



# High School

# ELD 2

**WEEK #2**

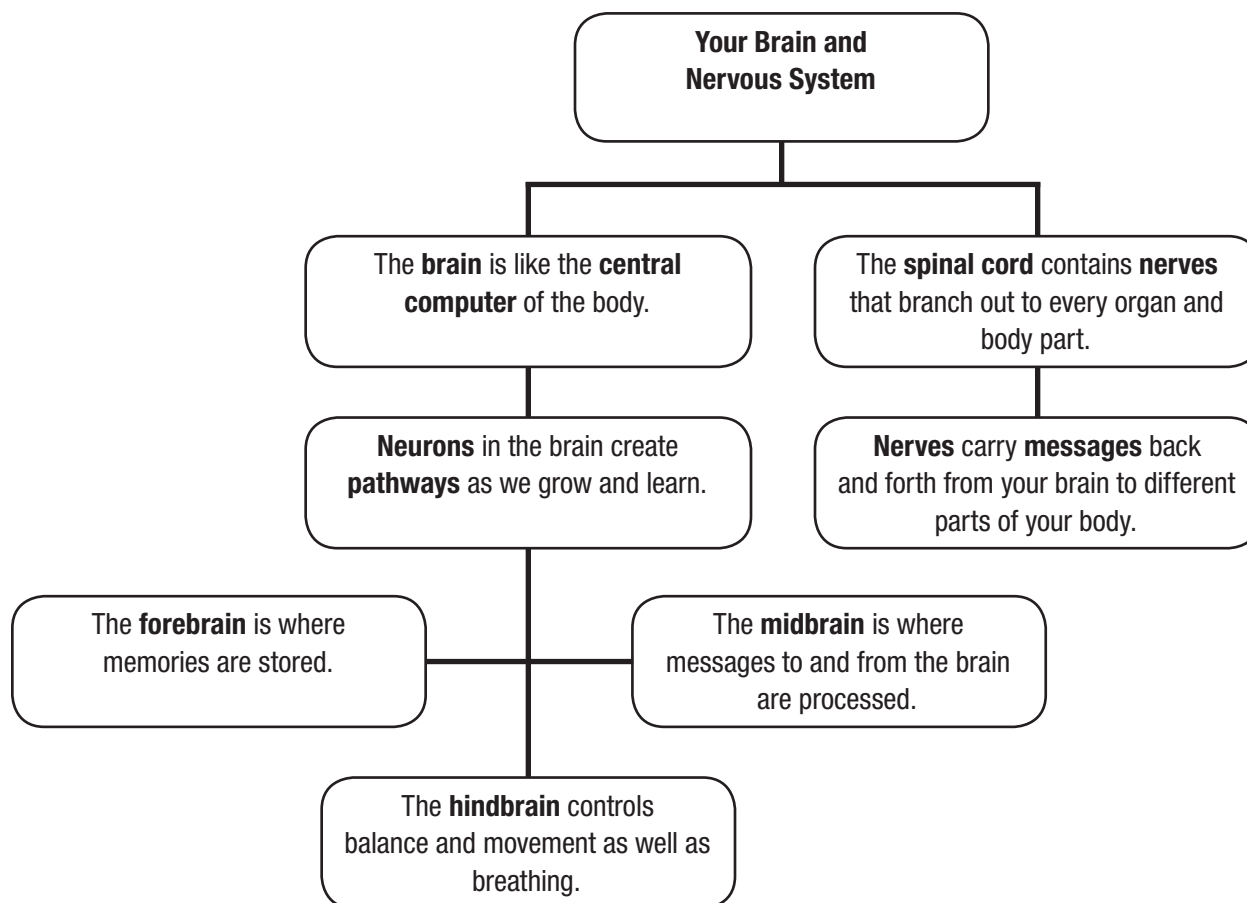
# Why should we reach out to others?

## “Your Brain and Nervous System”

### SUMMARY

This science article tells about the human brain and nervous system. The brain controls all the functions of the body. The nervous system sends messages between the body and the brain. The brain and nervous system control intelligence, learning, and memory. The three main parts of the brain are the forebrain, midbrain, and hindbrain. The forebrain contains all the information that makes up who we are, such as our intelligence, memory, and personality. The midbrain organizes the messages going to and from the brain. The hindbrain is responsible for our balance and movement. It also controls automatic functions like breathing and heart rate.

