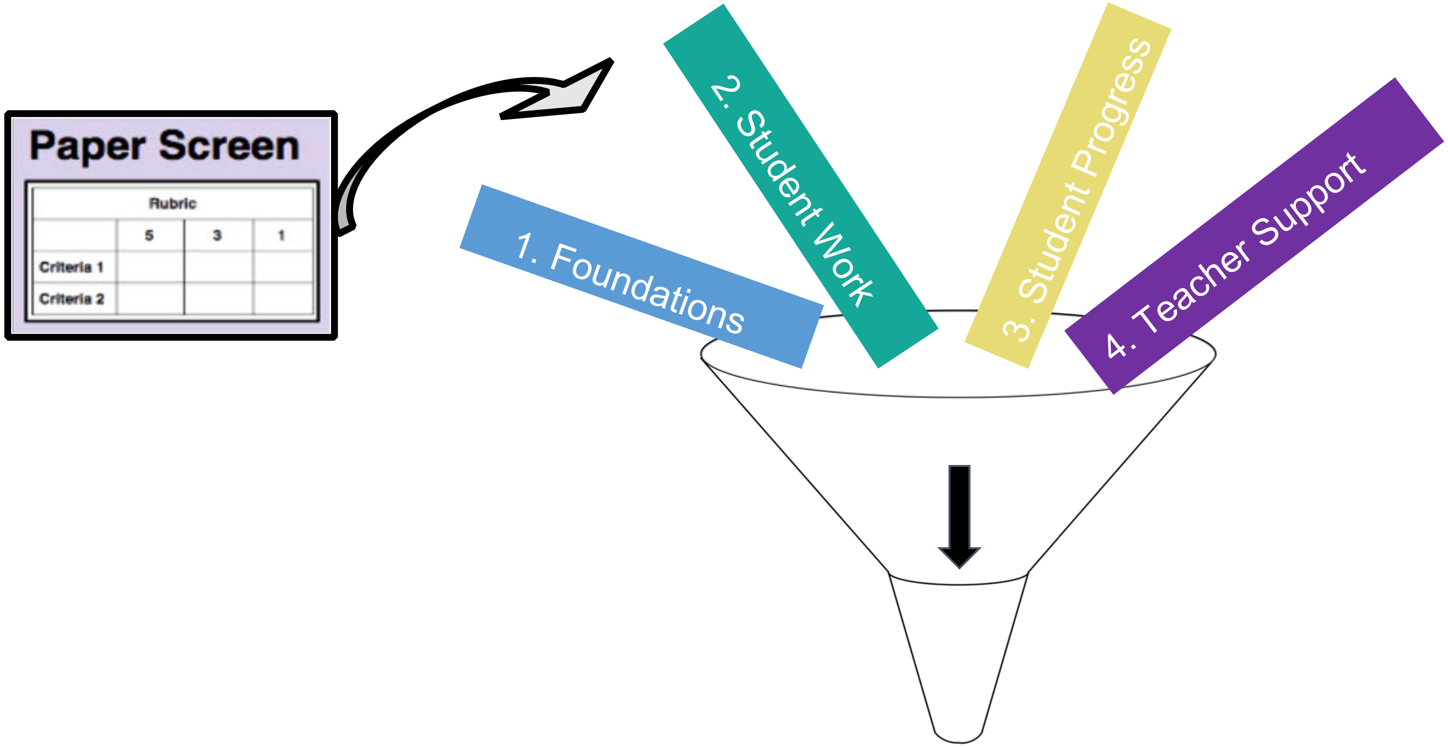
CA NGSS TIME

California Next Generation Science Standards
Toolkit for Instructional Materials Evaluation

Section 3: Paper Screen
Rubric 5 Designed for CA NGSS: Program Evaluation

A Project of the CA NGSS Collaborative
Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

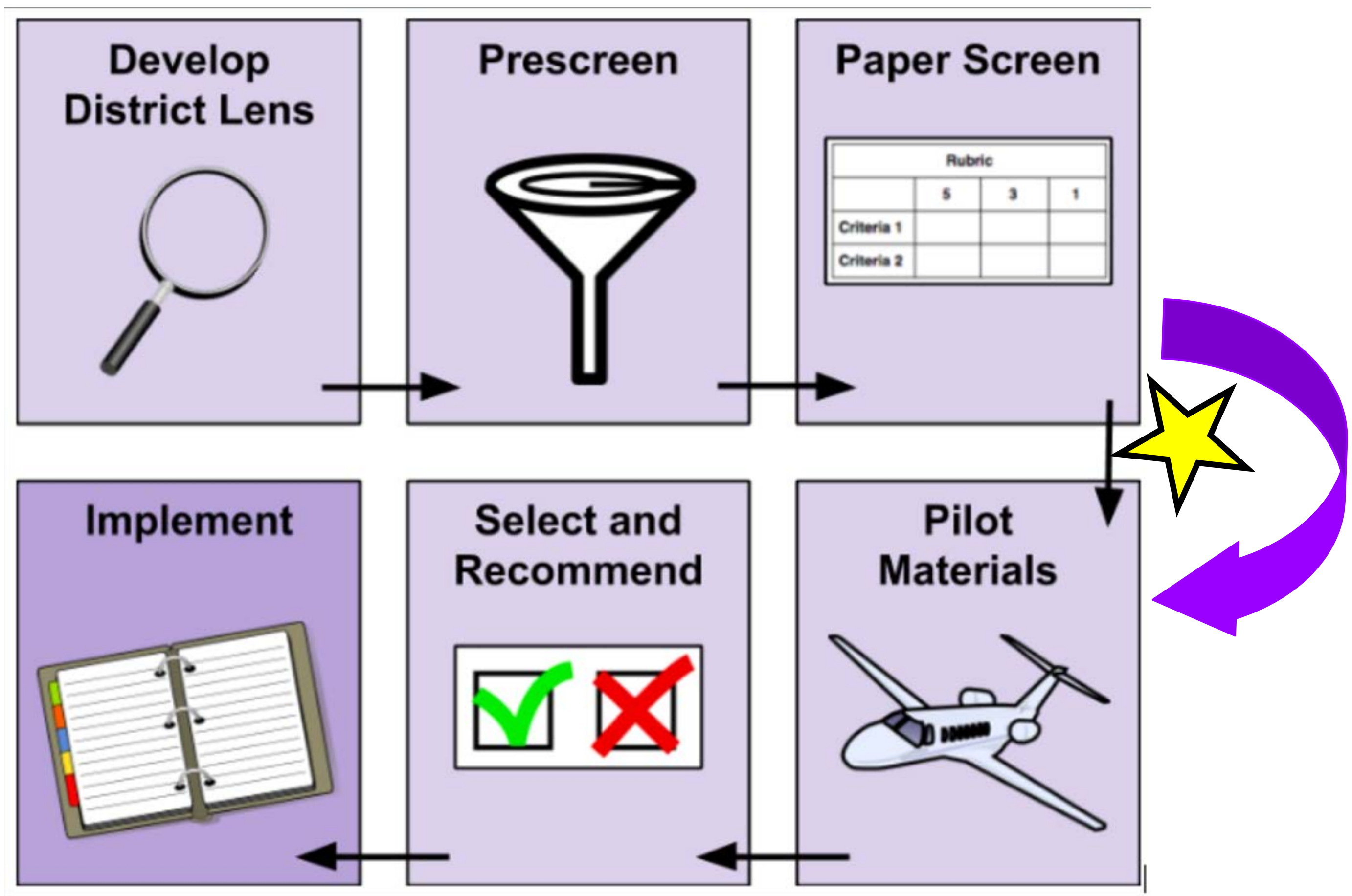
Recap of the Paper Screen Process



Synthesis of Rubrics 1-4

Designed for CA NGSS: Score Sheet

CA NGSS TIME Road Map

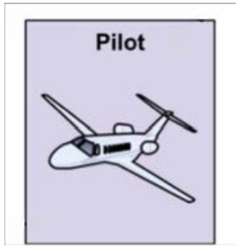


Rubric 5 Goals

- Provide a process to analyze an instructional program across units or across grade levels to determine the consistency of high quality NGSS materials.
- Look at the program in its entirety to add to the decision (from the paper screen) as to which programs will be piloted.

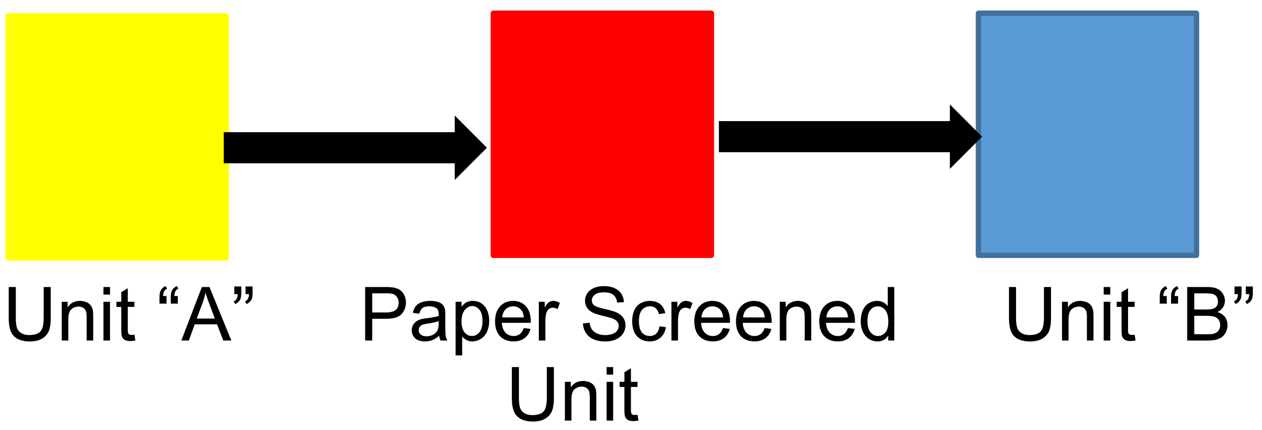
Overview of Rubric 5

Rubric 1-4 (Paper Screen Score) → **5. Program Evaluation Rubric** →



The Program Evaluation Rubric combines the in-depth look from one unit **AND** a 'dipstick' view of 2-3 additional units in the program to determine the consistency of quality across the program. It is the summation of 3-4 units that allows a 'birds-eye' view of the program to refine the selection of materials to pilot.

Units to Review

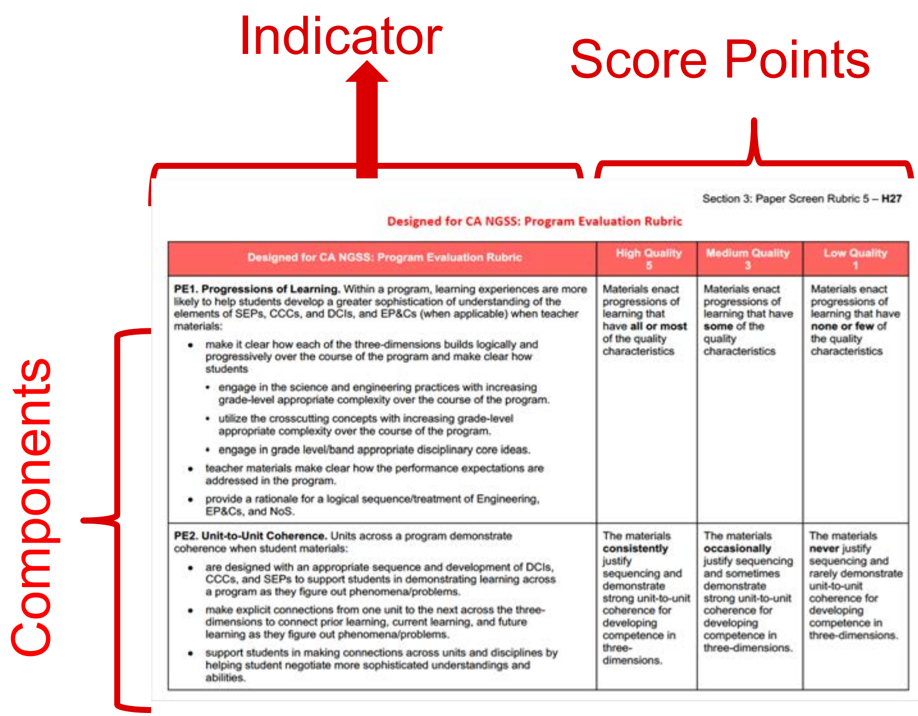


Essential Question

- What would you expect to see in instructional materials that would suggest the entire program supports phenomenon/problem-driven three-dimensional focused teaching and learning?

Understanding the Rubric

Recognize the format of the rubric: Components, indicators and score points.



Section 3: Paper Screen Rubric 5 – **H27**

Designed for CA NGSS: Program Evaluation Rubric

Designed for CA NGSS: Program Evaluation Rubric	High Quality 5	Medium Quality 3	Low Quality 1

PE1. Progressions of Learning. Within a program, learning experiences are more likely to help students develop a greater sophistication of understanding of the elements of SEPs, CCCs, and DCIs, and EP&Cs (when applicable) when teacher materials:
• make it clear how each of the three-dimensions builds logically and progressively over the course of the program and make clear how students
  ◦ engage in the science and engineering practices with increasing grade-level appropriate complexity over the course of the program.
  ◦ utilize the crosscutting concepts with increasing grade-level appropriate complexity over the course of the program.
  ◦ engage in grade level/band appropriate disciplinary core ideas.
• teacher materials make clear how the performance expectations are addressed in the program.
• provide a rationale for a logical sequence/treatment of Engineering, EP&Cs, and NoS.
	Materials enact progressions of learning that have **all or most** of the quality characteristics	Materials enact progressions of learning that have **some** of the quality characteristics	Materials enact progressions of learning that have **none or few** of the quality characteristics

PE2. Unit-to-Unit Coherence. Units across a program demonstrate coherence when student materials: • are designed with an appropriate sequence and development of DCIs, CCCs, and SEPs to support students in demonstrating learning across a program as they figure out phenomena/problems. • make explicit connections from one unit to the next across the three-dimensions to connect prior learning, current learning, and future learning as they figure out phenomena/problems. • support students in making connections across units and disciplines by helping student negotiate more sophisticated understandings and abilities.	The materials **consistently** justify sequencing and demonstrate strong unit-to-unit coherence for developing competence in three-dimensions.	The materials **occasionally** justify sequencing and sometimes demonstrate strong unit-to-unit coherence for developing competence in three-dimensions.	The materials **never** justify sequencing and rarely demonstrate unit-to-unit coherence for developing competence in three-dimensions.

What would it look like?

For each component of the rubric:

- Read and underline key words in the indicators.
- Read score points (5,3,1).
- Discuss what a “5” might look like in any instructional materials. What might the materials include? What evidence might be indicated on the evidence chart?

Transition to Component Groups

PE1 Progressions of Learning

PE2 Unit-to-Unit Coherence

PE3 Program Assessment System

Rubric 5: Gather Evidence Unit "A"

PROGRESSIONS OF LEARNING. Within a program, learning experiences are more likely to help students develop a greater sophistication of understanding of the elements of SEPs, CCCs, and DCIs when teacher materials:	Strong	Adequate	Weak
• make it clear how each of the three dimensions builds logically and progressively over the course of the program and make clear how: • students engage in the science and engineering practices with increasing grade-level appropriate complexity over the course of the program.			
• students utilize the crosscutting concepts with increasing grade-level appropriate complexity over the course of the program.			
• students engage in grade level/band appropriate disciplinary core ideas • provide a rationale for a logical sequence and treatment of ETS and NoS.			

Strengths	Limitations

UNIT-TO-UNIT COHERENCE. Units across a program demonstrate coherence when student materials:	Strong	Adequate	Weak
• are designed with an appropriate sequence and development of DCIs, CCCs, and SEPs to support students in demonstrating learning across a program as they figure out phenomena/problems. • make explicit connections from one unit to the next across the three dimensions to connect prior learning, current learning, and future learning as they figure out phenomena/problems.			
• support students in making connections across units and disciplines by helping student negotiate more sophisticated understandings and abilities.			

Strengths	Limitations

PROGRAM ASSESSMENT SYSTEM. Over the course of the program, a high-quality system of assessments has the following characteristics:	Strong	Adequate	Weak
• coordinate the variety of ways student learning is monitored to provide information to students and teachers regarding student progress for all three dimensions of the standards and toward proficiency at the identified grade level/band performance expectations.			
• include support for teachers and other leaders to make program level decisions based on unit, interim, and/or year-long summative assessment data			
• Is driven by an assessment framework and provides a structured conceptual map of student learning along with details of how achievement of the outcomes can be measured.			

Strengths	Limitations

Scoring: Reaching Consensus

- All participants contribute ideas.
- View differences as helpful rather than as a hindrance; disagree publicly.
- Paraphrase the discussion when needed and seek to understand each other's point of view.
- Not a unanimous vote, but something the team can "live with".

Scoring Unit “A”

1. PE1 Component Group shares its findings: ranking, strengths and limitations.
2. Whole group shares initial score.
3. Discuss evidence for score and reach consensus.
4. Record final score on C9.
5. Repeat for PE2 and PE3.

Scoring Unit “B”

Repeat process for scoring Unit “A”

- Component groups gather evidence and discuss ranking, strengths and limitations.
- Component group shares findings with whole group.
- Whole group consensus scores for Unit “B”.

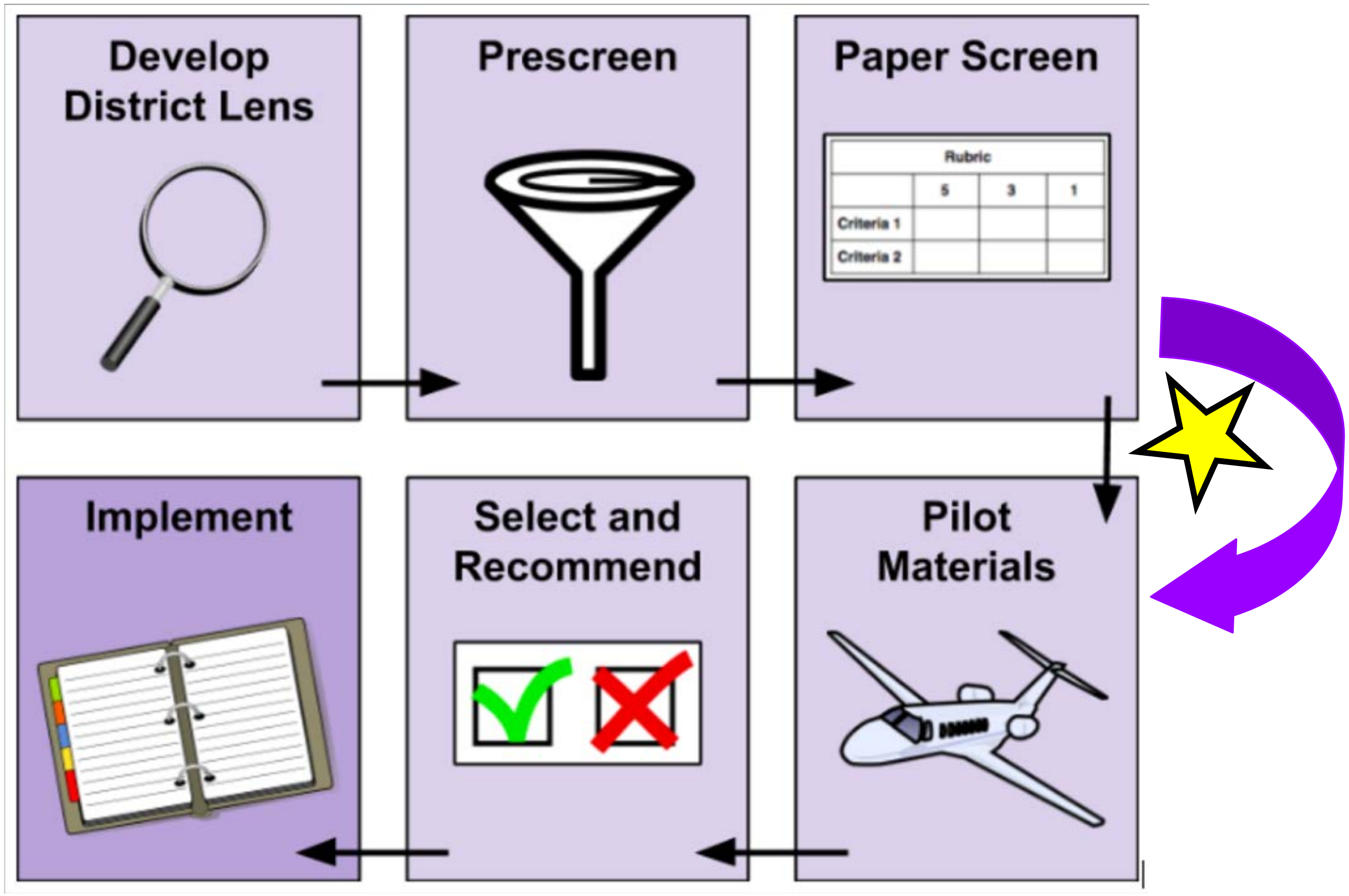
Total Score for Rubric 5: Program Evaluation

Designed for the NGSS: Program Evaluation	
PE 1 Progressions of Learning	
PE2 Unit-to-Unit Coherence	
PE 3 Program Assessment System	
TOTAL Support for Teachers	**SUM =**

Consider Rubric 5 Score to Determine Pilot Materials

- Review the paper screen rank order of instructional materials.
- Consider the “program evaluation score” for these materials.
- How do the program evaluation scores support the paper screen rank order?
- Determine which materials should be piloted.

