



Make Sun S'mores!

Harness the energy of the Sun to make the best snack ever invented.

A solar oven is a box that traps some of the Sun's energy to make the air inside the box hotter than the air outside the box. In other words, the solar

You will need:

- Cardboard box with attached lid. Lid should have flaps so that the box can be closed tightly. Box should be at least 3 inches deep and big enough to set a pie tin inside.
- Aluminum foil
- Clear plastic wrap
- Glue stick
- Tape (transparent tape, duct tape, masking tape, or whatever you have)
- Stick (about 1 foot long) to prop open reflector flap. (Use a skewer, knitting needle, ruler, or whatever you have.)
- Ruler or straight-edge
- Box cutter or Xacto knife (with adult help, please)

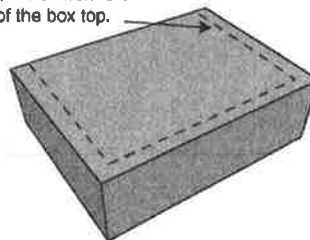
How to make solar oven:

CAUTION:

Have an adult cut the box with the box cutter or blade.

1. Using the straight edge as a guide, cut a three-sided flap out of the top of the box, leaving at least a 1-inch border around the three sides.
2. Cover the bottom (inside) of the flap with aluminum foil, spreading a coat of glue from the glue stick onto the cardboard first and

Cut here, 1 inch from the edge of the box top.



3. Line the inside of the box with aluminum foil, again gluing it down and making it as smooth as possible.

For more information and to find this activity online go to NASA's Climate Kids website: <http://climatekids.nasa.gov/smares>.
Find more fun activities at <http://climatekids.nasa.gov/make>.



4. Tape two layers of plastic wrap across the opening you cut in the lid—one layer on the top and one layer on the bottom side of the lid.
5. Test the stick you will use to prop the lid up. You may have to use tape or figure another way to make the stick stay put.



Make sure the foil inside the flap is very smooth, to make it like a mirror.

Put the oven to work!

Set the oven in the direct Sun, with the flap propped to reflect the light into the box. You will probably have to tape the prop in place. Preheat the oven for at least 30 minutes.



Two layers of plastic wrap over the opening will help keep heat in, while still letting all the light shine through.

To make S'mores, you will need:

- Graham crackers
 - Large marshmallows
 - Plain chocolate bars (thin)
 - Aluminum pie pan
 - Napkins!
1. Break graham crackers in half to make squares. Place four squares in the pie pan. Place a
 2. Place the pan in the preheated solar oven.
 3. Close the oven lid (the part with the plastic wrap on it) tightly, and prop up the flap to reflect the sunlight into the box.
 4. Depending on how hot the day is, and how directly the sunlight shines on the oven, the marshmallows will take 30 to 60 minutes to get squishy when you poke them.
 5. Then, open the oven lid and place a piece of chocolate (about half the size of the graham cracker square) on top of each marshmallow. Place another graham cracker square on top of the chocolate and press down gently to squash the marshmallow.
 6. Close the lid of the solar oven and let the Sun heat it up for a few minutes more, just to melt the chocolate a bit.
 7. Enjoy!

IMPORTANT!

The marshmallow goes UNDER the chocolate.

CLUE into CLIMATE



KQED
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Science
ready to EXPLORE

Lesson 4e: Plug-In Hybrids: The Latest in Electric/Hybrid Car Technology

SUBJECTS

Earth Science

Physical Science

OVERVIEW

Cars that run on electricity produce about one-half the greenhouse gas emissions of conventional gasoline vehicles. In this lesson, students will learn how plug-in electric hybrid technology works and compare plug-in hybrids with conventional vehicles and standard hybrids. Students should have a general understanding of the effects of automobile emissions on the environment before beginning the lesson.