### Visual Summary



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### Use What You Know

List three important tasks your brain performs every day.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

### Text Structure

The introduction to a science article usually provides the main idea of the article. Underline the sentence that contains the main idea. Then rewrite it in your own words.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Reading Strategy: Use Visuals

Visuals such as drawings and diagrams are often used to illustrate information in a science text. Look at the illustration and label the brain. What protects the brain?



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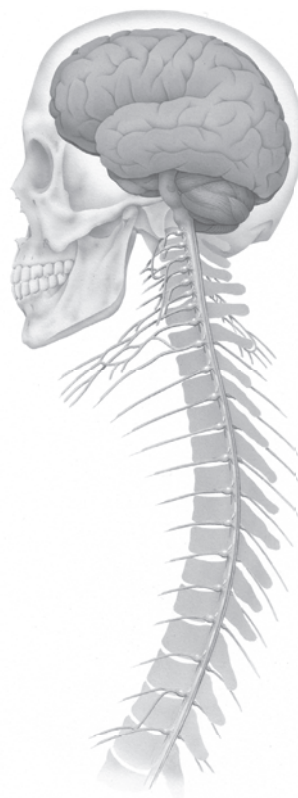
## Your Brain and Nervous System

When you're taking a big math test, you know that your brain is hard at work. But your brain is doing a lot more than just remembering **formulas**. Those sweaty palms you get as the test starts? That's your brain at work. The relief you feel when you know an answer's right? That's your brain too.

The brain may simply be the **bossiest** part of the body: It tells virtually every other part of your body what to do, all the time. It not only controls what you think and feel, how you learn and remember, and the way you move your body, but also things such as the beating of your heart and whether you feel sleepy or awake.

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**formulas**, sets of principles you use to solve problems  
**bossiest**, always telling someone what to do



## Why Are the Brain and Nervous System Important in Everyday Life?

You can think of the brain as a central computer that controls all the functions of your body. Then think of the nervous system as a network that relays messages back and forth from the brain to different parts of the body. The **nervous system** does this via the **spinal cord**. It runs from the brain down through the back and contains thread-like nerves that branch out to every organ and body part.

When a message comes into the brain from anywhere in the body, the brain tells the body how to react. For example, if you accidentally touch a hot stove, the nerves in your skin shoot a message of pain to your brain. The brain then sends a message back telling the muscles in your hand to pull away.

### Comprehension Check

The text compares the brain and nervous system to a computer and network. Underline these comparisons in the text. What do you think would happen if your mental “computer” shut off or was disconnected?



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### Text Structure

The headings in a science article usually identify the topic of a section. Sometimes they ask questions. Circle the heading on this page. Where will you find the answer to the heading’s question?



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### Comprehension Check

Your nervous system sends two kinds of messages when you touch a hot stove.



Underline the passage in the text that identifies these messages. What kind of messages do you think your nervous system sends when you take a bite of a delicious sandwich?

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### Comprehension Check

Underline the words that describe the importance of the folds and grooves that make up the brain's surface. If the brain's surface were smooth, how do you think the brain's size would be affected?




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### Text Structure

A science article often provides facts containing measurements such as weight or length. Underline the facts that contain measurements of weight or length on this page. How do these measurements help you better understand the brain and spinal cord?




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### Comprehension Check

Underline the passage in the text that tells how neurons send messages. What two words do you think *electrochemical* is related to?




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## How the Brain Works

Considering everything it does, the human brain is incredibly **compact**, weighing just 3 pounds [1.36 kg.]. Its many **fold**s and **grooves**, though, provide it with the additional surface area necessary for storing all of the body's important information.

The spinal cord, on the other hand, is a long **bundle** of nerve tissue about 18 inches [45 cm.] long and  $\frac{3}{4}$  inch [2 cm.] thick. It extends from the lower part of the brain down through the spine. Along the way, various nerves branch out to the entire body. These are called the **peripheral nervous system**.

## How the Nervous System Works

The basic functioning of the nervous system depends a lot on tiny cells called **neurons**. The brain has billions of them. All neurons relay information to each other through a complex electrochemical process, making connections that affect thinking, learning, movement, and behavior.

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**compact**, small but arranged so that everything fits neatly into the available space  
**fold**s and **grooves**, areas that rise and fall like waves  
**bundle**, small group

## Intelligence, Learning, and Memory

At birth, your nervous system contains all the neurons you will ever have, but many of them are not connected to each other. As you grow and learn, messages travel from one neuron to another over and over, creating connections, or pathways, in the brain. It's why riding a bike or driving a car seems to take so much concentration when you first learn but later on becomes **second nature**: The pathway is established.