CA NGSS TIME Road Map



Value of The Process

What is the value of Rubric 5 in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 3: Paper Screen – Rubric 5 Designed for CA NGSS: Program Evaluation Script (Facilitator Guide)

Purpose

Rubric 5: Program Evaluation is an optional process that can be used between section 3: Paper Screen and section 4: Pilot Materials. Rubric 5 enables a committee to determine if high quality is consistent across a grade level (e.g., across modules; chapters; units) or between grade level progressions.

Facilitator Note: Rubric 5 is not part of the professional learning sessions using Disruptions/Corn

Time: 1 hours 30 minutes

Part I	Introduction	10 minutes
Part II	Program Evaluation: Review and Analyze Evidence, and Score Components	70 minutes
Part III	Debrief	10 minutes

Materials

Slides

S1	Title
S2	Recap of the Paper Screen Process
S3	CA NGSS TIME Roadmap
S4	Rubric 5 Goals
S5	Overview of Rubric 5
S6	Units to Review
S7	Essential Question
S8	Understanding the Rubric
S9	What Would It Look Like?
S10	Transition to Component Groups
S11	Rubric 5: Gather Evidence Unit “A”
S12	Scoring: Reaching Consensus
S13	Scoring Unit “A”
S14	Scoring Unit “B”

S15	Total Score for Rubric 5: Program Evaluation
S16	Consider Rubric 5 Score to Determine Pilot Materials
S17	CA NGSS TIME Road Map
S18	Value of The Process

Handouts

H24	Designed for CA NGSS: Program Evaluation - Progressions of Learning
H25	Designed for CA NGSS: Program Evaluation - Unit-to-Unit Coherence
H26	Designed for CA NGSS: Program Evaluation - Program Assessment System
H27	Sampling Techniques for Program Evaluation
H28	Designed for CA NGSS: Program Evaluation Rubric
H29a	Designed for CA NGSS: Program Evaluation-Strengths and Limitations Unit "A"
H29b	Designed for CA NGSS: Program Evaluation-Strengths and Limitations Unit "B"
H30	Designed for CA NGSS: Program Evaluation-Summary Strengths and Limitations

Supplies

- Chart Paper, markers, and blue tape

Charts

C9 Consensus Scoring

Components	Unit "A"		Unit "B"		Score for H9
	Initial Score	Final Score	Initial Score	Final Score	
PE1					
PE2					
PE3					

Other

From section 3.1: Designed for CA NGSS: Foundations

- Set of instructional materials (TE & SE)
- Characteristics of High-quality Instructional Materials charts
- **H9** – Designed for CA NGSS: Score Sheet
- **C1** – Norms for Collaborative Work
- **C2** – Conceptual Flow Key
- **C3** – Consensus Building Strategies

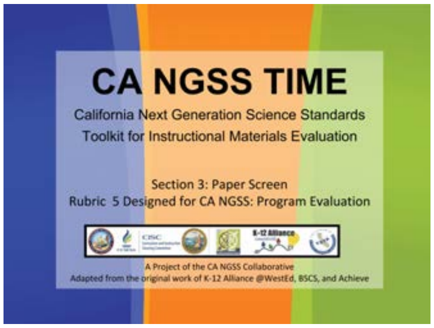
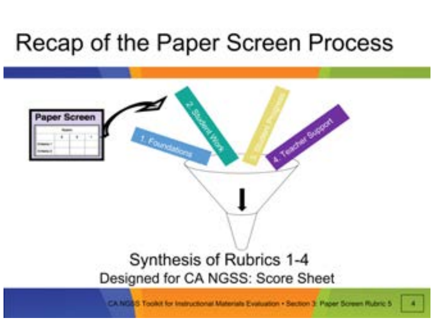
If space is available, post all of the charts from the paper screen.

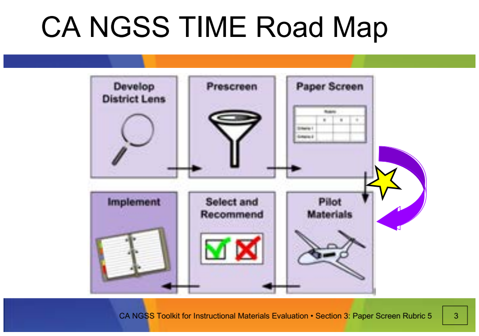
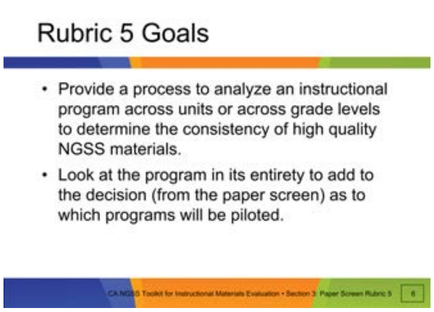
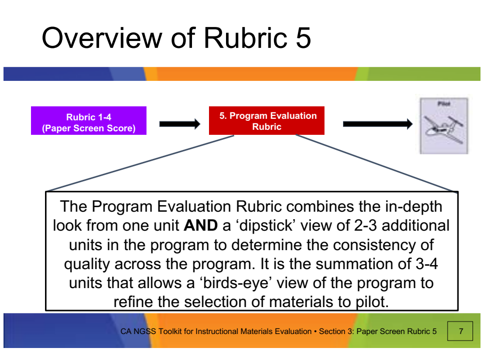
Advance Preparation

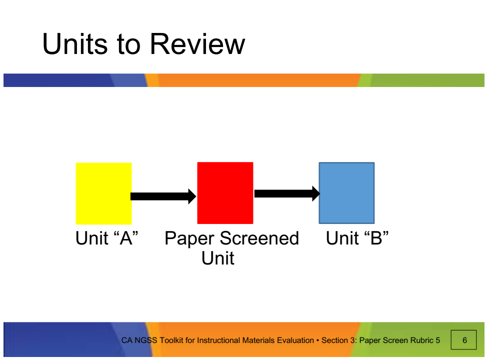
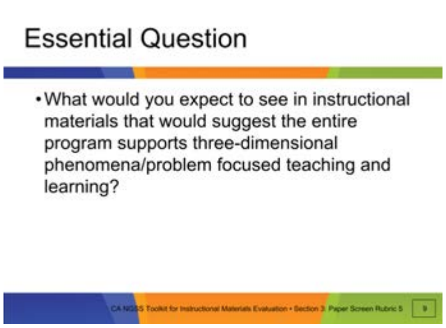
1. Determine which additional units will be reviewed in the Program Evaluation. It is recommended to select the <u>unit before and the unit after</u> the unit that was analyzed in the Paper Screen. This will provide a more cohesive "dip stick" of the other units.
2. Determine whether or not to jigsaw the rubric components for each new unit under review. If the group is large enough to have participants in partners or triads, it is recommended that the review be done as a jigsaw. If the group is very large, it is ok to have multiple "component groups." If the group is small, the group will need to review each component.
3. Make at least an initial pass through of the program being considered before asking the committee to engage in Rubric 5 so that you are ready to provide additional guidance to your team(s).
4. Duplicate enough copies of **H24, H25, H26** for each instructional material still under consideration so that each component group (if done as a jigsaw) has 2 copies—one for the unit before the unit that was paper screened, and one for the unit after the unit that was paper screened.
5. Duplicate enough copies of **H27** for each instructional material still under consideration for each group
6. Duplicate enough copies of **H28** for each instructional material still under consideration for every participant

7. Duplicate enough copies of **H29a** for each instructional material still under consideration for component groups for Unit “A” and **H29b** for component groups for Unit “B”.
8. Duplicate enough copies of **H30** for each instructional material still under consideration for the whole group.
9. Locate and display the chart paper with criteria for instructional materials created in Part II of the process for Rubric 1.
10. Create **Chart C9** Consensus Scoring.

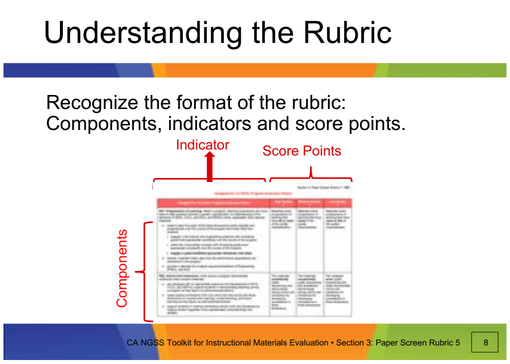
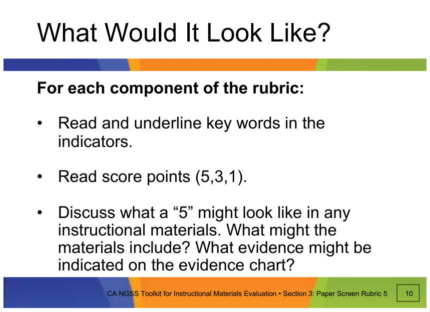
Part 1 – Introduction (15 minutes)

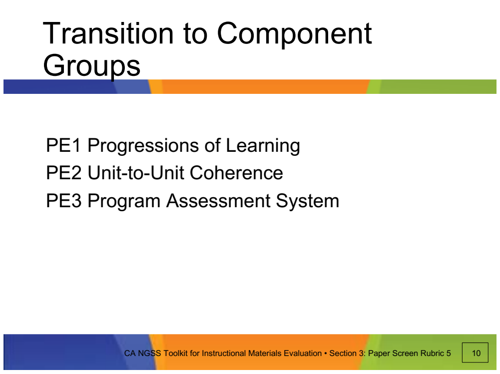
Slide	Slide Title and Facilitation Notes
	**Slide 1: Title** a. Welcome participants to the session. Remind them of the norms **(C1).** b. Explain that in this session, participants will be using Rubric 5 to conduct a program evaluation.
	**Slide 2: Recap of the Paper Screen Process** a. To help participants remember what they have done to this point, ask participants to partner talk about what they remember from the four previous rubrics. b. Ask partners to briefly share their thoughts. *Facilitator Note: Use these notes to enhance the conversation if necessary:* *Rubric 1: Designed for CA NGSS: Foundations considered the characteristics of high-quality instructional materials and developed a conceptual flow graphic as a foundation for CA NGSS TIME. We explored the question, “What are students going to learn?”* *Rubric 2: Designed for CA NGSS: Student Work focused on how well materials engaged and changed student thinking in powerful learning experiences. We explored the question, “How are students going to learn?”* *Rubric 3: Designed for CA NGSS: Monitoring Student Progress focused on how students were assessed in the instructional materials. We explored the question, “How are students assessed?”* *Rubric 4: Designed for CA NGSS: Teacher Support focused on how the instructional materials supported the teachers’ abilities to provide phenomenon/problem-based, three-dimensional instruction. We explored the question,*

Slide	Slide Title and Facilitation Notes
	"How do the materials support teachers to facilitate student learning?"
	**Slide 3: CA NGSS TIME Road Map** a. Point to the star on the slide and let participants know they are here! b. Remind participants that they chose to conduct Rubric 5 before piloting because they wanted more information about the quality of the materials across the program or they had too many programs to pilot and needed to winnow the list. c. Explain that Rubric 5 provides districts the opportunity to synthesize Rubrics 1–4 with a 'snapshot' look of two or three other units in the program to determine if high quality is consistent throughout the instructional materials.
	**Slide 4: Rubric 5 Goals** a. Briefly review the goals for Rubric 5. b. Review which programs the teams will be analyzing using Rubric 5.
	**Slide 5: Overview of Rubric 5** a. Explain the arrows as the process the committee goes through when using Rubric 5. b. Ask participants to read the overview on the slide.

	**Slide 6: Units to Review** a. Review which programs the teams will be analyzing using Rubric 5. b. Explain that the review will be done on 2 additional units from the instructional materials. The first unit is the one that comes before the unit that was paper screened. It will be called Unit A. The second unit is the one that comes after the unit that was paper screened. It will be called Unit B.
	**Slide 7: Essential Question** a. Share the essential question and ask participants in partners to discuss their ideas. b. Ask several partners to share their ideas. Chart their ideas and comment as appropriate.

Part II – Program Evaluation (70 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 8: Understanding the Rubric** a. Distribute H28 to all participants. b. In table groups, ask participants to identify the components, indicators, and score points on this rubric. c. Ask participants what they remember about the indicators and score points? (Indicators help explain the components, and the score points help identify the degree to which the materials meet the criteria).
	**Slide 9: What Would It Look Like?** a. Jigsaw the components on Rubric 5. Divide the whole group into 3 groups. If the groups are too large, make multiples of each. b. Explain that each group will discuss one component and then report back to the whole group. Assign PE1 Progressions of Learning to one group, PE2 Unit-to-Unit Coherence to another group, and PE3 Program Assessment System to the third group. c. Ask groups to read their component. Have participants underline key words in the indicator that describe what they are looking for in the instructional materials. d. Have participants read the score points to see a description of the different quality levels for the components/indicators. e. Ask groups to discuss what a '5' might look like for program evaluation in any instructional material. What might materials include? (e.g., conceptual depiction of the learning progress across units for the three dimensions and EP&Cs if applicable; flow chart of how the units connect to each other; assessment

Slide	Slide Title and Facilitation Notes
	progressions across the units). What evidence might be identified? (e.g., ranking on strengths and limitations charts; number of strengths vs. number of limitations; can the limitations be addressed?) f. Ask each component group to share what a ‘5’ would look like for that component. Ask non-reporting component groups to take notes on what the other groups are sharing. g. Invite the group to return to the high-quality instructional materials chart they created at the beginning of this session. Using a different colored marker, add or revise ideas based on the discussion. *Facilitator Note: the purpose of this step is to continue to build a shared understanding of the characteristics of high-quality instructional materials designed for the CA NGSS and to calibrate scoring across groups. This is particularly important since the committee will analyze different units from the program using this same rubric. Remind participants to take notes.*
	**Slide 10: Transition to Component Groups** *Facilitator Note: See Advance Preparation for grouping ideas. Once a decision has been made as the best way to conduct the Rubric 5 evaluation, ask groups to move into their working groups.* a. Explain the way that the groups are formed. b. Explain that the team will consider one program at a time, and then repeat the process of any other programs that need to be analyzed using Rubric 5.

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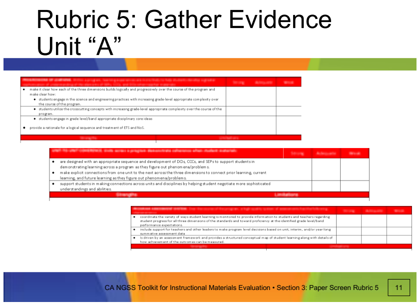
<tr><td>
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Slide 11: Rubric 5 Gather Evidence

a. Remind participants which instructional materials are being review and which two units (the one before the unit that was paper screened - Unit A and one after - Unit B) are to be analyzed.

b. If conducting this review in a jigsaw, distribute **H24, H25, H26 and H27** to the appropriate groups.

c. Ask groups to read their component and indicators and underline any key words they want to remember.

d. Provide time for the component groups to analyze Unit A to determine if the materials are strong, adequate or weak and record strengths and limitations (**H24, H25, H26)** for use during the final scoring.

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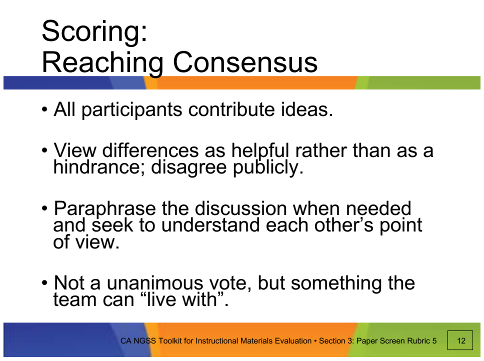
<tr><td>
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Slide 12: Scoring: Reaching Consensus

Whole Group

a. This is an animated slide.

b. Remind participants that each CA NGSS TIME rubric is scored by reaching consensus. Ask participants what they remember about consensus scoring.

c. Advance slide several times. Ask participants to relate their ideas with those on the slide.

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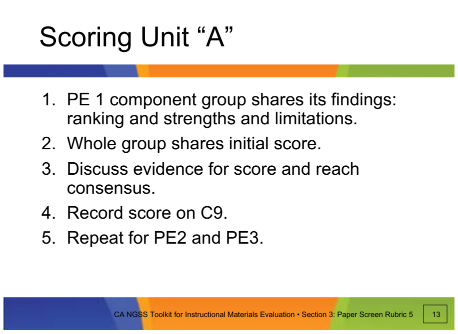
<tr><td>
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Slide 13: Scoring Each Component: Unit A

a. Use this slide to provide an overview of what participants will do to score each component.

b. Explain that each component group will report their findings, and then the whole group will score Unit A.

c. Ask jigsaw groups to share their findings from

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Slide	Slide Title and Facilitation Notes
	their analysis. (Note if there are multiple groups for each component, ask them to build on each other's reporting). d. Ask non-reporting groups to take notes on what the other component groups are reporting. e. Focus on the rankings and strengths and limitations from the reporting group. f. Ask the participants for their initial score by using the fist of 5 strategy. Ask participants to make a fist, and then on the count of 3, show their score by raising 1, 3, or 5 fingers. g. Record the initial vote on Chart **C9 (Consensus Scoring)** h. If the initial score is unanimous, move to **H29a** to record summary ranking and strengths and limitation for this component. i. If the initial score is not unanimous, facilitate a discussion to reach consensus. Start with these strategies: i. ask participants to provide evidence to support their score. ii. ask participants who gave a score of '5' to explain why they scored it a '5,' relying on their evidence; have a "1' explain why they scored it as a '1' **iii.** Discuss/debate and ask for a rescore using the fist of 5. Record the second score on Chart **C9 (Consensus Scoring).** *Facilitator Notes: Encourage full participation, ensure that discussions and decisions are based on evidence from the instructional materials. If necessary, use additional strategies found on* ***Chart C3 (Consensus Building Strategies)***

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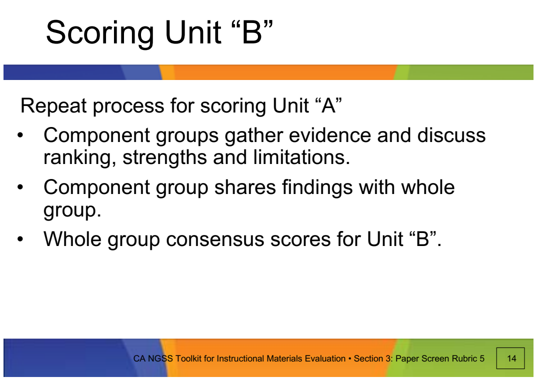

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Slide 14: Scoring Unit B

a. Use this slide to provide an overview of the steps for scoring Unit B

b. Repeat the process used for scoring Unit “A” by returning to Slide 11 by asking participants to get in their component groups to gather evidence, this time on Unit B. Explain that they will record their findings on their second copy of H24, H25, H26. Provide time for groups to gather evidence.

Facilitator Note: Groups should work on the same component that they analyzed for Unit A.

c. Reconvene the whole group and repeat the process for scoring on Slide 13.

d. If the initial score is unanimous, move to **H29b** to record summary ranking and strengths and limitations for this component.

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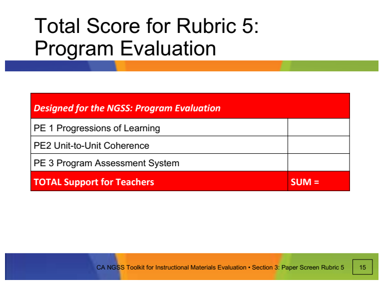

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Slide 15: Total Score for Rubric 5: Program Evaluation

a. Review the scores for Unit A and Unit B on **C9.**

b. Conduct a discussion about how the three units (Unit A, the unit that was paper screened, and Unit B) align in quality.

c. Use consensus scoring to determine a final score for the Program Evaluation and record on **H9.**

d. Use evidence from **H29a** and **H29b** to Complete **H30 (Designed for CA NGSS: Program Evaluation Strengths and Limitations)** as a summary of the discussion. This form will be used as an artifact of Rubric 5 to support the scoring decision, and to plan professional learning if the materials are adopted.