GRADE LEVELS

4-8

CA SCIENCE STANDARDS

Grade 4: Physical Sciences. 1. Electricity and magnetism are related effects that have many useful applications in everyday life. (g)

Grade 6: Earth Sciences. 6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. (a)

ESSENTIAL PRINCIPLES OF CLIMATE LITERACY

Guiding Principle for Informed Climate Decision: Humans can take actions to reduce climate change and its impacts. (D, E, G)

ESSENTIAL QUESTIONS

1. How are hybrid vehicles different from conventional gasoline vehicles? (*Hybrid electric vehicles [HEVs] combine an internal combustion engine powered by gasoline with an electric propulsion system. In a standard gasoline-powered vehicle, heat energy is lost every time the driver hits the brakes. In an HEV, this energy is instead converted into electric energy that can be stored in a battery. In the course of driving, an HEV uses battery power for at least part of the journey, reducing the need for gasoline.*)
2. How might an increase in the use of hybrid and plug-in hybrid vehicles help address climate change? (*It could lead to a reduction in greenhouse gas emissions and help to slow global warming.*)

MEDIA RESOURCE

QUEST video: "Plug-in Hybrids"

Video length: 6 minutes, 20 seconds

Link: <http://www.kqed.org/education/educators/clue-into-climate/renewable-energy.jsp>

Through watching this video, students will learn:

- About the history of plug-in hybrid vehicles and how plug-in electric hybrids work
- The differences between conventional gasoline engines, standard hybrid technology, and plug-in hybrid vehicles
- How the use of plug-in hybrid technology could help mitigate climate change

VOCABULARY**charge**

a specific quantity of electricity

emissions

substances discharged into the air

hybrid vehicle

a vehicle that uses two or more kinds of power, such as an automobile that runs on the combination of an internal combustion engine and an electric motor powered by batteries

internal**combustion engine**

a conventional, diesel- or gasoline-powered heat engine

kinetic energy

the energy of motion

plug-in hybrid

an electric hybrid vehicle with a large battery bank that can be recharged by plugging into regular household current

ACTIVITY 1: PLUG-IN HYBRID CARS

Time: 30 minutes

Materials:

- Computer with Internet access
- Projector and speakers
- Pencils and paper

Procedure:

1. Discuss conventional and hybrid vehicles as a class. How do conventional, gasoline-powered vehicles impact the environment? What role do they play in the production of greenhouse gases? How are hybrid vehicles different from conventional vehicles? Are they a good solution to the environmental issues created by conventional vehicles?
2. Before watching the video "Plug-In Hybrids," have students divide a piece of paper into three sections, labeling them Gasoline-Powered, Standard Hybrid, and Plug-in Hybrid. As they watch the video, instruct them to take notes on how each of these different technologies works, the benefits and drawbacks of each, and any facts they find interesting about the three technologies. Watch the video a second time if necessary.
3. Discuss the three technologies. How do they differ from one another? Which one has the best fuel efficiency? What are the downfalls or limitations of each technology? What are the benefits? Working in partners, have students create a comparison chart for conventional, standard hybrid, and plug-in hybrid vehicles.

ACTIVITY 2: DESIGNING CARS OF THE FUTURE

Time: 60+ minutes

Materials:

- Construction paper
- Markers
- Writing paper and pencils
- Various recycled materials
- Computers with access to the Internet (optional)

Procedure:

1. Discuss the plug-in technology from "Plug-In Hybrids." What do you think is currently preventing car manufacturers from mass-producing plug-in hybrids? Do you think we'll be seeing numerous plug-in hybrids on our roads in the near future? Will they be very different from the cars we drive now?
2. In groups of three or four, have students design their vision of an eco-friendly car for the future. If time permits, allow students to do research on various car designs, then discuss their findings as a class. Students should work together to create a poster with a visual of their vehicle and a written paragraph that includes the following information:
 - What their vehicle looks like
 - How it differs from a conventional car
 - What makes it better for the environment than a conventional car
 - Why the public should buy their car over any other
3. Variation: Students can build their car in 3-D using recycled materials.
4. Student groups present their finished car designs to the rest of the class.

WHAT CAN WE DO?

Use alternative means of transportation and encourage friends and family members to do the same! Walk, ride your bicycle, take public transportation, or carpool whenever you can to help reduce automobile emissions and cut down on greenhouse gas emissions.

ABOUT THE AUTHOR

Tamar Burris is a curriculum developer and former elementary school teacher. She is also a contributing writer to *Kidsville News* and other child and family publications.

KQED Education Network engages with community and educational organizations to broaden and deepen the impact of KQED media to effect positive change.
www.kqed.org/education

SUPPORT

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STEM LITERACY

Discussion Questions/Activities

- According to information supplied in "Plug-In Hybrids," with fuel extraction data factored in, electric cars produce only half the greenhouse gases of gasoline vehicles. Research this question: Would widespread adoption of plug-in hybrids reduce greenhouse gas emissions? If not, why not? If so, why and by how much?
- Research more data on vehicles and climate change. What statistics can you find? Which groups or individuals collected the data? What makes these groups or individuals experts on the subject?
- Think about any differing statistics or opinions you found when researching your data. How do you choose which ones to believe? Write a short paragraph outlining some of the things one should look for in climate change data.