In young children, the brain is highly adaptable. But as we age, the brain has to work harder to make new neural pathways, making it more difficult to master new tasks or change established behavior patterns. That's why many scientists believe it's important to keep challenging your brain to learn new things and make new connections.

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**second nature**, a well-learned skill that becomes easy to do

### Comprehension Check

Underline the text that explains why riding a bike or driving a car eventually becomes second nature. What's another example of a task that's hard at first but eventually becomes second nature?



### Text Structure

Science articles often show what words mean in terms of their opposites. Underline the sentence that describes the opposite of *adaptable*. Then, in your own words, write what the word *adaptable* means.



### Comprehension Check

Underline what the text says about how we can keep our brains flexible. Then list three activities you can do to make new mental connections.



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

### Comprehension Check

Underline what happens to information that's important enough to be remembered permanently. Why is long-term memory especially important?



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### Reading Strategy: Use Visuals

Definitions in a text can help you understand visuals on a page. In the diagram, circle the forebrain. Which information in the text lets you know which part of the brain this is?



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### Text Structure

A science article often defines key terms and provides examples. Underline the passage that defines the lobes of the brain and gives examples of them. List their four names here.



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Memory is another complex function of the brain. The things we've done, learned and seen are first processed in the cortex. Then, if we sense that this information is important enough to remember permanently, it's passed inward to other regions of the brain for long-term storage and retrieval. As these messages travel through the brain, they create pathways that serve as the basis of our memory.

The brain is made up of three main sections: the forebrain, the midbrain, and the hindbrain.

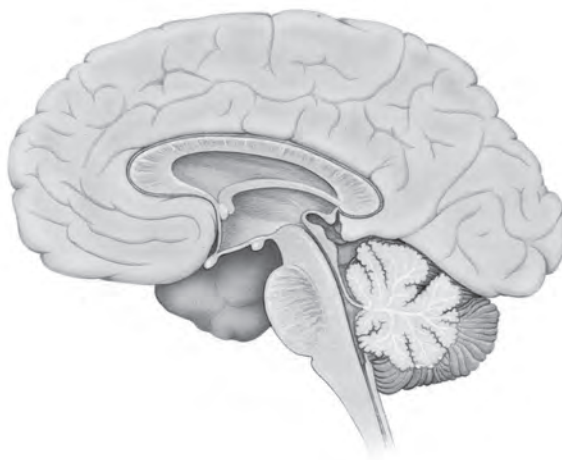
### The Forebrain

The forebrain is the largest and most complex part of the brain. It consists of the **cerebrum**. This is the area with all the folds and grooves typically seen in pictures of the brain.

The cerebrum contains the information that essentially makes us who we are: our intelligence, memory, personality, emotion, speech, and ability to feel and move. Specific areas of the cerebrum are in charge of processing these different types of information. These are called **lobes**, and there are four of them: the frontal, parietal, temporal, and occipital.

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permanently, forever  
retrieval, process of regaining, restoring, or remembering



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The cerebrum has right and left halves, called **hemispheres**. These are connected in the middle by a band of nerve fibers (the **corpus collosum**). These fibers enable the two sides to communicate.

Although these halves may look like mirror images of each other, many scientists believe they have different functions. The left side is considered the logical, analytical, **objective** side. The right side is thought to be more **intuitive**, creative, and **subjective**. So when you're doing a math problem you're using the left side. When you're listening to music, you're using the right side. Scientists think that some people are more "right-brained" or "left-brained" while others are more "whole-brained," meaning they use both halves of their brain to the same degree.

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**objective**, not influenced by your own feelings, beliefs, or ideas

**intuitive**, based on feelings rather than facts

**subjective**, influenced by personal opinion or feelings rather than facts

### Comprehension Check

Underline the function of the *corpus collosum*. What do you think would happen if the connection between the two hemispheres were lost?



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### Text Structure

A science article often provides examples to illustrate a fact or idea.



Circle the examples of activities that use either the left or the right brain. Then give two new examples each of "right-brained" and "left-brained" activities.

**Left:** \_\_\_\_\_

**Left:** \_\_\_\_\_

**Right:** \_\_\_\_\_

**Right:** \_\_\_\_\_

### Comprehension Check

Underline what the text says about people being "left-brained," "right-brained," or "whole-brained." Why do you think it might be an advantage to be "whole-brained"?