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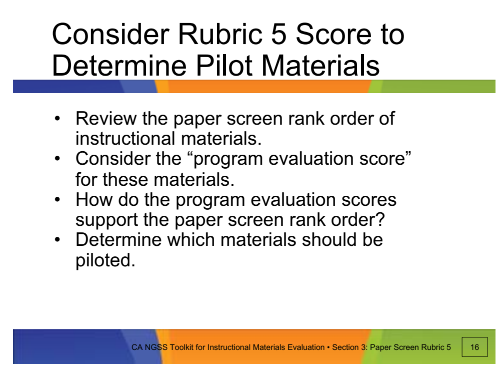

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Slide 16: Consider Rubric 5 to Determine Pilot Materials

a. Describe the process the selection committee would engage in to determine the best materials to pilot using the bullet points on the screen.

DISTRICT APPLICATION: Use the bullets on the screen to determine which materials should be piloted. If the program evaluation supports the paper screen, then the top ranked programs move forward to the pilot. If the program evaluation does not support the paper screen, the committee would need to consider if there are other materials from the paper screen that were close to the cut point that should undergo a Rubric 5 analysis.

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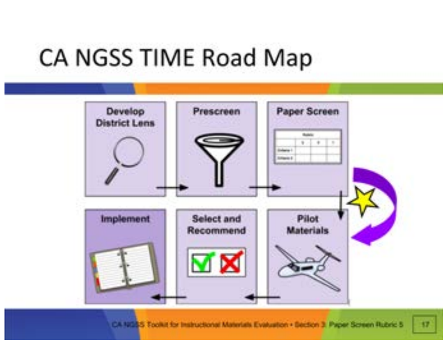

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Slide 17: CA NGSS TIME Road Map

b. Remind participants that they have finished the Paper Screen process with the additional Program Evaluation component.

c. Remind participants of which materials will move to the section 4: Pilot Materials.

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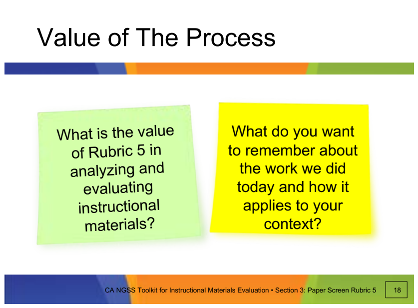

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Slide 18: Value of The Process

a. Remind participants that unlike the previous rubrics used in the Paper Screen process which provided a deep dive into one unit, the Program Evaluation was a "dip stick" into two additional units in the instructional materials to determine consistency of quality.

b. Invite participants to review the chart they made at the beginning highlighting the characteristic features and elements of high-quality instructional materials. Ask them to make additions to the chart in light of the learning they experienced during this process.

c. Ask participants to do a quick write on two large sticky notes to answers the prompts on the

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Slide	Slide Title and Facilitation Notes
	screen. d. Collect the value statements; ask participants to keep the remember statements. *Facilitator Note: Compile the value statements for the team. Determine with the committee if these statements might be part of the final report.*

Designed for CA NGSS: Program Evaluation - Progressions of Learning

Directions

1. Review the "Designed for CA NGSS: Program Evaluation" Rubric.
2. Review the teacher materials and/or student materials to assess the strength of each element.
3. Record strengths and limitations for each component based on your evidence. Cite specific examples.

Progressions of Learning Within a program, learning experiences are more likely to help students develop a greater sophistication of understanding of the elements of SEPs, CCCs, and DCIs, and EP&Cs (when applicable) when teacher materials:	**Strong**	**Adequate**	**Weak**
● make it clear how each of the three-dimensions builds logically and progressively over the course of the program and make clear how students			
○ engage in the science and engineering practices with increasing grade-level appropriate complexity over the course of the program.			
○ students utilize the crosscutting concepts with increasing grade-level appropriate complexity over the course of the program.			
○ students engage in grade-level/band appropriate disciplinary core ideas.			
● make clear how the performance expectations are addressed in the program.			
● provide a rationale for a logical sequence and treatment of Engineering, EP&Cs, and NoS.			

Strengths	**Limitations**

Designed for CA NGSS: Program Evaluation – Unit-to-Unit Coherence

Directions

1. Review the "Designed for CA NGSS: Program Evaluation" Rubric.
2. Review the teacher materials and/or student materials to assess the strength of each element.
3. Record strengths and limitations for each component based on your evidence. Cite specific examples.

Unit-to-Unit Coherence Units across a program demonstrate coherence when student materials:	**Strong**	**Adequate**	**Weak**
• are designed with an appropriate sequence and development of DCIs, CCCs, and SEPs to support students in demonstrating learning across a program as they figure out phenomena/problems.			
• make explicit connections from one unit to the next across the three-dimensions to connect prior learning, current learning, and future learning as they figure out phenomena/problems.			
• support students in making connections across units and disciplines by helping student negotiate more sophisticated understandings and abilities.			

Strengths	**Limitations**

Name of Instructional Materials ________________________________ Grade Level/Course _______ Unit/Module Title___________

Designed for CA NGSS: Program Evaluation—Program Assessment System

Directions:

1. Review the Designed for CA NGSS: Program Evaluation Rubric.
2. Review the teacher materials and/or student materials to assess the strength of each element.
3. Record strengths and limitations for each component based on your evidence. Cite specific examples.

Program Assessment System Over the course of the program, teacher materials will demonstrate a system of assessments that:	**Strong**	**Adequate**	**Weak**
• coordinates the variety of ways student learning is monitored to provide information to students and teachers regarding student progress for all three-dimensions of the standards and toward proficiency at the identified grade-level/band performance expectations.			
• includes support for teachers and other leaders to make program-level decisions based on unit, interim, and/or year-long summative assessment data.			
• is driven by an assessment framework and provides a structured conceptual map of student learning along with details of how achievement of the outcomes can be measured.			

Strengths	**Limitations**

Sampling Techniques for Program Evaluation

H24 – Designed for CA NGSS: Program Evaluation - Progressions of Learning

- The progressions sampling focuses primarily on teacher materials. We recommend an examination of the front matter or overview provided by the publisher/developer as an important source of Progressions of Learning component.
- To gather evidence specifically for the appropriateness of student engagement with DCIs, we recommend looking to see if materials help students make connections across science disciplines and that this be noted as a strength.
- To gather evidence specifically for the extent to which the teacher materials make clear how the performance expectations are addressed in the program, we recommend checking any “alignment” or “coverage” information provided in the teacher materials against what actually happens in the unit that was evaluated using the first four rubrics of the Paper Screen process. In other words, validate the claims made in the teacher materials by checking what happens with students.

H25 – Designed for CA NGSS: Program Evaluation - Unit-to-Unit Coherence

- The coherence component focuses primarily on student materials. Use the teacher materials as needed. We recommend an examination of the front matter or overview provided by the publisher/developer as an important source of information.
- We recommend scanning student materials from the designated units for the use of phenomena/problems. To the extent that concerns about quality are raised, the team may choose to develop a path of student learning from the Student Work process to better assess quality.
- We recommend scanning the transitions between the sampled units to determine the extent to which the materials make explicit connections from unit to unit.
- We recommend using information in the teacher materials (e.g., scope and sequence, table of contents, alignment chart) to determine three examples of at least one practice in three instances over the course of the program to provide an indication of how well students are supported in more sophisticated development of the practice. Candidate practices to target include: developing and using models, constructing explanations and designing solutions, and engaging in argument from evidence.

H26 – Designed for CA NGSS: Program Evaluation - Program Assessment System

- The assessment sampling focuses primarily on teacher materials. We recommend an examination of the front matter or overview provided by the publisher/developer as well as any assessment ancillary materials provided as important sources of information.
- We recommend testing claims about assessment of performance expectations made by the publisher/developer in the teacher materials by evaluating the unit that was evaluated in the previous four rubrics in the Paper Screen process for the quality of their claim.

Designed for CA NGSS: Program Evaluation Rubric

<table>
<tr><th>Designed for CA NGSS: Program Evaluation Rubric</th><th>High Quality
5</th><th>Medium Quality
3</th><th>Low Quality
1</th></tr>
<tr><td>PE1. Progressions of Learning. Within a program, learning experiences are more likely to help students develop a greater sophistication of understanding of the elements of SEPs, CCCs, and DCIs, and EP&Cs (when applicable) when teacher materials:
make it clear how each of the three-dimensions builds logically and progressively over the course of the program and make clear how students
engage in the science and engineering practices with increasing grade-level appropriate complexity over the course of the program.
utilize the crosscutting concepts with increasing grade-level appropriate complexity over the course of the program.
engage in grade level/band appropriate disciplinary core ideas.
teacher materials make clear how the performance expectations are addressed in the program.
provide a rationale for a logical sequence/treatment of Engineering, EP&Cs, and the Nature of Science (NoS).</td><td>Materials enact progressions of learning that have all or most of the quality characteristics</td><td>Materials enact progressions of learning that have some of the quality characteristics</td><td>Materials enact progressions of learning that have none or few of the quality characteristics</td></tr>
<tr><td>PE2. Unit-to-Unit Coherence. Units across a program demonstrate coherence when student materials:
are designed with an appropriate sequence and development of DCIs, CCCs, and SEPs to support students in demonstrating learning across a program as they figure out phenomena/problems.
make explicit connections from one unit to the next across the three-dimensions to connect prior learning, current learning, and future learning as they figure out phenomena/problems.
support students in making connections across units and disciplines by helping student negotiate more sophisticated understandings and abilities.</td><td>The materials consistently justify sequencing and demonstrate strong unit-to-unit coherence for developing competence in three-dimensions.</td><td>The materials occasionally justify sequencing and sometimes demonstrate strong unit-to-unit coherence for developing competence in three-dimensions.</td><td>The materials never justify sequencing and rarely demonstrate unit-to-unit coherence for developing competence in three-dimensions.</td></tr>
</table>

Designed for CA NGSS: Program Evaluation Rubric	High Quality 5	Medium Quality 3	Low Quality 1
PE3. Program Assessment System. Over the course of the program, teacher materials demonstrate a system of assessments that • coordinates the variety of ways student learning is monitored to provide information to students and teachers regarding student progress for all three-dimensions of the standards and toward proficiency at the identified grade-level/band performance expectations. • includes support for teachers and other leaders to make program-level decisions based on unit, interim, and/or year-long summative assessment data. • is driven by an assessment framework and provides a structured conceptual map of student learning along with details of how achievement of the outcomes can be measured.	The materials use a program-level assessment system that has all or most of the quality characteristics	The materials use a program-level assessment system that has some of the quality characteristics	The materials use a program-level assessment system that has few or none of the quality characteristics

Designed for CA NGSS: Program Evaluation - Strengths and Limitations
Unit "A"

Directions

1. Use this chart as a **component group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Program Evaluation" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each component based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
PE1. Progressions of Learning.		
PE2. Unit-Unit-Coherence.		
PE3. Program Assessment System.		

Name of Instructional Materials ______________________________ Grade Level/Course ______Unit/Module Title__________

Designed for CA NGSS: Program Evaluation - Strengths and Limitations
Unit "B"

Directions

1. Use this chart as a **component group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Program Evaluation" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each component based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
PE1. Progressions of Learning.		
PE2. Unit-Unit-Coherence.		
PE3. Program Assessment System.		

Name of Instructional Materials ________________________________ Grade Level/Course _______Unit/Module Title___________

Designed for CA NGSS: Program Evaluation – Summary Strengths and Limitations

Directions

1. Use this chart as a **whole group summary** of the strengths and limitations of the instructional materials.
2. Review the "Designed for CA NGSS Rubric: Program Evaluation" and your district lens.
3. Review the evidence (or lack of evidence) that the team gathered.
4. Record summary strengths and limitations for each component based on the team's observations. Cite specific examples.

Components	Strengths	Limitations
PE1. Progressions of Learning.		
PE2. Unit-Unit-Coherence.		
PE3. Program Assessment System.		

Section 4: Pilot Materials

Section 4: Pilot Materials provides guidance for further review of instructional materials selected through the section 2: Prescreen and section 3: Paper Screen processes as having potential of matching the district needs identified in section 1: Develop District Lens. This optional program review is a local control decision. Districts may choose to use an optional program review task based on the recommendation of the adoption committee, district leadership, past practice, or other variables. If the district determines that an optional review is not necessary or feasible, then the committee will proceed directly to section 5: Select and Recommend.

Consider the following guiding principles when planning for piloting programs:

- Include using the program in a representative sample of classrooms for a specific period of time during the school year.
- The time frame is determined by the district and would last a minimum of six weeks.
- The adoption pilot teachers will pilot each program being reviewed in their assigned program for a minimum of one unit.
- Ensure that teachers are comparing similar components of competing programs by standardizing the components being piloted.

For detailed guidance on piloting textbooks and instructional materials, refer to the January 2015 California State Board of Education Policy included below and download at: https://www.cde.ca.gov/ci/cr/cf/documents/impilotingguidelines.doc

California State Board of Education Policy Guidelines for Piloting Textbooks and Instructional Materials

Foreword

These guidelines have been revised to reflect changes in law related to the flexibility of local instructional materials reviews and the local control funding formula. They are designed to touch upon major considerations most likely to be universally applicable to local educational agencies (LEA) and offer suggested strategies. They are offered for grades K–8; however, they may be adapted for grades 9–12.

Introduction

The California State Board of Education (SBE) has constitutional authority to adopt textbooks for grades one through eight (Article IX, Section 7.5 of the California Constitution) and statutory authority to adopt instructional materials for kindergarten. Education Code (EC) sections 60200-60204 describe the process for the adoption of instructional materials for these grades and mandate that submitted materials be evaluated for consistency with adopted content standards and specific evaluation criteria approved by the SBE. (The evaluation criteria are incorporated in the curriculum frameworks.) EC Section 60010(h) defines instructional materials as "all materials that are designed for use by pupils and their teachers as a learning resource and help pupils to acquire facts, skills, or opinions or to develop cognitive processes. Instructional materials may be printed or non-printed, and may include textbooks, technology-based materials, other educational materials, and tests." The SBE traditionally adopts only basic instructional materials programs, i.e., programs that are designed for use by pupils and their teachers as a principal learning resource and meet in organization and content the basic requirements of a full course of study (generally one school year in length).

An LEA may choose to use instructional materials that have not been adopted by the SBE, pursuant to EC Section 60210, so long as they are aligned to state standards and a majority of the participants of any review process conducted by the LEA are classroom teachers who are assigned to the subject area or grade level of the materials being reviewed.

The process of selecting and implementing new instructional materials should be thoroughly planned, conducted publicly, and well documented. At every step an LEA should adhere to EC Section 60002 which states the following: "Each district board shall provide for substantial teacher involvement in the selection of instructional materials and shall promote the involvement of parents and other members of the community in the selection of instructional materials."

Overview

The section 4: Pilot Materials facilitation guide and presentation support the adoption committee in learning a process for analyzing instructional materials while using them in classrooms. The adoption committee will then use the results of the process to inform the selection and recommendation of instructional materials in section 5: Select and Recommend.

Piloting instructional materials using a representative sample of classrooms for a specified period of time during a school year is part of the adoption process in many school districts. A structured and monitored pilot process from CA NGSS TIME can be helpful to school districts and school sites as they consider the adoption of instructional materials.

An effective pilot will help determine if the materials will actually provide teachers with the needed resources to implement a standards-based instructional program that meets the needs of all learners. The core of the pilot process is determining the relationship of the materials to the standards and the teachers' evaluations of how well the materials provide student access to the standards. The actual use of the materials in classrooms will provide teachers experience with the program's organization, assessment, and range of instructional strategies. The evaluations of the pilot teachers will carry considerable influence at the decision making time.

The piloting process, being mindful of EC Section 60002 as quoted above, should also involve representatives of all populations in the district, including parents, administrators, English learner programs, and programs to support students with special needs. Listed below is a suggested chronology of the local pilot process.

1. Contact selected publishers to ascertain what assistance they will provide, e.g., number of pilots at free or reduced cost, in-service for the pilot teachers, consultation with teachers during the pilot process.
2. Establish the district contact for the selected publishers. Set firm ground rules with the publishers and teachers. Limit the amount of materials that can be distributed and to whom. Maintain a careful list of what materials are being used in each classroom in order to ensure student access to appropriate complete and rigorous content.
3. Ensure that teachers are comparing similar components of competing programs by standardizing the components to be piloted (e.g., intervention materials, English learner support, skills reinforcement).
4. Consider the use of formative assessments and pre- and post-testing.
5. Establish a system for removing non-consumable materials when the pilot is completed. Keep teachers, publishers, and site administrators informed of timelines and procedures.
6. Determine the duration of the pilot so that they will be able to evaluate the program fairly. It is preferable to have teachers use more than one program. This establishes a basis for comparison and evaluation.
7. Set up the pilot sites to represent the various student populations and teacher populations. Have programs distributed equally among grade levels.

8. Require that teachers attend in-service training for the specific materials they will pilot. Teachers need a shared understanding of what they have and how to use it in order to fairly evaluate the materials. They also need to understand that they are part of a small group of people who will be giving valuable input to the selection committee.
9. Review the evaluation instrument with the pilot teachers at the in-service training. Distribute it to the publishers prior to the in-service training, so they can address criteria during the in-service training.
10. Gather evaluations promptly when the pilot process is completed. Compile results and distribute them to the selection committee. Look for trends by grade level, criteria, and particular school populations. These evaluations will be used in the next step of the adoption process, section 5: Select and Recommend.

Additional Piloting Considerations

1. Keep the offerings of each publisher consistent with the other publishers, so that a bias will not be established toward a publisher who is more "generous."
2. Caution teachers and publishers about accepting or offering gifts, gratuities, meals, etc. Pilot evaluations need to be based on the merits of the program and its effectiveness with student learning. It is recommended that EC sections 60070–60076 be reviewed as these sections specify the prohibitions between publishers and school officials.
3. Establish firm guidelines regarding contact between publishers and district personnel at the outset of the piloting process and monitor during the process. To assist in setting guidelines, it is advisable to review the EC sections dealing with instructional materials (grades K–12, sections 60052–60076; grades K–8, sections 60200–60112; grades 9–12, sections 60400–60411).
4. Inform evaluation committees that publishers must comply with numerous statutes and regulations. In particular, evaluation committees should be aware that publishers are prohibited from publicizing in their marketing material excerpts, in whole or part, from state adoption reports.

Curriculum Mapping Considerations

If using materials from more than one source (i.e., open source) to provide content aligned to the SBE-adopted standards and the *CA Science Framework*, an LEA should develop a curriculum map to identify the materials to be utilized to provide complete coverage of the standards. This documentation is important for determining whether or not the LEA is in compliance with EC Section 60119, commonly known as Williams' instructional materials sufficiency. This law in part requires that each pupil in each school in the school district has sufficient textbooks or instructional materials, or both, that are aligned to the content standards adopted pursuant to EC Section 60605 or 60605.8 in each of the following subjects, as appropriate, that are consistent with the content and cycles of the curriculum framework adopted by the SBE: mathematics; science; history-social science; and English language arts, including the English language development component of an adopted program. While in the past an LEA typically utilized one SBE-adopted program for a particular grade level, in this era of local control, LEAs are beginning to incorporate additional materials. An LEA may utilize a textbook, a supplemental component, and online resources. It is important that an LEA demonstrate that students have access to this content both in the classroom and to take home, pursuant to EC Section 60119.

After completing the activities in the CA NGSS TIME sections 1–4, the adoption committee may be able to come to an agreement quickly and easily about which program(s) to adopt. If there is not a need for further discussion and deliberation, proceed to the Section 5: Select and Recommend Action Step 5.8: Recommend. If consensus is not reached and further deliberations are needed, follow the Action Steps outlined in Section 5: Select and Recommend.

Time

The timeline will vary for this section according to the instructional materials selected to pilot in classrooms. It is anticipated that the Introductory Meeting and Follow-Up Meeting will each be two hours in length.

Pilot Materials - At a Glance

Advance Preparation

Prior to the tasks in section 4: Pilot Materials, the district will need to obtain copies of instructional materials to be piloted for each grade level. Pilot Materials should be based on the outcomes of section 3: Paper Screen.