ASSESSMENT IDEAS

- Students write a science journal entry (or letter to the teacher) about what they learned.
- Students write a one-sentence summary of the main ideas in plug-in hybrid technology.

ADDITIONAL RESOURCES

A Comprehensive Guide to Plug-in Hybrids, HybridCARS

<http://www.hybridcars.com/plug-in-hybrid-cars>

An illustrated guide to plug-in hybrid cars and technology, this website includes interactive graphics showing the difference between standard hybrids and plug-in hybrids as well as a list of plug-in hybrids scheduled for production and their statistics.

All About Plug-in Hybrids (PHEVs), The California Cars Initiative

<http://www.calcars.org/vehicles.html>

This Web page offers in-depth information about plug-in hybrid technology, including what plug-in hybrids are, why they are considered a cleaner and cheaper alternative to conventional vehicles, and where prototypes of plug-in hybrids already exist.

How Hybrids Work, U.S. Department of Energy

<http://www.fueleconomy.gov/Feg/hybridtech.shtml>

Use Flash animation (or HTML) to examine the technologies used in hybrid vehicles.

Lesson Plan: Hybrid Cars, PBS NewsHour (grades 6–8)

http://www.pbs.org/newshour/extra/teachers/lessonplans/science/hybrid_cars.html

In this lesson, students examine the advantages and disadvantages of hybrid vehicles.

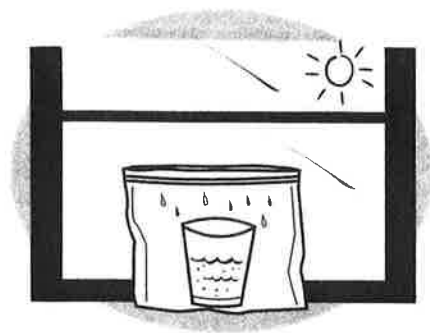
"Waiting for the Electric Car," QUEST

<http://www.kqed.org/quest/television/waiting-for-the-electric-car>

QUEST investigates battery technology for all-electric vehicles.

Hold the Salt

How can the sun be used to purify water?



- ① Add 2 or 3 good shakes of salt to the water in the small cup and stir it until the salt dissolves completely. Look at the salty water in the cup. How does it look compared to freshwater? Dip a finger into the cup of water and touch it to the tip of your tongue. How does the water in the cup taste? Record your observations:

You'll Need

- zipper-style sandwich bag
- 3-oz cup of water (plastic bathroom cups work best)
- small stirring stick or coffee stirrer
- saltshaker
- a sunny spot (a windowsill works fine)

- ② Without spilling any water, carefully place the cup inside the sandwich bag and zip the bag closed. Place the sandwich bag with the cup in a sunny spot for at least 15 minutes. Predict: What do you think will happen to the water in the cup when it sits in the sun? Write your prediction here:

- ③ After 15 minutes have passed, observe the plastic bag. Do you see any changes? What do you see? What do you think may have caused it? Write your ideas below:

- ④ Carefully open the sandwich bag and remove the cup without spilling any water. Take your finger and rub it on the inside of the bag. Touch your finger to the tip of your tongue. How does the water in the bag taste compared to the water in the cup?

- ⑤ Based on your experiment, explain how the sun's energy worked to purify the water. How might a device like this be used to make ocean water drinkable?

Using this Activity Guide

THE GREENS is a Web site from WGBH. It's for kids who want to help protect our planet. It features two characters, Izz and Dex, who are upbeat and optimistic about making their world a greener place. Through Izz and Dex's animated adventures, their blog, games, quizzes (and this very activity guide!), **THE GREENS** encourages kids to explore green living and sustainability and to take action wherever they can, making informed choices and meaningful changes.

ACTIVITIES

This guide, designed for afterschool programs, offers six activities for kids, ages 9 to 12.

- **"Investigate!"** activities deepen kids' understanding of topics like recycling and global warming.
- **"Take Action!"** activities encourage kids to launch environmental campaigns, like reducing junk mail and getting drivers to stop idling their cars.