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### Comprehension Check

Underline the passage that indicates what happens to information coming into the brain.



What do you think happens to a message coming into your brain from your eyes when you see a friend?

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### Text Structure

A topic sentence contains the main idea of a paragraph. Circle the topic sentence of the second paragraph. Then in your own words, tell what the paragraph is about.



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### Comprehension Check

Underline the functions of the thalamus, hypothalamus, and pituitary gland.



Imagine that you see a big, barking dog running after you. Explain how each part of the forebrain would help you.

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The outer layer of the cerebrum is called the **cortex** (also known as “gray matter”). Information collected by the five senses comes into the brain from the spinal cord to the cortex. This information is then directed to other parts of the nervous system for further processing. For example, when you touch the hot stove, not only does a message go out to move your hand, but one also goes to another part of the brain to help you remember not to do that again.

In the inner part of the forebrain sit the **thalamus, hypothalamus, and pituitary gland**. The thalamus carries messages from the sensory organs like the eyes, ears, nose, and fingers to the cortex. The hypothalamus controls the pulse, thirst, appetite, sleep patterns, and other processes in our bodies that happen automatically. It also controls the pituitary gland. This gland makes the hormones that control our growth, metabolism, digestion, sexual maturity, and how we respond to stress.

## The Midbrain

The midbrain, located underneath the middle of the forebrain, acts as a master **coordinator** for all of the messages going in and out of the brain to the spinal cord.

## The Hindbrain

The hindbrain sits underneath the back end of the cerebrum. It consists of the cerebellum, pons, and medulla. The **cerebellum** is also called the “little brain” because it looks like a small version of the cerebrum. It is responsible for balance, movement, and **coordination**. The **pons** and the **medulla**, along with the midbrain, are often called the **brainstem**. The brainstem takes in, sends out, and coordinates all of the brain’s messages. It also controls many of the body’s automatic functions, like breathing, heart rate, blood pressure, swallowing, digestion, and blinking.

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**coordinator**, one who organizes activities  
**coordination**, the way the parts of your body work together to do something

### Choose one and complete:

1. In your own words, write a paragraph that describes what happens in your nervous system when you accidentally touch a hot surface.
2. Choose your favorite animal. Do research on how your favorite animal’s brain works. Then, create a table that shows differences and similarities between the human and your chosen animal’s brains, intelligence, and memories.
3. Make your own diagram of the brain. Label each part and tell what it does.

### Comprehension Check

Underline what the midbrain does. How would the forebrain be affected if there was a problem with the midbrain?



### Text Structure

A science textbook often has highlighted words. Their definitions are at the bottom of the page. Circle the second highlighted word on this page. Look at its definition. Reread the sentence in which it appears. Rewrite the sentence without using the word.



### Comprehension Check

Underline the automatic functions controlled by the brainstem. Why is it important that these functions occur without our having to think about them?



## READING WRAP-UP

### Retell It!

Suppose a friend wonders how memories are made. In your own words, describe how your brain and nervous system receive sensory data and turn it into memories.

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### Reader's Response

Many people receive brain or spinal cord injuries each year as a result of auto accidents. How can drivers and passengers possibly avoid brain or spinal injuries in an accident?

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### Think About the Skill

How did focusing on the visuals help you better understand the article?

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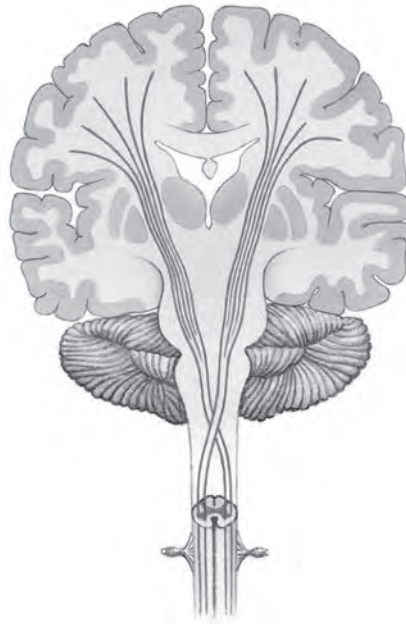
## EDIT FOR MEANING

### Read

You have read "Your Brain and Nervous System." Now read one paragraph from it again.