Action Steps	**Tasks**	**Materials**
4.1 – Introductory Meeting	4.1a: Review the purpose of the Pilot Materials process	Instructional Materials for Pilot Pilot Materials Presentation

Action Steps	Tasks	Materials
	4.1b: Overview of the Tools and Processes for the Pilot Materials process 4.1c: Identify learning experiences to be taught during the Pilot and prepare Pilot Tool 1 for each identified learning experience 4.1d: Prepare Pilot Tools 2 and 3 for each identified learning experience 4.1e: Overview of the Follow-Up Meeting	Pilot Materials Facilitator Guide Pilot Materials Handouts: - Pilot Materials Process Overview - Pilot Tool 1: Focus on Student Learning - Pilot Tool 2: Student Reflection on Learning - Pilot Tool 3: Teacher Reflection on Student Learning CA NGSS TIME Pilot Materials Task Sheet
4.2 – Classroom Pilot	4.2a: Teach the selected unit 4.2b: Gather student work for Pilot Tool 1 in the selected learning experiences 4.2c: Have students complete Pilot Tool 2 for each learning experience 4.2d: Complete Pilot Tool 3 for each learning experience	Instructional Materials for Pilot Pilot Materials Handouts: - Pilot Tool 1: Focus on Student Learning - Pilot Tool 2: Student Reflection on Learning - Pilot Tool 3: Teacher Reflection on Student Learning
4.3 – Follow Up Meeting	4.3a: Complete Pilot Tool 4 for each learning experience as a whole group 4.3b: Complete Pilot Tool 5 as a group for the program as a whole 4.3c: Complete the CA NGSS TIME Pilot Score	All evidence from classrooms on Pilot Tools 1-3 Pilot Materials Handouts: - Pilot Tool 4: Team Reflection on Student Learning

Action Steps	Tasks	Materials
	Sheets for Student Learning and Teacher Support as a group	- Pilot Tool 5: Evidence of Support for Teachers Pilot Materials Score Sheets

Action Step 4.1 – Introductory Meeting

Task 4.1a: Review the purpose of the Pilot Materials process

Share with participants the purpose of Section 4: Pilot Materials of CA NGSS TIME:

- Learn a process for analyzing instructional materials while using them in classrooms.
- Apply the process and tools to help further inform the selection of CA NGSS instructional materials for district adoption and to inform planning for classroom use.

This session of Section 4: Pilot materials frames a longer process that will occur in steps.

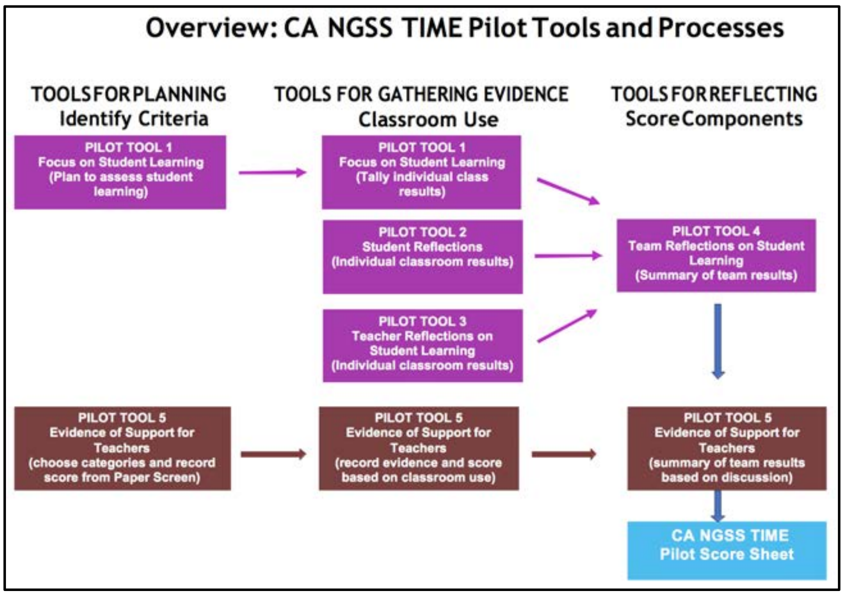
Task 4.1b: Overview of the Tools and Processes for the Pilot Materials process

Review the tools and processes that will be grouped into:

- Tools for Planning which will occur at this Introductory Meeting
- Tools Gathering Evidence which will occur during the classroom use
- Tools for Reflecting which will occur during the Follow-Up Meeting

Section 4: Pilot Materials – **H1**

CA NGSS TIME Pilot Materials Process and Tools Overview



Task 4.1c: Identify learning experiences to be taught during the Pilot and prepare Pilot Tool 1 for each identified learning experience

The facilitator will guide grade level teams in choosing up to five learning experiences within the grade level unit being taught during the classroom pilot. Grade level groups will prepare Pilot Tool 1 documents for each selected learning experience. The Tally section of these documents will be completed during the classroom use of the instructional materials.

Reviewer Name ____________________________

Section 4: Pilot Materials – **H2**

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** _________ **Grade/Course** __________________

Chapter/Module # and Title _____________________________________ **Lesson Title** _______________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Task 4.1d: Prepare Pilot Tools 2 and 3 for each identified learning experience

The team will prepare Pilot Tool 2: Student Reflection on Learning and Pilot Tool 3: Teacher Reflection on Student Learning for each learning experience chosen during Task 4.1c. Prepare enough copies of each pre-filled Pilot Tool 2 for all students participating in the pilot to complete for each selected learning experience. For K-1 students, teachers interview each student and record their ideas. For grade 2-12 students, the students write their own ideas.

Reviewer Name ____________________________

Section 4: Pilot Materials – **H3**

CA NGSS TIME Pilot Tool 2: Student Reflection on Learning

Program ____ **Program #** _________ **Grade/Course** __________________

Chapter/Module # and Title ______________________________ **Lesson Title** ______________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

What did I learn?	What do I still have questions about?
How hard did you have to think? Circle one number. (1 = very little; 5 = a lot) 1 2 3 4 5	

What was most helpful for your learning?

What was least helpful for your learning?

Reviewer Name ___________________________

Section 4: Pilot Materials – **H4**

CA NGSS TIME Pilot Tool 3: Teacher Reflection on Student Learning

Directions: Complete this tool for each of the **selected student learning experiences**, using results from Pilot Tools 1 and 2.

Program____**Program #** _________ **Grade/Course** __________________

Chapter/Module # and Title ____ **Lesson Title** ________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

Summarize key lesson learned (e.g., what did students "get", what are they still missing?) from analyzing student work? (Pilot Tool 1)	
Summarize student reflections (e.g., range and trends in student responses (Pilot Tool 2)	
Strengths	**Limitations**
Modifications/Recommendations for Customization	

Task 4.1e Overview of the Follow-Up Meeting

Review the documents that will be used at the follow up meeting in order to finalize reflections and score the pilot instructional materials. Also prepare the Task Sheet as a reminder for what the participating teachers need to complete during Action Step 4.2 – Classroom Pilot and what they will need to bring back to Action Step 4.3 – Follow-Up Meeting. This is also the time to answer any further questions teachers may have before they begin the Pilot in their classrooms.

Name of Instructional Materials ________________________ Grade Level/Course _______
Program # _______ Reviewer Name ________________________________

Section 4: Pilot Materials – **G3**

CA NGSS TIME Pilot Materials Task Sheet

Before you go: Record agreements or assignments about what will be needed by each team or person for the next steps in your pilot.

What to Do	What to Bring

Action Step 4.2 – Classroom Pilot

Participating teachers need to teach the selected grade level unit(s) in their classrooms with fidelity. In order to provide a complete analysis of the instructional materials for Action Step 4.3 – Follow-Up Meeting, it is important that teachers do not deviate from the published materials during the classroom use portion of the Pilot.

During this instruction, teachers need to be aware of the selected learning experiences for which they need to collect student work. Complete the Tally on Pilot Tool 1 for each selected learning experience and have their students complete Pilot Tool 2 directly after each of the selected learning experiences. After Pilot Tools 1 and Tool 2 are completed, teachers will complete Pilot Tool 3 for each selected learning experience. All of the student work and completed Pilot Tools 1–3 need to be brought to Action Step 4.3 – Follow-Up Meeting. These tools will be used as evidence when completing Pilot Tool 4: Team Reflection on Student Learning at the Follow-Up Meeting.

Action Step 4.3 – Follow-Up Meeting

Task 4.3a: Complete Pilot Tool 4 for each learning experience as a whole group

The adoption facilitator will lead the team in collecting the tally information, student reflections, and teacher reflections for each of the selected learning experiences. All participating teachers within an adoption grade span should hear from each other to help develop a holistic picture of the program.

Reviewer Name ____________________________

Section 4: Pilot Materials – **H5**

CA NGSS TIME Pilot Tool 4: Team Reflection on Student Learning

Directions: Use this tool to summarize each person's results from Pilot Tools 1, 2, and 3. Complete one Pilot Tool 4 per group for each of the **selected student learning experiences**.

Program ____ **Program #** _________ **Grade/Course** _________________

Chapter/Module # and Title ____ **Lesson Title** _________________________________

Overall Student Score (Combine individual class results from Pilot Tool 1)					
High Quality Work		**Medium Quality Work**		**Low Quality Work**	
Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)	Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)	Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)
Score How well did the instructional materials support student learning? Circle the score (i.e., 5, 3, or 1) based on Pooled Tally Percentage based on the percentage of high-quality work. Record on CA NGSS TIME Pilot Score Sheet.			**5** (66% and above – High-Quality Student Work)	**3** (33 to 65% – High-Quality Student Work)	**1** (32% and below – High-Quality Student Work)

As a team, would you recommend that this student learning experience remain as is? Why or why not? What changes would you recommend?
What professional learning is needed to better implement this learning experience to increase student understanding?

Task 4.3b: Complete Pilot Tool 5 as a group for the program as a whole

The adoption facilitator will need to fill in the Paper Screen scores from Section 3: Paper Screen Rubric 4 Designed for CA NGSS: Teacher Support on Pilot Tool 5 prior to the Follow-Up Meeting. Participating teachers will work as a team to cite evidence from student and teacher reflections (Pilot Tools 2 and 3) about the experience of piloting the instructional materials based on the Component of Support for Teachers listed on Pilot Tool 5. From this evidence and discussion, the team needs to come to consensus for each Component and assign a Pilot Score. If all pilot teachers did not participate in the Paper Screen process, it will be necessary to review the Reaching Consensus process used throughout Section 3: Paper Screen.

Name of Instructional Materials ______________________________Grade Level/Course _______
Lesson/Instructional Sequence Title ___________________________ Program # _______
Reviewer Name ___________________________

Section 4: Pilot Materials – **H6**

CA NGSS TIME Pilot Tool 5: Evidence of Support for Teachers

Directions: Record the score from the CA NGSS TIME Paper Screen for each component in the space provided.

Record and analyze evidence from your actual experience using the following questions as a guide.

- To what extent did the evidence cited and the score in Paper Screen match your experience with the materials?
- How did the materials support your use? What were the missed opportunities?

Determine score (5 = high-quality, 3 medium-quality, 1 low-quality) for each component of the Support for Teachers based on your pilot experience.

Component of Support for Teachers	Paper Screen Score	Response to Questions (Cite Evidence)	Pilot Score
TS1. Phenomena/Problems Drive Three-Dimensional Learning. Teacher materials provide: • background information about the phenomena or problems included in the learning sequence and across sequences; • an explanation of the role of phenomena or problems in driving student learning; and • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and appropriate EP&Cs.			
TS2. Coherence. Teacher materials describe and provide a rationale for: • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences; • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions; and • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA and appropriate EP&Cs.			

Task 4.3c: Complete the two Score Sheets as a group

The adoption facilitator leads the team in transferring the scores from Pilot Tool 4 for each learning experience to the CA NGSS TIME Pilot Score Sheet - Student Learning Experience (G1). Any evidence from further discussion should also be cited on this score sheet.

Name of Instructional Materials ________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title _____________________________ Program # _______
Reviewer Name ____________________________

Section 4: Pilot Materials – **G1**

CA NGSS TIME Pilot Score Sheet - Student Learning Experience

Component	Score	Evidence
STUDENT LEARNING EXPERIENCE		
TOTAL Student Learning	**T=**	Student Learning Program Score = T/25 X 100% =

The adoption facilitator leads the team in transferring the Pilot Scores from Pilot Tool 5 to the CA NGSS TIME Score Sheet - Teacher Support (G2). Cite evidence from discussion on this score sheet. Add the Student Learning Score from the CA NGSS TIME Pilot Score Sheet - Student Learning Experience (G1) to the Teacher Support Score and average the two for a Grand Total Score.

Name of Instructional Materials ________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title _____________________________ Program # _______
Reviewer Name ____________________________

Section 4: Pilot Materials – **G2**

CA NGSS TIME Pilot Score Sheet - Teacher Support

Component	Score	Evidence
TEACHER SUPPORT		
TS1. Phenomenon/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**T=**	Teacher Support Program Score = T/25 X 100% =
GRAND TOTAL (average score)		Student Learning Score + Teacher Support Score/2 =

CA NGSS TIME

California Next Generation Science Standards

Toolkit for Instructional Materials Evaluation

Section 4: Pilot Materials

further review of instructional materials

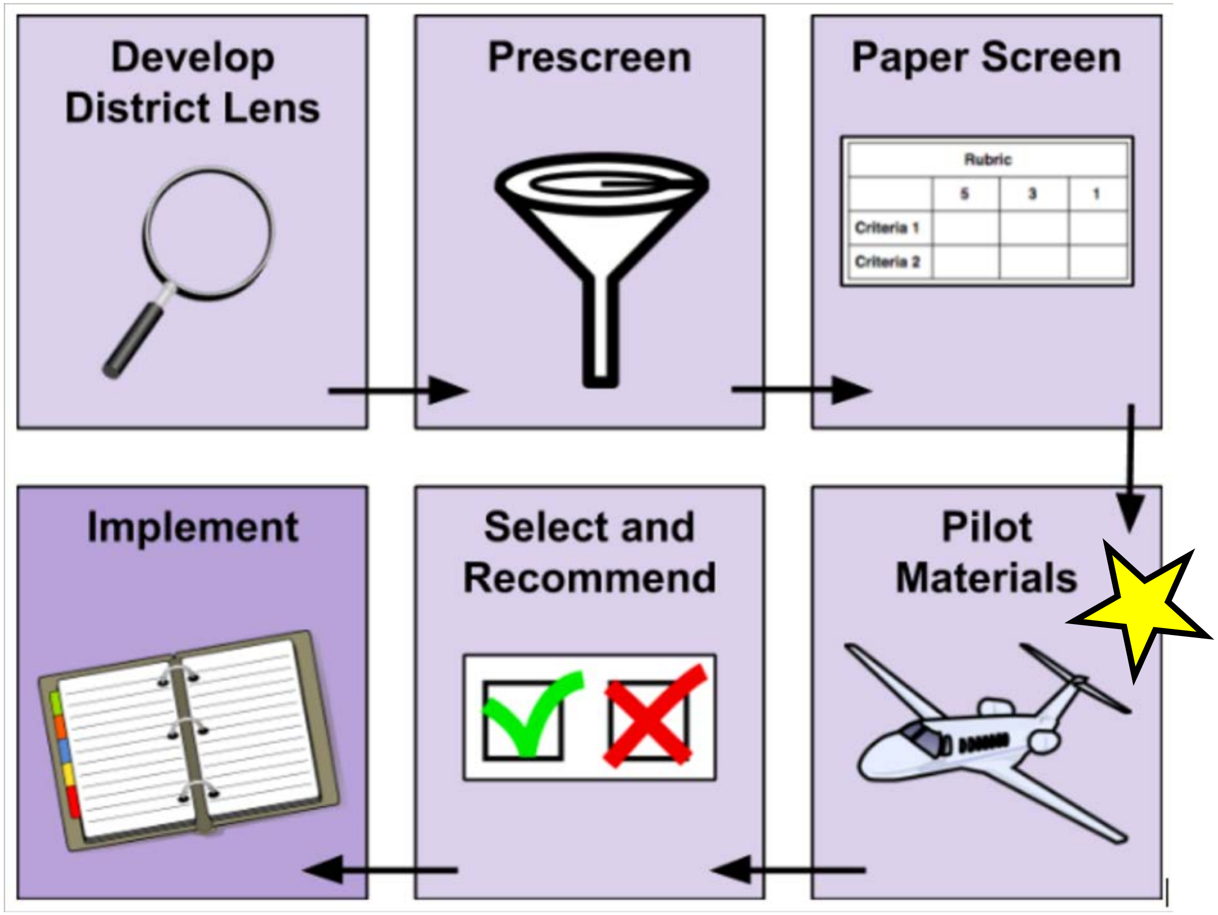
A Project of the CA NGSS Collaborative

Adapted from the original work of K-12 Alliance @WestEd, BSCS, and Achieve

Purpose & Outcomes

- Learn a process for analyzing instructional materials while using them in classrooms.
- Apply the process and tools to help
  - further inform the selection of CA NGSS instructional materials for district adoption.
  - inform planning for classroom use.

CA NGSS TIME Road Map



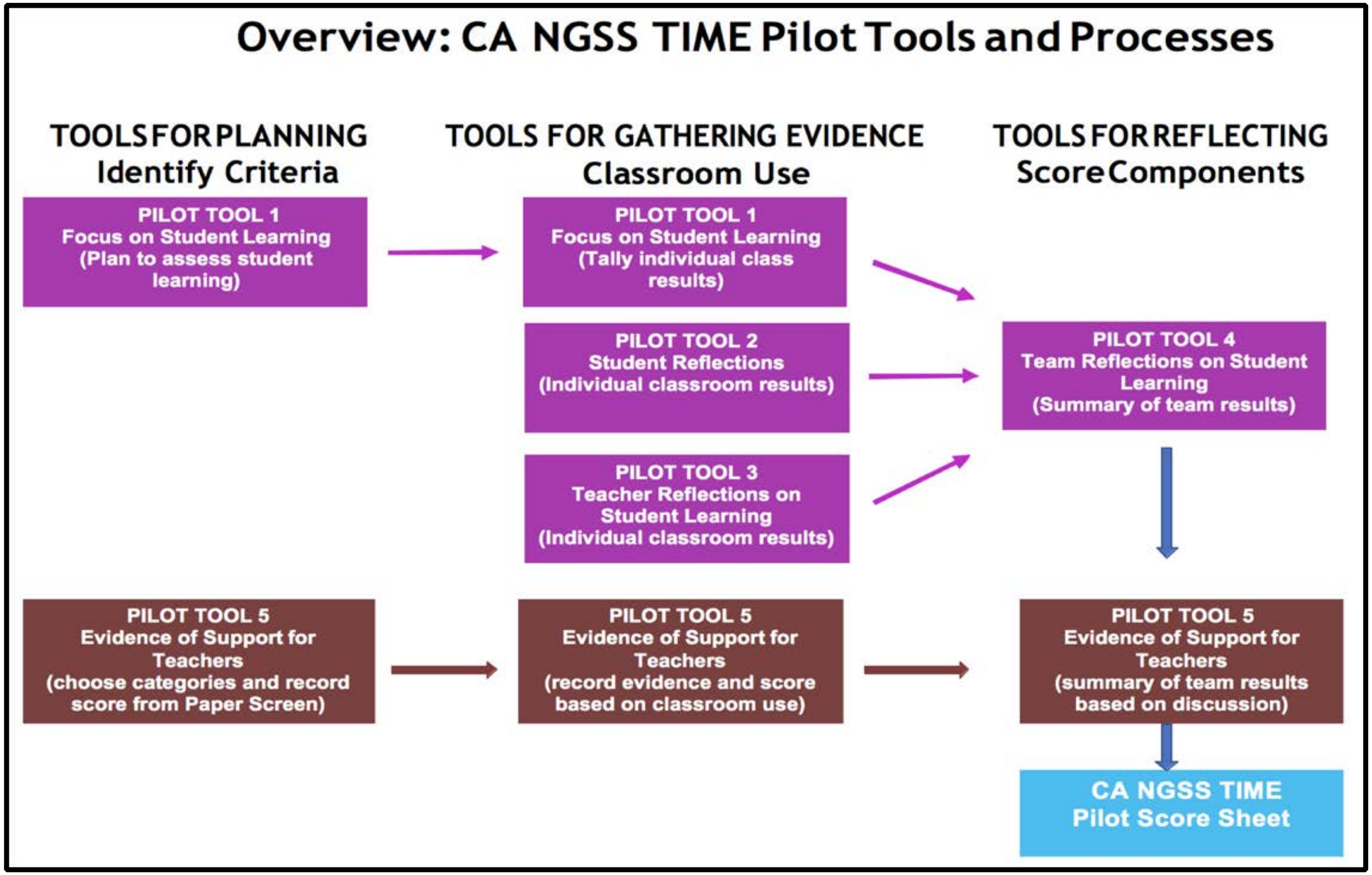
Pilot Goals

- Learn to use the CA NGSS TIME Pilot processes and tools.
- Apply the Pilot processes and tools to the programs identified in *Section 3: Paper Screen*