Each "Investigate!" activity is paired with a "Take Action!" activity: kids learn about a problem in one session; in the next, they engage in a hands-on activity that can help solve it. They'll have fun AND come away with a hopeful and positive sense that their efforts to go green really can make a difference.

SCHEDULING

Four of the six activities can be conducted over four one-hour sessions; the last two can be done together, in a single one-hour session. Ideally, you'd want to do the activities in the order they appear—each builds on knowledge kids gained in an earlier activity. But any of these activities can be done independently of one another.



LEADER NOTES

These notes offer suggestions to help you facilitate the activities. They mention any advance preparation needed and suggest ways to introduce and lead the activities. They conclude with a list of three or four key points you'll want kids to come away with at the end of your session. The main emphasis of the leader notes is the discussions you'll be having with the kids. These are built around open-ended, exploratory questions. The more you ask kids to express their opinions and ideas, the more engaged they'll be. They'll discover they've got plenty of good ideas, can tackle tough problems, and that their actions make a real contribution to the future of the Earth.

HANDOUTS for Kids

Make double-sided handouts for each kid, or have them share handouts to save paper. For each activity, there's an:

- Introduction that provides kids background and context for the activity.
- Activity sheet that lists materials, gives instructions, and suggests questions to explore.

Be sure to get familiar with the handouts. While the Leader Notes offer tips on facilitating activities, the handouts contain the step-by-step instructions and the background information you'll need for your discussions with the kids.



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Cutting Down on Trash

Kids investigate the garbage that ends up in landfills, and then take action to cut down on trash through a "Bring Your Own Bag" campaign

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- 5 Investigate! Make a Garbage Dump Pizza
- 6 Don't Just Use Once: Re-Use!
- 7 Take Action! "Bring Your Own Bag" Campaign



Recycle and Reduce

Kids investigate recycling by making their own recycled paper, and then take action to reduce wasted paper through a campaign to reduce junk mail

- 8 Leader Notes
- 10 Remarkable Recycling!
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LEADER NOTES

Cutting Down On Trash

With these two activities, kids investigate landfills and the garbage that ends up in them; then they take action by making reusable grocery bags to reduce what goes into landfills.

INVESTIGATE!

Make a Garbage Dump Pizza

Kids create a pie chart pizza topped with trash that reveals the different types of garbage we throw away. In the process, they're likely to discover that lots of things tossed in landfills could have been recycled or reused instead.

PREPARE AHEAD

1. **Read through** Trash Talk (p. 4) and the Make a Garbage Dump Pizza activity sheet (p. 5). Make a double-sided handout of these pages for each kid. Or, to save paper, have kids share.
2. **Collect trash for this activity—the more the better!**
This activity works best if you have lots of interesting trash to use. Start collecting materials at least one week in advance. You'll need trash from each of the nine categories listed on the activity sheet. If you see your group before the day of the activity, ask them to bring in trash from home.
 - Collect lots of small samples or cut items into "bite-size" pieces. Add color and texture with sandwich bags, pieces of cloth or ribbon, buttons, popsicle sticks, chopsticks, paper clips, tin foil, and old toy parts—as long as it's trash that's destined for the garbage bin. Bring in leaves, twigs, or dried grasses.
 - For messy, unsafe, or oversized items (like food scraps, glass, and cans), supply old magazines from your recycling bin so kids can cut out pictures instead of using the real thing.
3. **Cut out the pizza "dough" ahead of time.** Make cardboard circles at least 16" across. Use recycled cardboard or old cardboard boxes. Or, to save time, pick up pre-cut cardboard pizza or cake circles.

INTRODUCE THE ACTIVITY

1. Distribute the handout and go over **Trash Talk** with your group. Ask kids what it might be like to live near a landfill. Ask them how long they think it takes for things to break down in a landfill (see "Everlasting Trash"). What else could have been done with paper, glass, and plastic besides tossing it on a garbage heap?
2. Now have kids turn to the **Garbage Dump Pizza** activity. Explain that the pie chart shows the main categories of trash that end up in landfills. Have them identify the largest sources of trash on the pie chart. Is this the kind of trash they expected to find in a landfill?



LEAD THE ACTIVITY

1. Sort the trash. Put all the trash in one place, and have kids sort it into the categories listed on the activity sheet. Set up stations around the room, one for each type of trash.