#### **Intelligence, Learning, and Memory**

At birth, your nervous system contains all the neurons you will ever have, but many of them are not connected to each other. As you grow and learn, messages travel from one neuron to another over and over, creating connections, or pathways, in the brain. It's why riding a bike or driving a car seems to take so much concentration when you first learn but later on becomes second nature: The pathway is established.



## Fix the Error

Each paragraph below contains the same information as the paragraph you just read. However, each paragraph contains one error. First, find the error. Then fix it by editing the sentence so that the information is correct.

1. Find and fix the error.

### **Intelligence, Learning, and Memory**

When you are born, your nervous system contains all the neurons you will ever have, but there are no connections between many of them. As you grow and learn, new neurons are formed, which create connections, or pathways, in the brain. That's why you really have to concentrate when you first learn new tasks like riding a bike or driving a car. Later, these tasks are much easier to accomplish, because a pathway has been formed.

2. Find and fix the error.

### **Intelligence, Learning, and Memory**

At birth, your nervous system does not contain very many neurons, and many of them are not connected to each other. As you grow up and learn new things, messages repeatedly travel from neuron to neuron to make new paths in the brain. As you know, learning to ride a bike or drive a car are not easy tasks when you first start. You have to really pay attention to accomplish these tasks. However, later you find out that it's easy to do these things. That's because connections, or pathways, have been made between certain neurons.

## FOCUS ON DETAILS

### Word Search Puzzle

To complete this word search puzzle, you'll need to remember or search for details from the reading. Look at the clues and circle the answers in the puzzle below. Check off each clue after you've found the answer. Write the word next to its clue. The first answer has been done for you.

1.  Occurring regularly, without conscious control automatic
2.  The process of breaking down food for energy \_\_\_\_\_
3.  Opening and closing your eyes \_\_\_\_\_
4.  Forever, not temporary \_\_\_\_\_
5.  Most commanding or controlling \_\_\_\_\_
6.  Moves back and forth between two points \_\_\_\_\_
7.  Organs that flex and extend to move your limbs \_\_\_\_\_
8.  Thread-like bundles of cells that transmit sensory data \_\_\_\_\_
9.  Having the power to create or make things up \_\_\_\_\_
10.  Character traits that define a person \_\_\_\_\_

M	R	B	A	N	Q	O	Q	M	T	C	P	G	M	A
P	E	L	O	F	E	S	B	N	S	R	V	E	G	U
X	A	T	I	S	E	R	E	R	G	E	N	Q	K	T
F	H	P	A	L	S	N	V	D	Q	A	M	Z	L	O
O	K	E	C	B	A	I	J	E	R	T	T	J	H	M
Q	B	S	I	M	O	Z	E	X	S	I	I	H	Y	A
X	U	D	R	Z	Y	L	A	S	Q	V	C	W	J	T
M	Z	E	X	K	X	L	I	R	T	E	Z	V	X	I
X	P	R	E	L	A	Y	S	S	R	W	V	I	D	C
B	L	I	N	K	I	N	G	L	M	I	Q	D	B	B
X	F	J	K	C	I	K	U	Y	A	U	J	A	L	T
P	E	R	S	O	N	A	L	I	T	Y	Y	A	X	B
L	X	J	K	H	E	N	K	F	X	J	G	V	Y	S
W	H	R	G	L	F	E	C	Z	P	H	K	H	E	L
L	Y	D	A	R	W	V	T	G	X	V	S	S	R	I

## READ FOR FLUENCY

1. Silently read the text below. Make sure you understand the point that each sentence is making.
2. Underline the word or words in each sentence that are most important. When you read, you should say these underlined words with expression.
3. Look again at the punctuation in the paragraphs. Remember that when a sentence ends in a period, you should read the words as a statement and take a breath before beginning a new sentence. When you see a comma, you should pause briefly. When you see an exclamation mark, you should sound excited. When you see a question mark, you should read as though you are asking a question.
4. Now read the paragraphs below out loud. Pay attention to the important words and punctuation as you read.
5. Write down any words that slowed you down. Practice saying these words out loud.
6. Read the text below out loud two more times. You may want to ask a friend or family member to listen to you and tell you their reactions to your reading.

### **Intelligence, Learning, and Memory**

At birth, your nervous system contains all the neurons you will ever have, but many of them are not connected to each other. As you grow and learn, messages travel from one neuron to another over and over, creating connections, or pathways, in the brain. It's why riding a bike or driving a car seems to take so much concentration when you first learn but later on becomes second nature: The pathway is established.

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