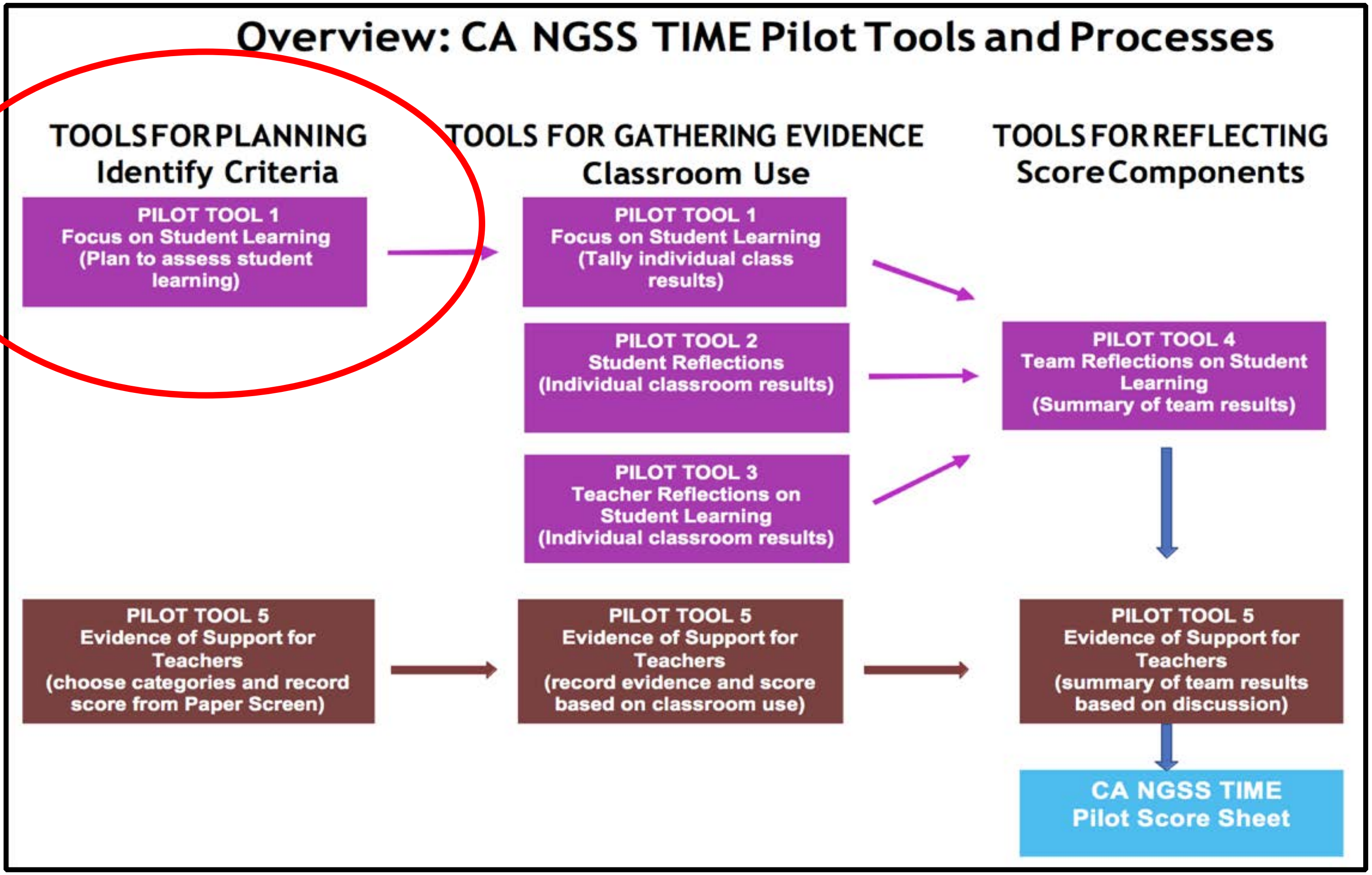
Driving Questions

- What programs will our district pilot in classrooms?
- Why were these programs chosen?
- Which “units” will be piloted? Why?

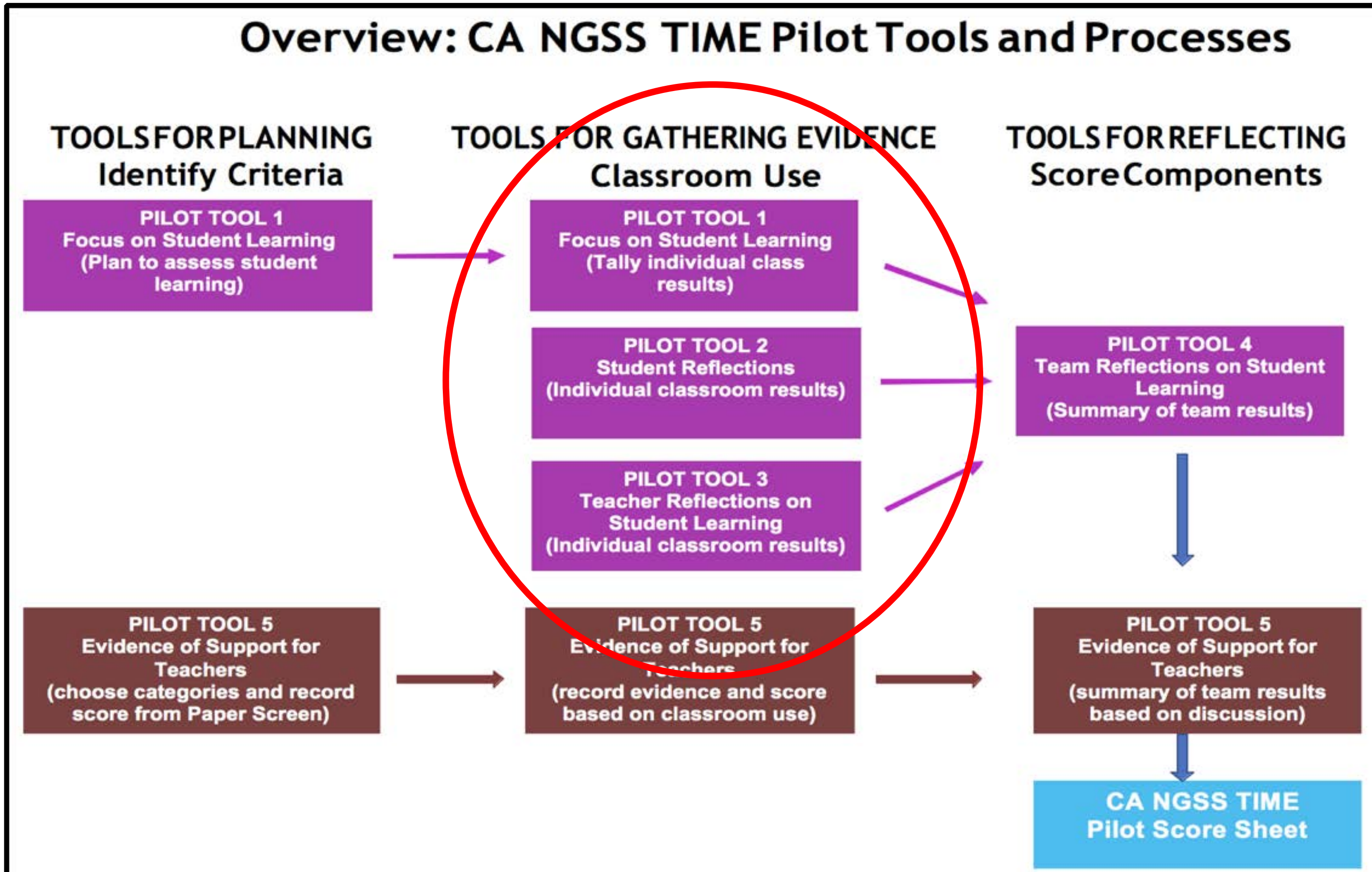
Overview CA NGSS TIME Pilot – **H1**



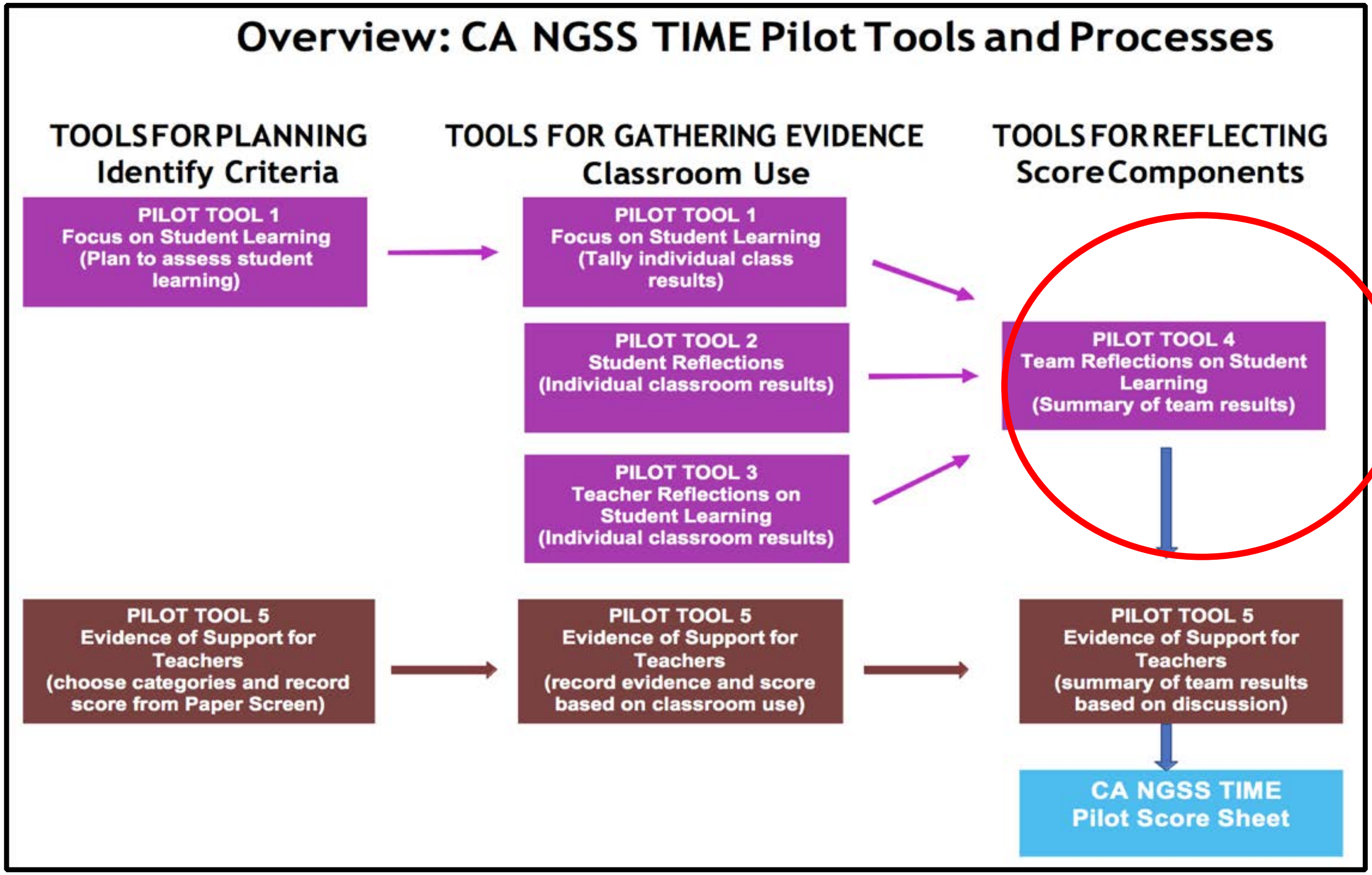
Overview CA NGSS TIME Pilot



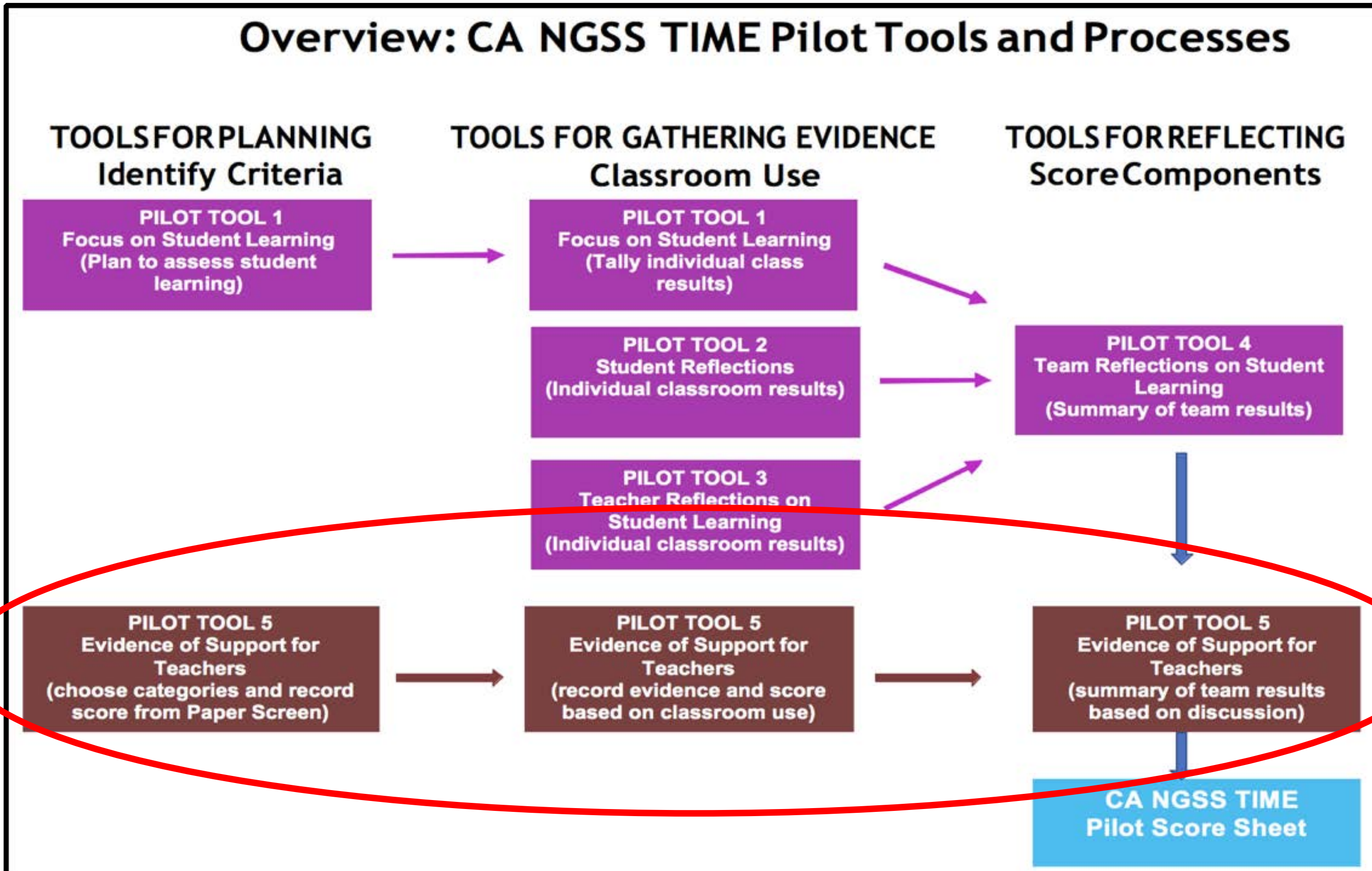
Overview CA NGSS TIME Pilot



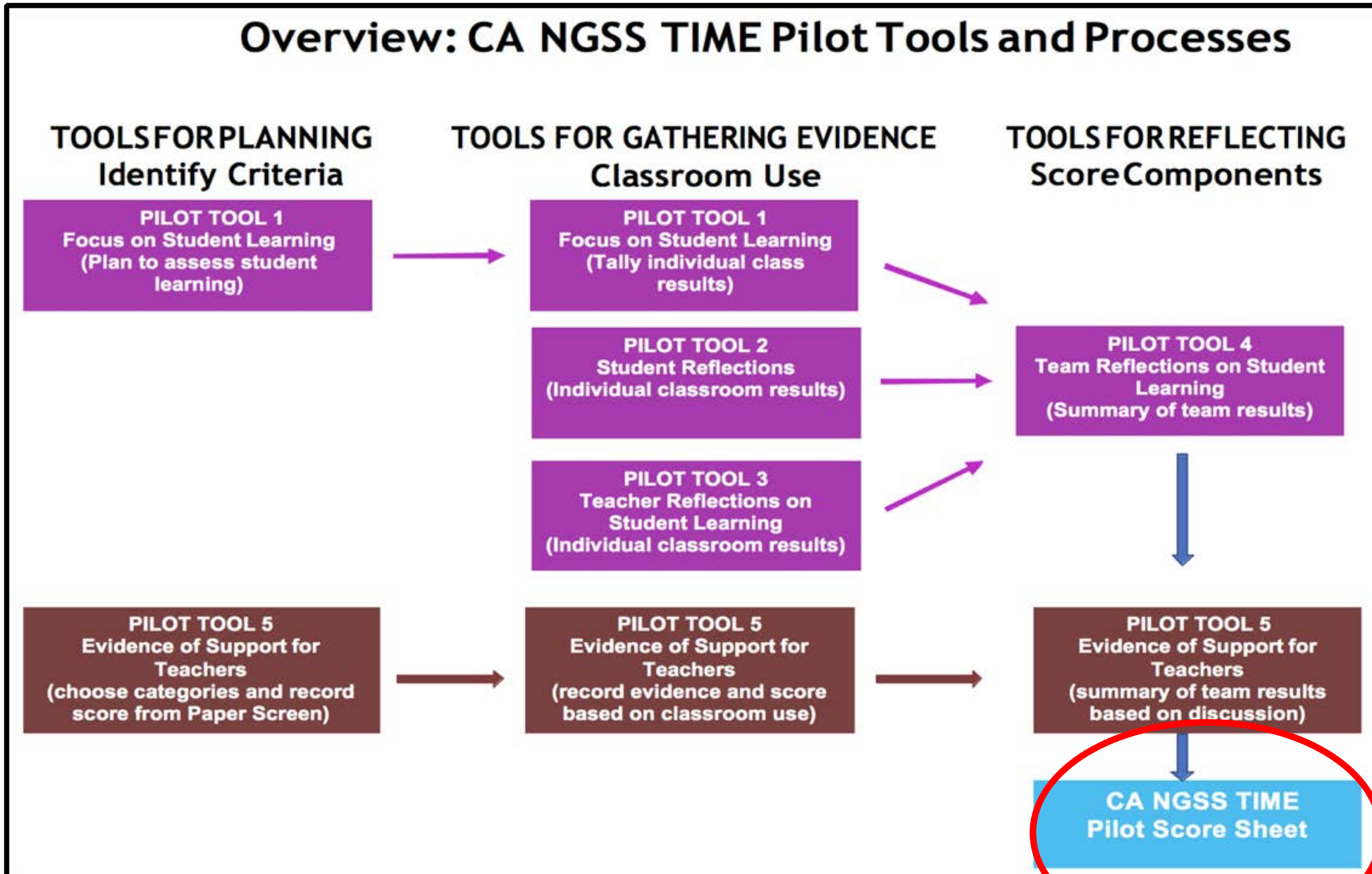
Overview CA NGSS TIME Pilot



Overview CA NGSS TIME Pilot



Overview CA NGSS TIME Pilot



Pilot Tool 1 Overview – **H2**

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Reaching Consensus

- all participants contribute ideas
- view differences as helpful rather than as a hindrance; disagree publicly
- everyone can paraphrase the discussion and seek to understand each other’s point of view
- not a unanimous vote, but something the team can “live with”

Planning: Pilot Tool 1

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
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Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Planning: Pilot Tool 1

Reviewer Name ______________________________

Section 4: Pilot Materials – **H2**

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Planning: Pilot Tool 1

Reviewer Name _______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Planning: Pilot Tool 1

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Pilot Tool 1 Repeat

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Pilot Tool 2 – **H3**

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 2: Student Reflection on Learning

Program ____ **Program #** _________ **Grade/Course** _________________

Chapter/Module # and Title ______________________________________ **Lesson Title** ________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

What did I learn?	What do I still have questions about?
How hard did you have to think? Circle one number. (1 = very little; 5 = a lot) 1 2 3 4 5	

What was most helpful for your learning?

What was least helpful for your learning?

Pilot Tool 3 – **H4**

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 3: Teacher Reflection on Student Learning

Directions: Complete this tool for each of the **selected student learning experiences**, using results from Pilot Tools 1 and 2.

Program____**Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ___________________________________

Student Learning Experience ____
(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

Summarize key lesson learned (e.g., what did students "get", what are they still missing?) from analyzing student work? (Pilot Tool 1)	
Summarize student reflections (e.g., range and trends in student responses (Pilot Tool 2)	
Strengths	**Limitations**
Modifications/Recommendations for Customization	

Pilot Tool 4 – **H5**

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 4: Team Reflection on Student Learning

Directions: Use this tool to summarize each person's results from Pilot Tools 1, 2, and 3. Complete one Pilot Tool 4 per group for each of the **selected student learning experiences**.