2. Help kids create the pie chart. Most will be able to draw their own rough approximation of the pie chart on the cardboard circle, but younger kids may need your help.

3. Assist with the pie “crust.” Younger kids may need help twisting and attaching newspaper crust to the pizza. You may want to twist several lengths of newspaper crust in advance or have kids use pizza bases with the crusts already attached. Use tape, not glue, to attach the rolled crust.

TALK ABOUT IT

Display everyone’s pizzas and ask kids the questions at the end of the activity sheet. You’ll want to get these points across:

- We generate a huge amount of trash.
- Much of this trash could have been recycled or reused instead.
- Kids can have lots of ideas for cutting down on the trash that goes into landfills.



“Bring Your Own Bag” Campaign

Kids learn about reusing resources instead of tossing them into the garbage bin. They’ll decorate a reusable bag that their families can take to the supermarket.

PREPARE AHEAD

1. Read through Reuse (p. 6) and the “Bring Your Own Bag” activity sheet (p. 7). Make a double-sided handout of these pages for each kid.

2. Gather the materials listed on the activity sheet. Inexpensive blank canvas bags can be purchased at most craft stores.

INTRODUCE THE ACTIVITY

1. Distribute the handout and go over **Don’t Just Use Once: Re-Use!** with your group. Ask kids what kind of bags their families use at the supermarket—paper or plastic. Why do they prefer one or the other? Have they noticed whether their supermarket sells reusable bags? Have they seen anyone use them?



Make sure kids understand the idea of “reusing.” Most know that recycling is good for the environment, but they might not realize that reusing is another important way to help. Ask them what they think is better for the environment: recycling plastic and paper bags, or reusing bags?

2. Now have kids turn to the **“Bring Your Own Bag”** activity. Mention that before they start decorating, they’ll want to decide on the best environmental message or picture for their bag. Point out that what they feature on their bag may have a big influence on other people.

LEAD THE ACTIVITY

- Make sure kids sketch their designs on paper first, so they can try out various ideas.
- If this is your first time working with fabric paints, try a few test prints on a rag until you get a sense of how much paint to use. Warn kids that fabric paints are permanent, and have them work quickly so paint does not dry on the stamp.

TALK ABOUT IT

Line up the decorated bags and ask kids to talk about their designs. Discuss questions that appear on the activity sheet, getting these points across:

- Why “reusing” is an important way to protect the environment.
- What else can be reused besides bags (e.g., water bottles and lunch boxes).
- How kids can inspire others to go green through messages and images.
- Ways they might broaden their BYOB campaign so that it reaches a wider audience.

INTRO

Trash Talk



Taking Out the Garbage

What did you throw away today? A cereal box from breakfast, a tuna can from lunch, food scraps from dinner? It's hard to believe, but every day each of us throws away four pounds of trash! In a month, you produce more trash than you weigh!

Where DOES All That Trash Go?

From the wastebasket to the trash can, then out to the curb. Some may get recycled, but most goes onto a garbage truck and is carted off to a landfill.

Anatomy of a Landfill

A landfill is a dump designed to collect trash and keep it separated from the surrounding environment. A plastic liner keeps dirty liquids in the landfill and stops them from spreading to neighboring land and into streams or groundwater. Each day a layer of soil is spread over the landfill to cover the day's trash.

The Rotten Truth

It takes trash a LONG time to decay in a landfill because there's very little sunlight, air, or moisture to help materials break down. Non-biodegradable trash, like plastic bottles, glass jars, and metal, can stay around for decades or even centuries.

What a Heap of Garbage!

Some landfills are so big they look like mountains. Trucks drive right up onto the giant piles of trash to dump their loads. One of the largest in the world is called Fresh Kills Landfill. For more than 50 years, the trash from New York City was dumped there. The landfill is so huge, it can be seen from space. In places it is 225 feet high, taller than its neighbor, the Statue of Liberty!

Recycling Landfills

The good news is that lots of abandoned landfills, including Fresh Kills, are being turned into beautiful parks—it'll take decades, but someday you'll be able to mountain bike and canoe there!

Everlasting Trash



Trash takes this long to
break down in the environment!

| | |
|------------------------|-----------------|
| newspaper : | 6 weeks |
| apple core : | 2 months |
| plastic bag : | 10-20 years |
| aluminum can : | 80-200 years |
| glass bottle : | 1 million years |
| most plastic bottles : | never! |

Source: U.S. National Park Service, "Garbage In, Garbage Out" Audubon Magazine, Sept./Oct. 1999.

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ACTIVITY

Make a Garbage Dump Pizza

INVESTIGATE!

Find out more about landfills by making this trashy pizza. No plain cheese here—we'll have ours with everything!

MATERIALS

- 16" cardboard circle
- Newspaper for crust
- Magazines
- Pencil
- Ruler
- Scissors
- Glue
- Tape
- Trash toppings, several for each category of trash shown on the pie chart

Use the pie chart below as your guide. Whip up a pizza topped with all the trash you'd find in a landfill.

1. Collect and Sort the Trash

Divide your trash into nine piles, one for each "slice." For messy items like food scraps or heavy items like glass, use pictures from old magazines.

2. Make the Pizza

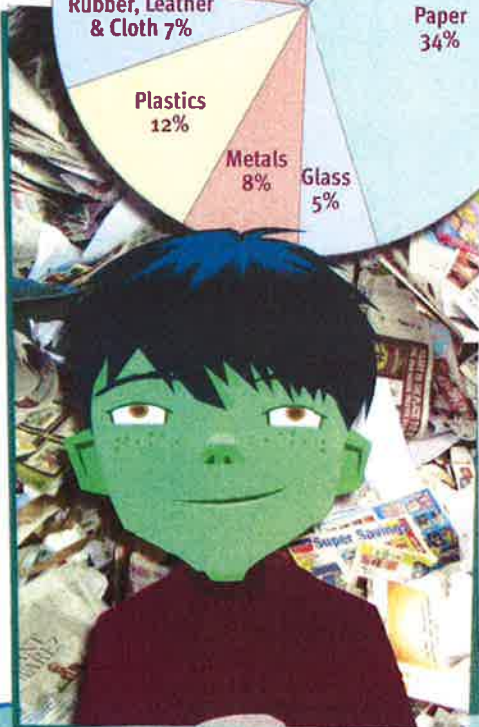
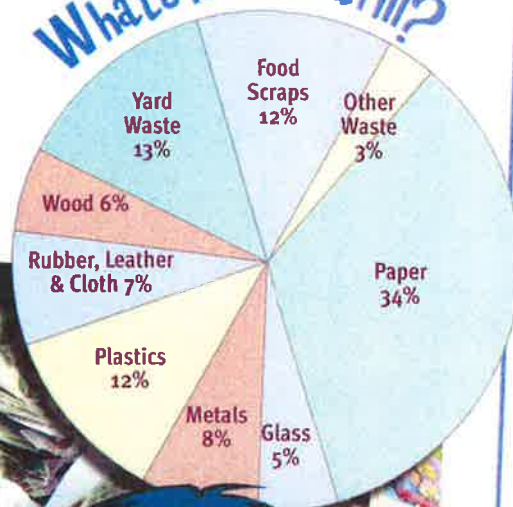
- Start with the large cardboard circle. This will be the base of your pizza pie chart.
- Use a pencil and ruler to draw the slices of pizza to match the slices on the pie chart.
- Then label the slices on your pie like this: paper 34%, glass 5%, etc. When you're finished you should have one slice of pizza for each type of trash.
- Next, visit each of the trash stations to get an assortment of "toppings." Glue or tape samples of each type of trash onto your pizza slices. Try to find at least one topping for each slice of pizza.
- Finish your pizza by adding a newspaper crust. Unfold a piece of newspaper. From the longest edge, roll it loosely into a small tube, and then twist tightly. Tape this piece of newspaper "crust" to the edge of your cardboard circle. Repeat with additional pieces of newspaper until you have enough "crust" to go around the whole pie.

3. Ready to Serve

Don't eat your pizza! Instead, show it to your friends and family so they understand what kind of trash we throw away every day.

Are there any garbage toppings on your pizza that could have been recycled or reused? Can you think of some ways your family or your school could reduce its garbage so it doesn't end up in a landfill? What if you were only allowed to use one trash can?

What's in a Landfill?



Source: Environmental Protection Agency, figures for 2006, published Nov 2007. Percentages are rounded.

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INTRO

Don't Just Use Once: Re-Use!