Program ____ **Program #** __________ **Grade/Course** __________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

<table>
<tr><th colspan="6">Overall Student Score (Combine individual class results from Pilot Tool 1)</th></tr>
<tr><th colspan="2">High Quality Work</th><th colspan="2">Medium Quality Work</th><th colspan="2">Low Quality Work</th></tr>
<tr><td>Pooled Tally for All Students</td><td>Pooled Percentage (Pooled Tally/N X 100%)</td><td>Pooled Tally for All Students</td><td>Pooled Percentage (Pooled Tally/N X 100%)</td><td>Pooled Tally for All Students</td><td>Pooled Percentage (Pooled Tally/N X 100%)</td></tr>
<tr><td colspan="3">Score
How well did the instructional materials support student learning? Circle the score (i.e., 5, 3, or 1) based on Pooled Tally Percentage based on the percentage of high-quality work.
Record on CA NGSS TIME Pilot Score Sheet.</td><td>5
(66% and above – High-Quality Student Work)</td><td>3
(33 to 65% – High-Quality Student Work)</td><td>1
(32% and below – High-Quality Student Work)</td></tr>
</table>

As a team, would you recommend that this student learning experience remain as is? Why or why not? What changes would you recommend?
What professional learning is needed to better implement this learning experience to increase student understanding?

Pilot Tool 5 – **H6**

Name of Instructional Materials ________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title ____________________________ Program # _______
Reviewer Name ____________________________

CA NGSS TIME Pilot Tool 5: Evidence of Support for Teachers

Directions: Record the score from the CA NGSS TIME Paper Screen for each component in the space provided.

Record and analyze evidence from your actual experience using the following questions as a guide.

- To what extent did the evidence cited and the score in Paper Screen match your experience with the materials?
- How did the materials support your use? What were the missed opportunities?

Determine score (5 = high-quality, 3 medium-quality, 1 low-quality) for each component of the Support for Teachers based on your pilot experience.

Component of Support for Teachers	Paper Screen Score	Response to Questions (Cite Evidence)	Pilot Score
TS1. Phenomena/Problems Drive Three-Dimensional Learning. Teacher materials provide: • background information about the phenomena or problems included in the learning sequence and across sequences; • an explanation of the role of phenomena or problems in driving student learning; and • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and appropriate EP&Cs.			
TS2. Coherence. Teacher materials describe and provide a rationale for: • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences; • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions; and • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA and appropriate EP&Cs.			

Reflecting and Scoring: Student Learning – **G1**

Name of Instructional Materials ___________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title _______________________________ Program # _______
Reviewer Name ______________________________

CA NGSS TIME Pilot Score Sheet - Student Learning Experience

Component	Score	Evidence
STUDENT LEARNING EXPERIENCE		
TOTAL Student Learning	**T=**	Student Learning Program Score = T/25 X 100% =

Reflecting and Scoring: Teacher Support – **G2**

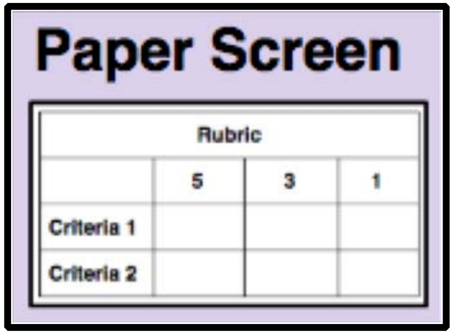
Name of Instructional Materials ________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title ____________________________ Program # _______
Reviewer Name ___________________________

Section 4: Pilot Materials – **G2**

CA NGSS TIME Pilot Score Sheet - Teacher Support

Component	Score	Evidence
TEACHER SUPPORT		
TS1. Phenomenon/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**T=**	Teacher Support Program Score = T/25 X 100% =
GRAND TOTAL (average score)		Student Learning Score + Teacher Support Score/2 =

Pilot: Score for Selection



- Next you will combine the scores from the Paper Screen and Pilot
- Rank the instructional materials
- Make a decision about which to select and recommend for adoption

Task Sheet – **G3**

Name of Instructional Materials ___________________________ Grade Level/Course _______
Program # _______ Reviewer Name ___________________________________

CA NGSS TIME Pilot Materials Task Sheet

Before you go: Record agreements or assignments about what will be needed by each team or person for the next steps in your pilot.

What to Do	What to Bring

Thank You

What is the value of the Pilot Materials process in analyzing and evaluating instructional materials?

What do you want to remember about the work we did today and how it applies to your context?

Section 4: Pilot Materials Facilitator Guide

Purpose

To analyze instructional materials for how student thinking and engagement is addressed, how teachers are supported in providing CA NGSS-aligned instruction, and to enable participants to apply Pilot tools and process.

Participants utilize the results of the CA NGSS TIME Develop District Lens, Prescreen and Paper Screen processes to inform the selection of instructional materials to pilot and test in the classroom. They evaluate the pilot results to inform final selection decision or recommendation and use evidence to inform professional learning and other support needed for broad and effective use of selected program across the district.

Time: 2 Hours, 45 Minutes (includes a 10 minute break)

Part I	Introduction to Pilot	15 minutes
Part II	Tools	105 minutes
Part III	Scoring	10 minutes
Part IV	Closing	10 minutes

Other

- Chart Paper, markers, and blue painters tape
- Sticky notes (3” x 3”)
- Sharpies (enough for each person to have one)
- Sets of instructional materials (Teacher Editions & Student Editions)
- Artifacts from Paper Screen for programs that will be piloted

Group Handouts per team

G1 CA NGSS TIME Pilot Score Sheet: Student Learning

G2 CA NGSS TIME Pilot Score Sheet: Teacher Support

G3 Task Sheet: What to do? What to bring?

Handouts

H1 Pilot Overview

H2 Pilot Tool 1: Focus on Student Learning

H3 Pilot Tool 2: Student Reflection on Learning

H4 Pilot Tool 3: Teacher Reflection on Student Learning

H5 Pilot Tool 4: Team Reflection on Student Learning

H6 Pilot Tool 5: Evidence of Support for Teachers

Resources

Optional handout and full publication resources for presenters and room

R1 Designed for CA NGSS: Teacher Support Rubric

R2 A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) by National Research Council

R3 *Next Generation Science Standards for California Public Schools, Kindergarten through Grade Twelve* (CA NGSS) 2013
https://www.cde.ca.gov/pd/ca/sc/ngssstandards.asp

R4 CA Science Framework (2016)
https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp

Advance Preparation

Prepare group and individual handouts

Share any electronic files your district plans to utilize

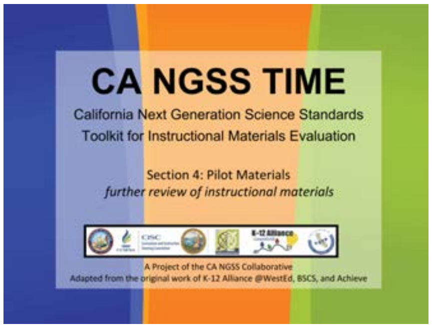
Charts

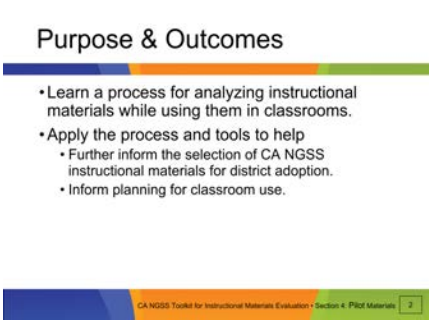
C1a and b: Create and post the charts of the score sheets **G1** and **G2**

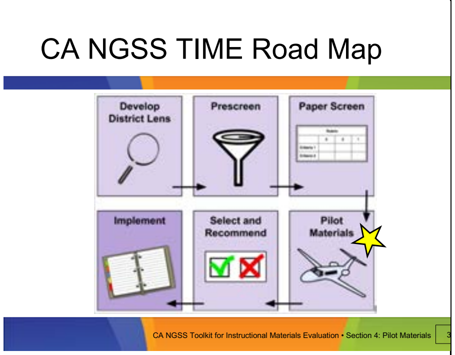
C2 (**Norms for Collaborative Work)**: Prepare a chart that highlights some norms for productively and respectfully work together throughout this process (or re-task this chart from Section 3: Paper Screen if available). You may include the following:

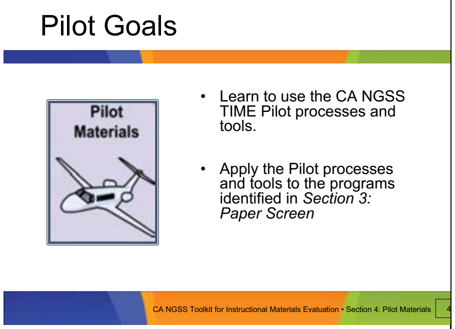
- Be kind and respectful
- Be present and engage in the process (today and beyond)
- Ask questions for clarification
- Use evidence to support your ideas
- Assume positive intentions
- Nobody is an expert, everybody learns

Part I – Introduction to Pilot (15 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 1: Title** Welcome participants to the session. Determine who is in the room.

	**Slide 2: Purpose & Outcomes**
	
	Share with participants the purpose of the Pilot Phase of CA NGSS TIME.
	
	• Learn a process for analyzing instructional materials while using them in classrooms.
	• Apply the process and tools to help:
	  • further inform the selection of CA NGSS instructional materials for district adoption.
	  • inform planning for classroom use.
	
	Remind them that this session is to frame a longer process that will occur over time.
	
	Some of this session will be reused at Follow-Up Meetings.
	
	Facilitator Note: If not already scheduled, Follow-Up Meeting dates and times should be scheduled and agreed to before the end of the Introduction Meeting.

	**Slide 3: CA NGSS TIME Road Map** Highlight where we are in the overall CA NGSS TIME process.

<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td>
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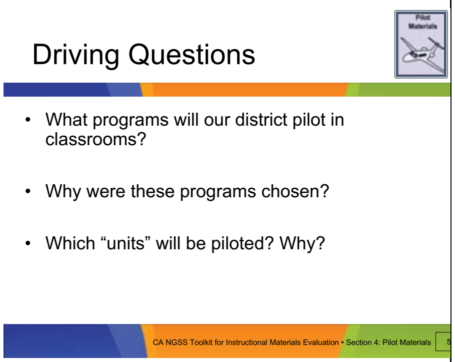
Slide 4: Pilot Goals

Provide an overview of the pilot goals. Share with participants that they will (1) learn to use the CA NGSS TIME Pilot processes and tools, and (2) apply the Pilot processes and tools with to the programs identified in section 3: Paper Screen.

</td></tr>
<tr><td>
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Slide 5: Driving Questions

Identify for the participants the driving questions.

Inform participants that evidence collected during the CA NGSS TIME (or other processes) Prescreen and Paper Screen processes will be gathered and brought to this Pilot work.

This slide offers a chance to revisit decisions made in section 3: Paper Screen which may have occurred at another time or with other staff. If it is not needed move on.

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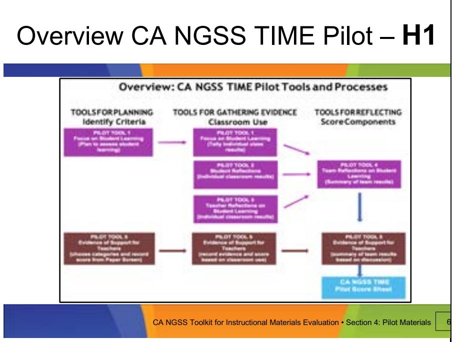
<tr><td>
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Slide 6: Overview: CA NGSS TIME Pilot (H1)

Provide participants with **(H1)** to follow as presenter navigates through the Pilot Tools and Processes on the next several slides.

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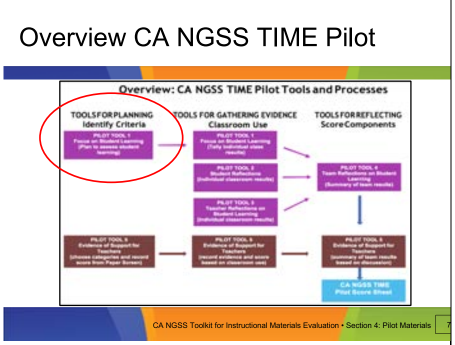
<tr><td>
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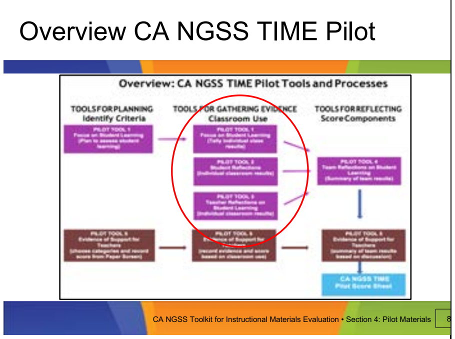
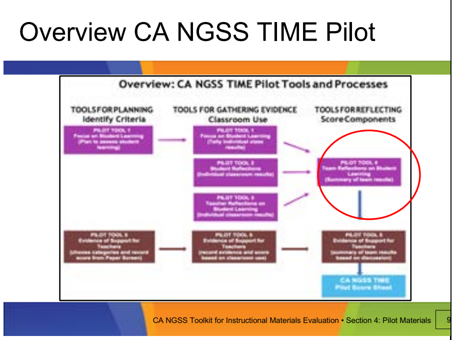
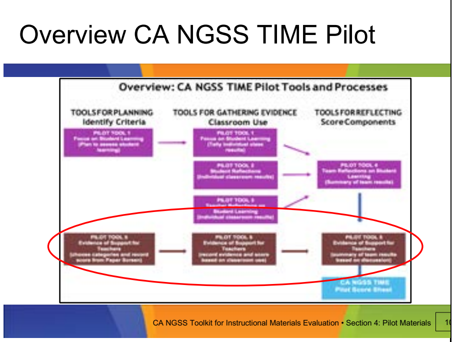
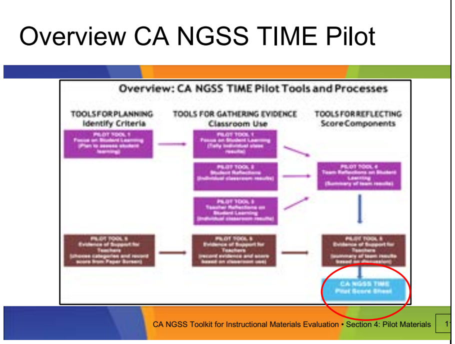
Slide 7: Overview: Tools for Planning

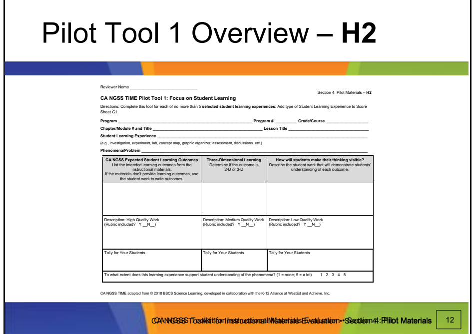
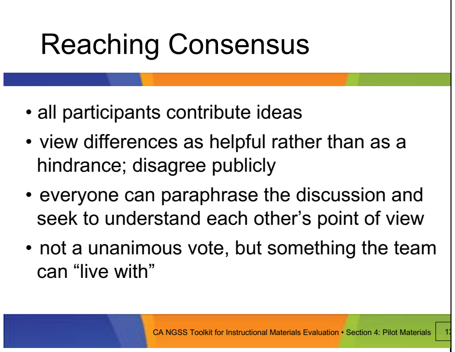
In Tools for Planning, the participants will focus on student learning using Pilot Tool 1, plan to assess student learning.

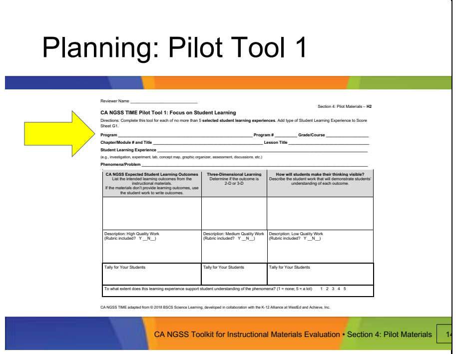
</td></tr>
</table>

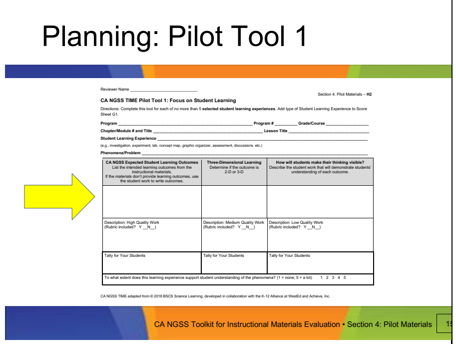
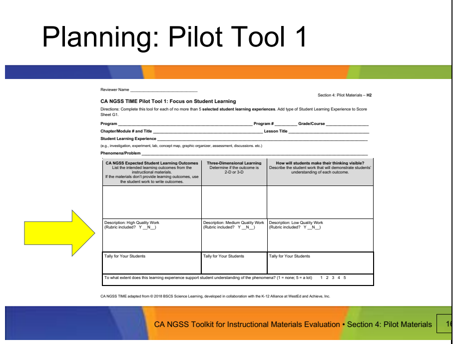
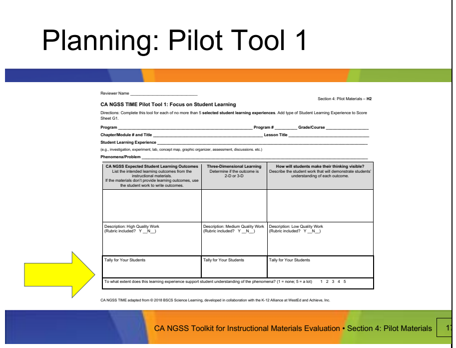
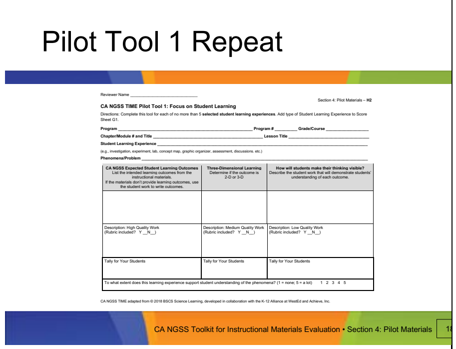
Slide	Slide Title and Facilitation Notes
	**Slide 8: Overview: Tools for Gathering Evidence** In Tools for Gathering Evidence, each teacher piloting the identified program/programs and "units" of instruction will score student work, gather student reflections, and reflect on the student work by themselves using Pilot Tools 1, 2, and 3.
	**Slide 9: Overview: Tools for Reflecting on Evidence** In Tools for Reflecting, teachers will share the evidence gathered during classroom use and reflect on the process together at a follow up meeting using Pilot Tool 4.
	**Slide 10: Overview: Scoring** Using "Pilot Tool 5: Evidence of Support for Teachers," pilot teachers will have an opportunity to review the findings from section 3: Paper Screen and collect additional evidence of how the teacher materials in the program support teachers.
	**Slide 11: Overview: Reflecting on Scoring** Let the team know that when they come together after piloting materials in their classrooms, the team will reflect on and score the evidence from Pilot Tools 1–5 to inform a selection decision. Teams will complete "G1 – CA NGSS TIME Pilot Score Sheet: Student Learning" and "G2 – CA NGSS TIME Pilot Score Sheet: Teacher Support" at a follow-up meeting.

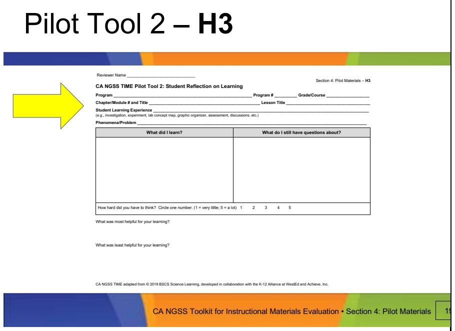
Part II – The Tools (105 minutes)

NOTE: Refer to appropriate Handout (H) for each Tool. Include a 10-minute break

Slide	Slide Title and Facilitation Notes
	**Slide 12: Pilot Tool 1 - Overview (H2)** Hand out **Pilot Tool 1 (H2)**. Let participants know they will work in grade level groups to identify which unit will be taught. Grade level groups then determine which learning experiences will be highlighted during the pilot process. They use Pilot Tool 1 for each of the selected learning experiences. • Provide a brief overview of the tool and the purpose of Tool 1 in the Pilot. • Determine a range of learning experiences within the unit that will be used to help you focus on student learning • Identify the Phenomena/Problem • List intended outcomes • Determine the extent to which the outcome is three dimensional • Describe how students make their thinking visible • Describe the quality of student work *Facilitator Note: Coming to consensus about what experiences will be used for the pilot may need some facilitation when the team first works on this. Evidence from the Paper Screen should be used. Refer to C2 (Norms for Collaborative Work) and Slide 13 (Reaching Consensus) if needed.*
	**Slide 13: Reaching Consensus** *Facilitator Note: Prior work with CA NGSS TIME consensus building can be mentioned here, or move ahead to slide 27 as needed. Point out C2 (Norms for Collaborative Work).* a. Explain to participants that consensus means all participants contribute ideas and encourage the use of one another's ideas and opinions. The group views differences as helpful rather than as a hindrance. Everyone can paraphrase the issue at hand and everyone has a chance to describe their feelings about the issue. Those who continue to disagree indicate publicly that they are willing to go along for an experimental try for a prescribed period of time. Finally, all share in the final decision. Consensus does not mean a unanimous vote, everyone's first choice, or that everyone agrees. As Facilitator, work to encourage participation, rely on evidence from the Paper Screen and Pilot, and moderate discussions.

Slide	Slide Title and Facilitation Notes
	Facilitator Note: Encourage full participation, ensure that discussions and decisions are based on evidence from the instructional materials. Some strategies for reaching consensus include: • Show your score • Provide evidence to support and refute (record in strengths and limitations) • Partner with a colleague to help communicate your ideas • Take a break • Shift locations • What would it take (record in strengths and limitations) b. Have participants show their score publicly c. Ask them to provide evidence to support score choices. Remind participants to record their thinking in Strengths and Limitations. d. Ask people who gave a score of '5' to explain why they scored it a 5, relying on their evidence, have a '1' explain why they scored it as a 1. Discuss/debate, and revote
 	**Slide 14: Planning: Pilot Tool 1** Review the learning experiences available in the unit that will be piloted. Discuss which learning experiences allow for assessing student learning. Provide time for teams to choose ONE learning experience (or point them in a productive direction). Fill in the program specific information at the top of Tool 1 for the learning experience chosen.

Slide	Slide Title and Facilitation Notes
	**Slide 15: Planning: Pilot Tool 1** Discuss and complete the top row on the table on Pilot Tool 1 for the chosen learning experience: CA NGSS Expected Learning Outcomes, Three-Dimensional Learning, and How will students make their thinking visible?
	**Slide 16: Planning: Pilot Tool 1** Determine if the materials include guidance for assessment, i.e., score descriptors, rubrics, examples of student work that is high, medium, or low performance. If so, record in the next row on the table of Pilot Tool 1 and attach the materials. If guidance for assessment of student work is not provided in the materials, determine if this opportunity for assessing student learning is appropriate to include in the review. If so, decide indicators of high, medium, and low student work.
	**Slide 17: Gathering Evidence: Pilot Tool 1** Explain to participants that they will score student work samples after instruction. Also explain to participants that they will tally the number of students performing at each score descriptor. Participants will also indicate the extent to which the learning experience supports student understanding of the phenomenon after they have looked at student work. Share with participants that the tallies will be used at the Follow-Up Meeting.
	**Slide 18: Pilot Tool 1 (Repeat)** Determine the additional learning experiences that will be used in the classroom pilot. Complete Pilot Tool 1 for each learning experience chosen. Refer back to slides 14–17 as needed.

<table>
<tr><th>Slide</th><th>Slide Title and Facilitation Notes</th></tr>
<tr><td>
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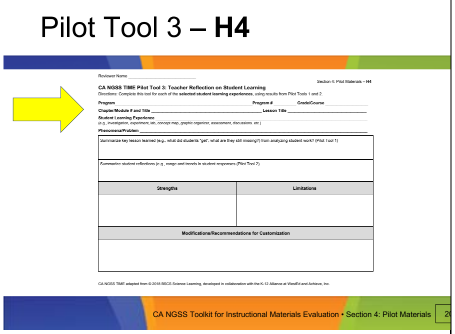
Slide 19: Pilot Tool 2 (H3)

Distribute Pilot Tool 2 **(H3)** and ask participants to complete the top of the form for each learning experience chosen in preparation for copying for students.

For K-1 students, teacher will interview each student and record their ideas. For grade 2–12 students, the students write their ideas.

</td></tr>
<tr><td>
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Slide 20: Pilot Tool 3 (H4)

Distribute Pilot Tool 3 **(H4)** and ask participants to complete the top of the form for each learning experience chosen.

This tool will be completed by the teacher after the students complete their reflections on learning and needs to be brought to the Follow-Up Meeting.

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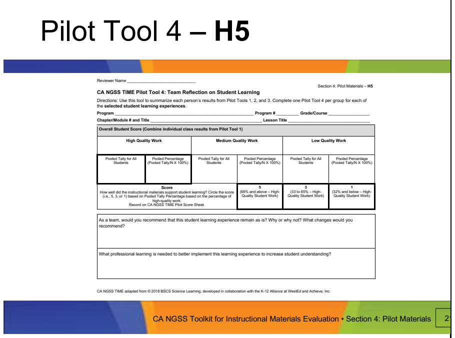
<tr><td>
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Slide 21: **Pilot Tool 4 (H5)**

Provide an overview of how participants will use Pilot Tool 4 **(H5)** when the team reconvenes at the Follow-Up Meeting.

Explain that this tool is a summary of what the individual teachers gathered in Pilot Tools 1, 2, and 3 and is completed as a group.

Facilitator Note: Reuse slides 21-25 as needed at the Follow-Up Meeting.

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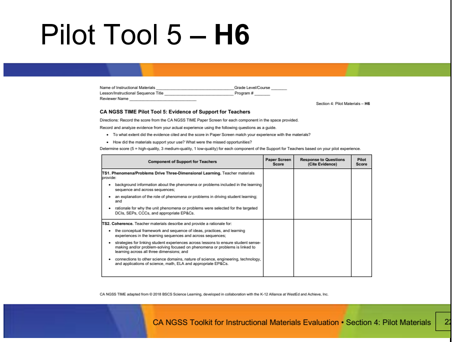
<tr><td>
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Slide 22: **Pilot Tool 5 (H6)**

Provide an overview of how participants will use Pilot Tool 5 **(H6)** when the team reconvenes at the Follow-Up Meeting.

This tool will allow for a comparison between the Paper Screen and the Pilot Materials experience. Complete one Pilot Tool 5 for each adoption grade span (i.e. K-5, 6-8).

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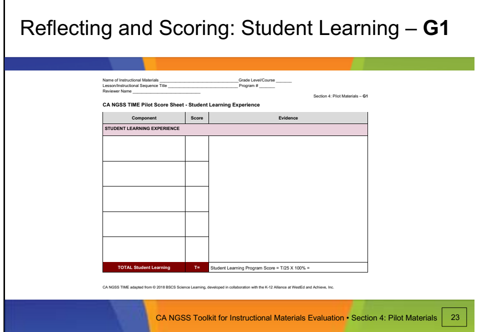
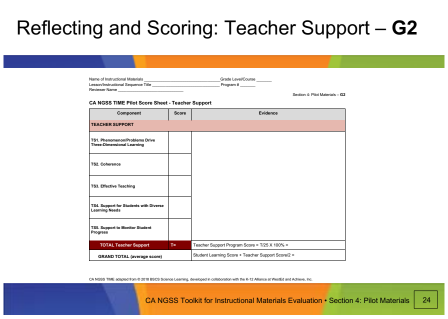
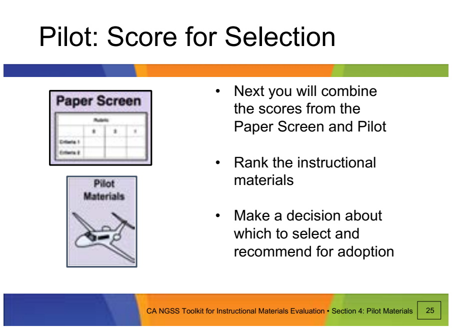
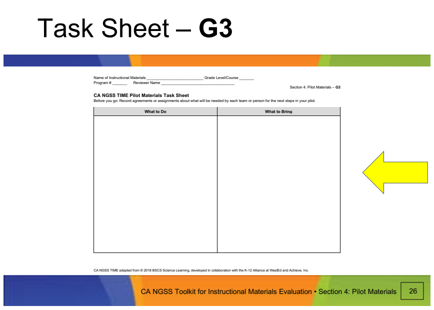
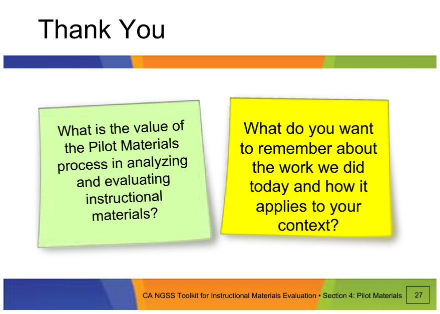
Part III – Scoring (10 minutes)

NOTE: Refer to appropriate Group Handouts **(G)**

Slide	Slide Title and Facilitation Notes
	**Slide 23: Reflecting and Scoring: Student Learning (G1)** Explain that the scoring process has two parts: 1) student learning **(G1)** 2) teacher support **(G2)** At the Follow-Up Meeting the team will use evidence gathered during teaching, their discussions about that evidence, and the information and **scores from Pilot Tool 4 (H5) and Pilot Tool 5 (H6)** to complete the Score Sheets. **CA NGSS TIME Pilot Score Sheet – Student Learning Experience (G1)** will provide each student learning experience with a score and then provide a summation of the evidence that was used to determine the score.
	**Slide 24: Reflecting and Scoring: Teacher Support (G2)** **CA NGSS TIME Pilot Score Sheet – Teacher Support (G2)** will include scores for each component of teacher support and then provide a summation of the evidence that was used to determine the score. Teachers then add the score for student learning with the score for teacher support to get a total score for the pilot.
	**Slide 25: Score for Selection** At the Follow-Up Meeting, participants will combine the scores from the Paper Screen and the Pilot Materials process across grade levels. This will allow them to rank order the instructional materials and decide on which program to Select and Recommend for adoption. Use these tools to support and create documentation of scoring (using information from the score sheets and the evidence pages) to present during Section 5: Select and Recommend. This documentation can be used to support the purchase and implementation of the selected materials.

Part IV – Closing (10 minutes)

Slide	Slide Title and Facilitation Notes
	**Slide 26: Task Sheet** Review and record what participants need to do as next steps (teach the unit(s) with chosen learning experiences and complete Tools 2 and 3) and what they need to bring to the Follow-Up Meeting (all student work and documents for Tools 1–3 for each of the chosen learning experiences).
	**Slide 27: Thank You** Pass out sticky notes. Ask participants to write down on one sticky note "aha" they have from the pilot process and synthesize of the process used today. This could be an understanding, "aha," or even a challenge. On another sticky note, instruct participants to write down what is something they still "need" to help them understand the CA NGSS and/or pilot phase process. Participants should group the "gots" and "needs" together with other colleagues.

Name of Instructional Materials ________________________________Grade Level/Course ______
Lesson/Instructional Sequence Title ____________________________ Program # ______
Reviewer Name ___________________________

CA NGSS TIME Pilot Score Sheet - Student Learning Experience

Component	Score	Evidence
STUDENT LEARNING EXPERIENCE		
TOTAL Student Learning	**T=**	Student Learning Program Score = T/25 X 100% =

Name of Instructional Materials ________________________________Grade Level/Course ________
Lesson/Instructional Sequence Title ____________________________ Program # ________
Reviewer Name ___________________________

CA NGSS TIME Pilot Score Sheet - Teacher Support

Component	Score	Evidence
TEACHER SUPPORT		
TS1. Phenomenon/Problems Drive Three-Dimensional Learning		
TS2. Coherence		
TS3. Effective Teaching		
TS4. Support for Students with Diverse Learning Needs		
TS5. Support to Monitor Student Progress		
TOTAL Teacher Support	**T=**	Teacher Support Program Score = T/25 X 100% =
GRAND TOTAL (average score)		Student Learning Score + Teacher Support Score/2 =

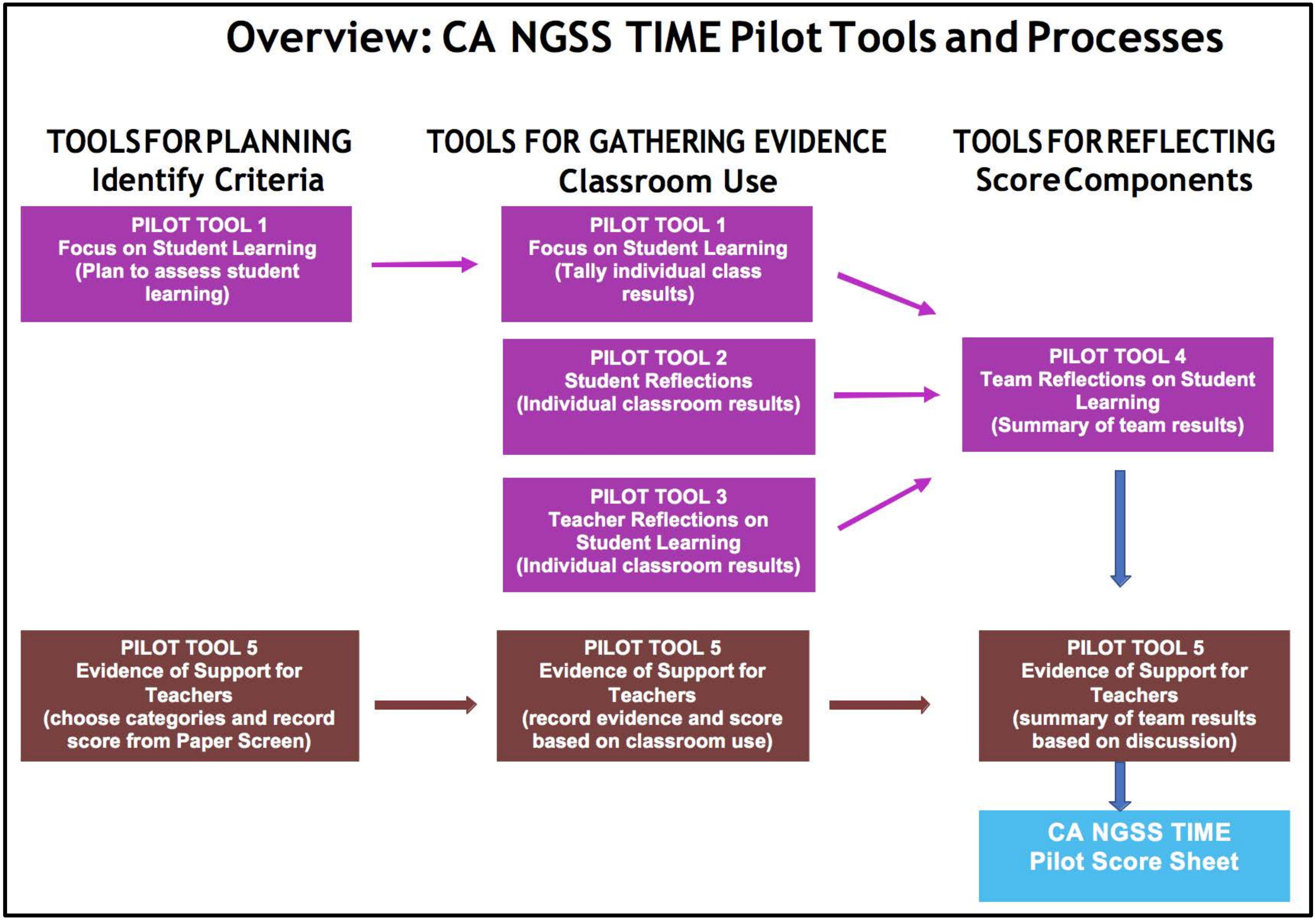
Name of Instructional Materials ___________________________ Grade Level/Course _______
Program # _______ Reviewer Name ___________________________________

CA NGSS TIME Pilot Materials Task Sheet

Before you go: Record agreements or assignments about what will be needed by each team or person for the next steps in your pilot.

What to Do	What to Bring

CA NGSS TIME Pilot Materials Process and Tools Overview



Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 1: Focus on Student Learning

Directions: Complete this tool for each of no more than 5 **selected student learning experiences**. Add type of Student Learning Experience to Score Sheet G1.

Program ____ **Program #** __________ **Grade/Course** __________________

Chapter/Module # and Title ____________________________________ **Lesson Title** ________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

CA NGSS Expected Student Learning Outcomes List the intended learning outcomes from the instructional materials. If the materials don't provide learning outcomes, use the student work to write outcomes.	**Three-Dimensional Learning** Determine if the outcome is 2-D or 3-D	**How will students make their thinking visible?** Describe the student work that will demonstrate students' understanding of each outcome.
Description: High Quality Work (Rubric included? Y __N__)	Description: Medium Quality Work (Rubric included? Y __N__)	Description: Low Quality Work (Rubric included? Y __N__)
Tally for Your Students	Tally for Your Students	Tally for Your Students
To what extent does this learning experience support student understanding of the phenomena? (1 = none; 5 = a lot) 1 2 3 4 5		

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 2: Student Reflection on Learning

Program ____________________ **Program #** __________ **Grade/Course** ____________________

Chapter/Module # and Title ____________________ **Lesson Title** ____________________

Student Learning Experience ____________________
(e.g., investigation, experiment, lab concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____________________

What did I learn?	What do I still have questions about?
How hard did you have to think? Circle one number. (1 = very little; 5 = a lot) 1 2 3 4 5	

What was most helpful for your learning?

What was least helpful for your learning?

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 3: Teacher Reflection on Student Learning

Directions: Complete this tool for each of the **selected student learning experiences**, using results from Pilot Tools 1 and 2.

Program____**Program #** __________ **Grade/Course** ___________________

Chapter/Module # and Title ____ **Lesson Title** ___________________________________

Student Learning Experience ____

(e.g., investigation, experiment, lab, concept map, graphic organizer, assessment, discussions. etc.)

Phenomena/Problem ____

Summarize key lesson learned (e.g., what did students “get”, what are they still missing?) from analyzing student work? (Pilot Tool 1)	
Summarize student reflections (e.g., range and trends in student responses (Pilot Tool 2)	
Strengths	**Limitations**
Modifications/Recommendations for Customization	

Reviewer Name ______________________________

CA NGSS TIME Pilot Tool 4: Team Reflection on Student Learning

Directions: Use this tool to summarize each person's results from Pilot Tools 1, 2, and 3. Complete one Pilot Tool 4 per group for each of the **selected student learning experiences**.

Program ____ **Program #** __________ **Grade/Course** __________________

Chapter/Module # and Title ____ **Lesson Title** ____________________________________

Overall Student Score (Combine individual class results from Pilot Tool 1)					
High Quality Work		**Medium Quality Work**		**Low Quality Work**	
Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)	Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)	Pooled Tally for All Students	Pooled Percentage (Pooled Tally/N X 100%)
Score How well did the instructional materials support student learning? Circle the score (i.e., 5, 3, or 1) based on Pooled Tally Percentage based on the percentage of high-quality work. Record on CA NGSS TIME Pilot Score Sheet.			**5** (66% and above – High-Quality Student Work)	**3** (33 to 65% – High-Quality Student Work)	**1** (32% and below – High-Quality Student Work)

As a team, would you recommend that this student learning experience remain as is? Why or why not? What changes would you recommend?
What professional learning is needed to better implement this learning experience to increase student understanding?

Name of Instructional Materials ________________________________Grade Level/Course _______
Lesson/Instructional Sequence Title ____________________________ Program # _______
Reviewer Name ___________________________

CA NGSS TIME Pilot Tool 5: Evidence of Support for Teachers

Directions: Record the score from the CA NGSS TIME Paper Screen for each component in the space provided.

Record and analyze evidence from your actual experience using the following questions as a guide.

- To what extent did the evidence cited and the score in Paper Screen match your experience with the materials?
- How did the materials support your use? What were the missed opportunities?

Determine score (5 = high-quality, 3 medium-quality, 1 low-quality) for each component of the Support for Teachers based on your pilot experience.

Component of Support for Teachers	Paper Screen Score	Response to Questions (Cite Evidence)	Pilot Score
TS1. Phenomena/Problems Drive Three-Dimensional Learning. Teacher materials provide: • background information about the phenomena or problems included in the learning sequence and across sequences; • an explanation of the role of phenomena or problems in driving student learning; and • rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and appropriate EP&Cs.			
TS2. Coherence. Teacher materials describe and provide a rationale for: • the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences; • strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions; and • connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA and appropriate EP&Cs.			

Name of Instructional Materials ______________________________Grade Level/Course _______
Lesson/Instructional Sequence Title ___________________________ Program # _______
Reviewer Name __________________________

Component of Support for Teachers	Paper Screen Score	Response to Questions (Cite Evidence)	Pilot Score
TS3. Effective Teaching. Teacher materials provide evidence for the use and effectiveness of strategies that: • support students in learning through authentic and meaningful phenomena or design problems; • support student learning across the three dimensions; and • make student thinking visible; promote reasoning, sense-making, and problem-solving; challenge student thinking; and develop metacognitive abilities.			
TS4. Support for Students with Diverse Learning Needs. Teacher materials provide an array of strategies that: • support student access to the targeted learning goals, experiences, and performances; and • help teachers differentiate instruction.			
TS5. Support to Monitor Student Progress. Materials provide support for teachers to: • monitor student learning and progress over time; and • make decisions about instruction and provide feedback to students.			

Designed for CA NGSS: Teacher Support Rubric

Designed for CA NGSS: Teacher Support Rubric	**High Quality 5**	**Medium Quality 3**	**Low Quality 1**
TS1. Phenomena/Problems Driven Three-Dimensional Learning. Teacher materials provide ● background information about the phenomena or problems included in the learning sequence and across sequences. ● an explanation of the role of phenomena or problems in driving student learning. ● rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, CCCs, and EP&Cs (when applicable). Evidence found in: F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems.	Materials provide little guidance to teachers about how students develop, use, and integrate the three dimensions and EP&Cs (where appropriate) to make sense of phenomena or design solutions to problems
TS2. Coherence. Teacher materials describe and provide a rationale for ● the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. ● strategies for linking student experiences across lessons to ensure student sense-making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. ● connections to other science domains, nature of science, engineering, technology, and applications of science, math, ELA, and EP&Cs (when applicable). Evidence found in: F2, F3, F4, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.

Designed for CA NGSS: Teacher Support Rubric	High Quality 5	Medium Quality 3	Low Quality 1
TS3. Effective Teaching. Teacher materials support the use of and provide a rationale and evidence of effectiveness for strategies that ● support students in learning through authentic and meaningful phenomena or design problems. ● support student learning across the three dimensions. ● make student thinking visible; promote reasoning, sense-making, and problem-solving; challenge student thinking; and develop metacognitive abilities. Evidence found in: SW1, SW2, SW3, SW4, SP3	Materials provide rationale and robust support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide some rationale and support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide little rationale and support for teachers to implement strategies that enhance student performances, thinking, and metacognition.
TS4. Support for Students with Diverse Learning Needs. Teacher materials provide an array of strategies ● to support student access to the targeted learning goals, experiences, and performances. ● that help teachers differentiate instruction. Evidence found in: SW5, SP4	Materials include robust and comprehensive strategies for supporting learners with diverse needs.	Materials include some robust strategies for supporting learners with diverse needs.	Materials include few robust strategies for supporting learners with diverse needs.
TS5. Support to Monitor Student Progress. Materials provide support for teachers to ● monitor student learning and progress over time. ● make decisions about instruction and provide feedback to students. Evidence found in: SW3, SW4, SP1, SP2, SP3	Materials provide robust support for interpreting and using data generated from assessments.	Materials provide some support for interpreting and using data generated from assessments.	Materials provide little support for interpreting and using data generated from assessments.

Section 5: Select and Recommend

Overview

After completing the activities in the CA NGSS TIME sections 1-4, the adoption committee may be able to come to an agreement quickly and easily about which program(s) to adopt. If the adoption committee has one program ready for selection, proceed to Action Step 5.8: Recommend. If the committee has not yet identified a clear choice for adoption, proceed with all section 5: Select and Recommend Action Steps to provide a decision-making framework.

Districts choosing to adopt materials not on the state-approved list must still meet legal requirements. If a local education agency (LEA) chooses to use instructional materials that have not been adopted by the state board, the LEA shall ensure that a majority of the participants of any review process conducted by the LEA are classroom teachers who are assigned to the subject area or grade level of the materials. LEAs may also utilize supplemental resources or teacher-created units of study that meet the requirements of the science content standards requirements and Education Code relevant to science. For more information, refer to Education Code Section 60210 added via AB 1246 (Brownley). For the purpose of understanding the use of this toolkit, the term “program” may refer to a state-adopted publisher program, Open Educational Resources (OER) or other online materials, or teacher-created units of study.

Data/Resources

Use data, charts, and templates from CA NGSS TIME sections 1–4 as needed to assist adoption committee members as they complete this section.

Timeline

The process in this section of CA NGSS TIME is designed to facilitate the selection and recommendation of instructional materials. It may be necessary to conduct multiple sessions of this process, so the timeline will vary according to the number of programs being reviewed. The approximate timeline for each program being reviewed is 1–2 hours.

Action Step 5.1: Prepare for Decision-Making Process

1. Adoption committee facilitator reviews norms previously established and used in sections 1-4. If norms have not yet been developed, consider the following suggestions:
    a. Listen more than you speak
    b. Everyone has something valuable to say
    c. Don't steal anyone's "aha" movement
    d. No one in the room knows everything but everyone knows something
2. Review the definition of consensus used in previous sections of CA NGSS TIME:
    a. All participants contribute and provide evidence for their score
    b. View differences as helpful rather than as a hindrance
    c. Everyone can paraphrase the discussion and understand each other's point of view
    d. Those who disagree indicate publicly and are willing go along for prescribed amount of time
    e. Not a unanimous vote
    f. Something the team can "live with"
3. In Section 5, reaching a consensus decision for a selection and recommendation of instructional materials means:
    a. Each team member agrees he/she can support the program ultimately recommended by the committee.
    b. Each team member has a responsibility to support the adoption and its implementation throughout the district.
4. Adoption committee members agree to express and defend their level of support for each program. Introduce the Levels of Support.
    a. **I strongly agree** with this program and can support it.
    b. **I can support** this program. I am willing to go along with this choice.
    c. **I have concerns** and cannot support this program.
    d. **I abstain** because I didn't learn enough about this program to have an opinion.

e. Agree that if the adoption committee is unable to reach consensus, the district's Executive Committee will make the final decision.

Note: The District's Executive Committee may be a district level group overseeing the process of the teachers. The Executive Committee may include the Assistant Superintendent of Instruction, Coordinators, and Finance. They may have other lenses that may affect the outcome of the review, especially when consensus cannot be reached.

Action Step 5.2: Compile and Review Data

1. Adoption committee facilitator will lead a review of section 1: Develop District Lens. The format of this review will vary by district. Consult your district adoption guidelines and use any required adoption forms when compiling and reviewing data.
2. Adoption committee facilitator will lead a review of the publisher program choices (including careful analysis by grade level/span and across grade implications) with assembled notes and opinions on each (sections 2: Prescreen, section 3: Paper Screen, and section 4: Pilot Materials).

Action Step 5.3: Determine Level of Support for Each Program

1. Facilitator displays level of support categories (see Action Step 5.1.4) and reminds participants of data reviewed.
2. Facilitator guides a discussion on strengths and limitations of each program. Record strengths and limitations on charts or using an electronic tool (e.g., Padlet, AwwApp - A Web Whiteboard, or Google Doc). Refer to evidence from the Paper Screen and Pilot Materials processes as needed.
3. Adoption committee members determine their level of support regarding each separate program.
4. When all members are ready to be polled and defend their level of support for each program, polling begins. Members may express any level of support for any program—for example, members may choose to support two programs with full support. Consider using an electronic tool to poll (e.g., Poll Everywhere, Survey Monkey, Google Forms, etc.). Polling is not a numerical score as used in the Paper Screen process, but rather reflects a level of support.
5. Facilitator polls the group, and members individually display their level of support. You may consider making Levels of Support cards for each member to use during polling. Facilitator posts results for each program on a chart or

electronically. If documenting results electronically, ensure the document is displayed for everyone to see.

6. If consensus is reached after the first polling, proceed to Action Step 5.8: Recommend. If consensus has not been reached, proceed to Action Step 5.4: Discuss and Cite Evidence and continue discussing all programs still under consideration.

Action Step 5.4: Discuss and Cite Evidence

1. If program selections are in opposition to one another, invite participants to voice their opinions citing specific evidence (i.e., reference charts, notes, and data from sections 1–4). Depending on group size, this might take the form of a simple discussion, or in a large group a more structured process that breaks the group into smaller mixed groups for discussion and charting. Cross grade level sharing is important if the committee is making a grade span selection.
2. Discuss patterns in the strengths and limitations. Ask the group to narrow the existing strengths and limitations to items that might inhibit consensus. Encourage each member to share their concerns, rationale, and supporting evidence for identified limitations in a way that will inform and provide knowledge that will enable the group to reach consensus.
3. Conduct another poll to see if the level of support has shifted after the discussion of strengths and limitations.
4. Record results on the poll chart from Action Step 5.3. Update scores as needed to show current poll results. If the group appears to favor one program over another and consensus has been reached, proceed to Action Step 5.8: Recommend. If consensus has not yet been reached, proceed to Action Step 5.5: Work Toward Consensus.

Action Step 5.5: Work Toward Consensus

1. Committee members address the voiced limitations and discuss options for compromise.
2. Conduct another poll to see if the level of support has shifted after the discussion.
3. Record results on poll chart again. If the group appears to favor one program over another and consensus has been reached, proceed to Action Step 5.8: Recommend. If consensus has not yet been reached, proceed to Action Step 5.6: Examine Other Considerations.

Action Step 5.6: Examine Other Considerations

1. If the decision is not yet clear, now is the time to consider additional differences based on district priorities. Considerations include:
    a. Evaluation of criteria charts from section 1: Develop District Lens based on district need.
    b. Alignment between program types - Supports for external program types - Special Education, EL, Title I (Pull in/Pull Out) and other program areas.
    c. Other immediate needs such as new teachers, need for technology, growing number of students with intervention needs, etc.
    d. Factors such as cost breakdown of instructional components: materials, consumable and non-consumable supplies, and other resources, such as cost breakdown for components by grade span.
    e. Availability of professional learning support (within program and from the publisher).
    f. Opportunities to maximize articulation across schools, districts, and throughout the county.
2. Facilitator reviews consensus definition chart. Even though a choice may not be a member's first choice, facilitator reminds group that consensus means that everyone can support a program for the district.
3. Conduct a final poll of individuals in the group.
4. Record results on poll chart. If the group appears to favor one program over another and consensus has been reached, proceed to Action Step 5.8: Recommend. If there are still concerns and the committee can not support the program, return to Action Step 5.5: Work Toward Consensus.

Action Step 5.7: Fall-Back Decision-Making Option

1. If consensus was not reached, input will be used in a manner consistent with the District's Board Policy or by the Board themselves. Input will be forwarded from the adoption committee to the district's Executive Committee to make a final program choice.

Action Step 5.8: Recommend

1. Once the adoption committee has reached consensus, the adoption facilitator moves forward with a recommendation of instructional material program(s) in a manner consistent with the District's Board Policy.

Section 6: Implement

Implementing the CA NGSS through newly selected instructional materials is a major undertaking and many educators would hope that the new materials would magically transform teaching and learning to be aligned with the CA NGSS. Yet the reality of the complexities and beauty of the CA NGSS require thoughtful and purposeful planning that enable districts to move from novice to expert in providing quality science education for all students. This must include ongoing professional learning.

By conducting the previous sections of the CA NGSS TIME, your district adoption committee has been collecting data that will serve to inform the implementation plan. The Implementation Plan should be developed through the lessons learned in section 1: Develop District Lens, analyzing data from section 2: Prescreen and section 3: Paper Screen, and reflecting on results revealed through section 4: Pilot Materials.

Who should be involved in developing this plan?

We recommend a team of educators made up of a variety of stakeholders. Different points of view, while sometimes a challenge to balance, allows for buy in and credibility. This strategy will enable more people in a wider range of roles to be aware of the plan and can support it in a variety of ways.

What planning tools are available?

There are many tools and processes available. If the district has its own tools and they align with the shifts required by the instructional materials, then use those.

For districts looking for additional resources or support, one tool that complements the CA NGSS TIME is the Program Elements Matrix (PEM) (developed by the California Science Implementation Network, now part of K-12 Alliance @ WestEd and cited in the *Science Framework* for California Public Schools Kindergarten Through Grade Twelve, pages 180–181) and adapted with permission). It is presented here because of its adaptability to align with implementing high-quality science instructional materials.

The PEM is a matrix that features district-identified elements of science instruction to facilitate implementation from the status quo to the attainable goal. There are two basic rules in developing a PEM: (1) the elements have to be of key importance to the purpose of the PEM, and (2) the column descriptions have to indicate growth over time. The actual time frame for a PEM is dependent on the developers, but most districts work within a 3–5 year planning cycle. The PEM is a living document, meaning that it is reviewed yearly, with growth celebrated and non-growth analyzed for improvement. PEMs can be developed at a large grain size for an entire program, or at a smaller grain size where a specific element is explored in depth. Districts are highly encouraged to link the elements of key importance from the PEM to their site level plans and the Local Control Accountability Plan.

Using the PEM supports districts in long-term, big-picture planning. Figures 1–3 provide examples of how the PEM may be used at different organizational levels to support implementation of newly adopted instructional materials.

Figures 4 and 5 provide examples of tools that may be used to determine current status and next steps at the district and classroom levels.

Figure 6 is an Action Plan template that can be used to identify steps needed for successful implementation of adopted instructional materials as identified through the PEM process. Successful implementation is defined in the PEM based on the movement a district makes towards the Reach for the Stars column.

Figure 1. Sample PEM with possible column headers and elements at the district level.

SAMPLE Program Elements Matrix				
SAMPLE Elements	***Here We Are (Status Quo; Awareness)***	***Just for Starters (Beginning Transition)***	***Rolling Along (Intermediate Transition)***	***Reach for the Stars (Attainable Goal)***
Professional Learning Plan for Instructional Materials Implementation				
Leadership Development ● **Central Office** ● **Site Administrators** ● **Teacher Leaders**				
District Policies and Practices				
Materials Management				
Instructional Practices				
Assessment Practices				
Learning Environment				

Figure 2. Sample PEM based on CA NGSS TIME *Section 1: Develop District Lens* with possible elements and sub-elements for implementing an instructional materials program.

SAMPLE Implementing Selected Instructional Materials				
SAMPLE Elements	***Here We Are*** ***(Status Quo; Awareness)***	***Just for Starters*** ***(Beginning Transition)***	***Rolling Along*** ***(Intermediate Transition)***	***Reach for the Stars*** ***(Attainable Goal)***
Policies and Practices	Science priority at high school; marginal at middle school; not a priority at elementary school			Board policies and site-based practices treat science as a core subject
Instruction	Mostly lecture with conformational labs; some classrooms with student centered instruction			Students engage in using the three dimensions to build understanding of phenomenon and solve problems
Assessment	District end of course for secondary Teacher choice for other grades			Classrooms use formative and summative to monitor and adjust instruction; students self-monitor; common assessment for program

SAMPLE Implementing Selected Instructional Materials				
SAMPLE Elements	***Here We Are*** ***(Status Quo; Awareness)***	***Just for Starters*** ***(Beginning Transition)***	***Rolling Along*** ***(Intermediate Transition)***	***Reach for the Stars*** ***(Attainable Goal)***
Professional Learning	One-day districtwide Varies at site for PLCs			Job-embedded professional learning; collaboration time; focus on student learning
Leadership	Instructional Materials Committee; District TOSA No other leadership			TOSA with core leadership team of teachers and administrators; site representation

Figure 3. Sample PEM based on CA NGSS TIME Sections 2–4 with possible elements and sub-elements to define CA NGSS-designed instruction.

SAMPLE CA NGSS Instruction Using Selected Instructional Materials				
SAMPLE Elements	***Here We Are (Status Quo; Awareness)***	***Just for Starters (Beginning Transition)***	***Rolling Along (Intermediate Transition)***	***Reach for the Stars (Attainable Goal)***
Phenomenon/ problem-based	Teachers teach topics that student might one day want to know/understand.	Teachers use phenomenon as discrepant event.	Teachers recognize and use phenomenon or problems to anchor student learning.	Teachers recognize and use phenomenon AND problems to anchor student learning.
Three-dimensional	Teachers teach science as a body of knowledge to be learned with few instructional strategies.	Teachers use a few dimensions at the holistic level (e.g. ask questions; plan and conduct an investigation) to make ideas accessible to students.	Teachers use several of the dimensions at the element level and in conjunction with each other to help build student understanding.	Teachers frequently implement three-dimensional, phenomena/problem-based instructional practices as exemplified in the NGSS.
Learning environment	Teachers conduct class with little or no appreciation of student thinking and promote a teacher-centered learning environment.	Teachers recognize the value of a student-centered classroom environment, but lack the capacity to develop such an environment.	Teachers attempt to develop a learning environment that puts student thinking at the center of instruction.	Teachers successfully develop a learning environment that puts student thinking at the center of instruction.

SAMPLE CA NGSS Instruction Using Selected Instructional Materials				
SAMPLE Elements	***Here We Are (Status Quo; Awareness)***	***Just for Starters (Beginning Transition)***	***Rolling Along (Intermediate Transition)***	***Reach for the Stars (Attainable Goal)***
Student to student discourse	Teachers directly question students; sometimes students question teacher.	Teachers provide accountable talk stems to encourage students to share with other students.	Students select their own accountable talk stems in dialog with other students.	Students challenge each others thinking, using evidence and reasoning.
Student self-assessment	Teachers do not encourage students to reflect on or assess their own work.	Students experience limited opportunities for reflection and self-assessment.	Students experience some opportunities for reflection and self-assessment.	Students experience ongoing opportunities for reflection and self-assessment.

Figure 4. Sample District Profile Tool to determine steps to support implementation of instructional materials.

SAMPLE District Profile Tool				
SAMPLE Components	**Expert**	**Accomplished**	**Novice**	**Not Evident**
Professional Learning Plan for Instructional Materials Implementation	District enacts a multi-year plan for professional learning related to instructional materials implementation that is monitored, equitable, and focused on collaboration among stakeholders.	District develops a multi- year plan for professional learning related to instructional materials implementation that is monitored, equitable, and focused on collaboration among stakeholders.	District has a short-term plan for professional learning, but the plan may lack monitoring, equity, and/or collaboration among stakeholders.	District offers limited support for professional learning.
Leadership Development **Central Office** **Site Administrators** **Teacher Leaders**	District enacts a multi-year plan, for leadership development, that is monitored, equitable and focused on a common vision for the NGSS among stakeholders.	District develops a multi-year plan, for leadership development, that is monitored, equitable and focused on a common vision for the NGSS among stakeholders.	District has a short-term plan for leadership development, but the plan may lack monitoring, equity, and/or a common vision for the NGSS among stakeholders.	District lacks a vision and plan to support leadership development.

SAMPLE District Profile Tool				
SAMPLE Components	**Expert**	**Accomplished**	**Novice**	**Not Evident**
District Policies and Practices	District policies and practices fully support the selection and implementation of science instructional materials and are commensurate with other content areas, i.e., math and ELA.	District policies and practices somewhat support the selection and implementation of science instructional materials.	District policies and practices to support the selection and implementation of science instructional materials are inconsistent.	District policies and practices are absent to support the selection and implementation of science instructional materials.
Materials Management	District supports a fully operational materials management system to provide and replenish resources, i.e., science/engineering equipment, text resources, and technology, to ensure that teachers have what they need to effectively use the instructional materials with all their students.	District supports a materials management distribution system to provide resources, i.e., science/engineering equipment, text resources, and technology, to ensure that teachers have what they need to effectively use the instructional materials with all their students.	District supports a materials management distribution system to provide resources, i.e., science/engineering equipment, text resources, and technology.	District does not support a materials management distribution system.

Figure 5. Sample Teacher Profile Tool to determine steps to support classroom level implementation of instructional materials.

SAMPLE Teacher Profile Tool				
SAMPLE Component	**Expert**	**Experienced**	**Novice**	**Not Evident**
Instructional Practices	Teachers frequently implement three-dimensional, phenomena/ problem-based instructional practices as exemplified in the NGSS.	Teachers sometimes implement three-dimensional, phenomena/ problem-based instructional practices as exemplified in the NGSS, but more often learning is two-dimensional in nature.	Teachers use a few instructional strategies, not aligned to the shifts in NGSS, to make ideas accessible to students and may encourage some students to think critically or to deepen their knowledge of science.	Teachers teach science as a body of knowledge to be learned with few instructional strategies.
Student Reflection	Teachers offer ongoing opportunities for student reflection and self-assessment.	Teachers offer some opportunities for student reflection and self-assessment.	Teachers offer few opportunities for student reflection and self-assessment	Teachers do not encourage students to reflect on or assess their own work.

SAMPLE Teacher Profile Tool				
SAMPLE Component	**Expert**	**Experienced**	**Novice**	**Not Evident**
Assessment Practices	Teachers use information from a variety of assessments, that are three-dimensional, to plan and modify instruction.	Teachers use information from a variety of assessments that may be two dimensional, to occasionally plan and modify instruction.	Teachers use information from a limited range of assessments, not aligned to the shifts in NGSS, to plan learning sequences. Assessments may be used to inform instruction.	Teachers use one or two sources of information to assess student understanding. Assessments are not used to inform instruction.
Learning Environment	Teachers successfully develop a learning environment that puts student thinking at the center of instruction.	Teachers attempt to develop a learning environment that puts student thinking at the center of instruction.	Teachers recognize the value of a student-centered classroom environment but lack the capacity to develop such an environment.	Teachers conduct class with little or no appreciation of student thinking and promote a teacher-centered learning environment.

Figure 6. Sample Action Plan template for implementation of the instructional program based on the sub-elements identified in the PEM.

SAMPLE Action Plan				
What: Events and Activities (description, number, dates/times)	**Who is Responsible**	**Due Date**	**Done**	**Special Notes: Goals/Outcomes, Measures, Budget**