BAG-zillions of Them

How many plastic bags do you think are used worldwide in a year? A million? A billion? Not even close. The estimate is four to five TRILLION! If there are four people in your family, you probably use 1,500 of these bags every year. Do we REALLY need all these bags?

"Paper or Plastic?"

You've probably heard this question asked lots of times at the supermarket checkout counter: "Paper or plastic?" Which type of bag do you think is better for the environment?



Did you know that plastic bags are a huge litter problem?

The lightweight bags are easily carried away by the wind and often end up hanging from trees and floating in the ocean. Seabirds get tangled in them and endangered sea turtles can choke when they mistake them for one of their favorite foods—jellyfish.



You might think paper bags are friendlier than plastic for the environment, but it takes a lot of trees, water, and energy to make them. And unless they're recycled, paper bags take up lots of space in landfills.



The Answer Is . . . Neither!

Next time you're asked, "Paper or plastic?," say, "Neither!" Instead of using disposable bags that could end up in a landfill or harm wildlife, let's BYOB—Bring Your Own Bag! Lots of families are now taking reusable bags with them to stores.

Supermarkets Smarten Up

Supermarkets around the world are going green. Ireland decided to tax people every time they asked for a plastic bag. It worked like magic! Now almost nobody uses plastic shopping bags on the Emerald Isle. San Francisco became the first American city to actually OUTLAW plastic bags in grocery stores, and in Bangladesh, they're banned from the whole country!

How Green Is Your Grocery?

Is anything green going on at your supermarket? Lots of stores are now encouraging customers to BYOB and stop adding more waste to our world. In this activity, you're going to become part of the BYOB movement—you'll design and decorate your own reusable shopping bag.



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ACTIVITY

BYOB: "Bring Your Own Bag" Campaign

**Take
ACTION!**

Design and decorate a canvas bag that your family can reuse over and over again.

MATERIALS

- Plain canvas shopping bags
- Paper and pencil
- Fabric or acrylic paints
- Shallow paint containers
- Paint brushes
- Permanent fabric markers
- Cloth rags



1. Design and Decorate Your Bag

On a piece of paper, sketch out the design you want. Make a cool bag with a powerful message! Your bag will become a walking advertisement for protecting the environment. How will you inspire people to go green?

2. Get Your Family to BYOB

Now that you've created your "green" bag, give it to your family as a present. Talk to them about why reusable grocery bags are better than paper or plastic. Can you think of some ways you might get your family to take reusable bags whenever they go to the store?

3. Launch a Neighborhood BYOB Campaign!

Let's get others to reuse, too! Start a BYOB campaign and get your neighbors or relatives to carry reusable bags! What are some ways you might do this? Do you think making posters or giving away decorated bags would work? What about getting people to BYOB at other kinds of stores besides the supermarket?

What Else Can You BYOB?

Reusable bags are just one way to use less stuff. Can you think of others?



Here's another great idea!
Create your own GREENS bag,
using an inkjet printer,
iron-on transfer paper,
and a downloadable logo,
which you'll find at
pbskids.org/greens/go

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Recycle and Reduce

With these two activities, kids investigate recycling by making their own recycled paper; then they take action to reduce the amount of paper that needs recycling by starting a campaign to reduce junk mail.

INVESTIGATE!

Make Recycled Paper

Kids experience firsthand how recyclable materials can be turned into a new product.

PREPARE AHEAD

- 1. Read through** Remarkable Recycling! (p. 10) and the Make Recycled Paper activity (p. 11). Make a double-sided handout of these pages for each kid. Or, to save paper, have kids share.
- 2. Try it out.** It's a good idea to make a batch of pulp in advance so you'll know how it should look and feel.
- 3. Gather all materials** on the activity sheet before you start, and prepare them as indicated below.
 - **Flexible window screen.** Cut the screen into 3-inch squares, two for each kid. Fiberglass screen works well. Avoid aluminum screens (sharp edges) or plastic craft canvas.
 - **Used paper.** Newspaper will produce light gray paper. Add confetti, glitter, or pieces of colored paper to the pulp if you wish.
 - **Shallow plastic trays.** One "recipe" of pulp will fill a 6" x 2" x 9" food-storage container. A single tray can be shared by a group of 4–6 kids.
 - **Extra materials not listed on activity sheet.** Supply: a ladle or cup for scooping pulp from the blender; a large plastic bowl or bucket to collect leftover pulp.

INTRODUCE THE ACTIVITY

Distribute the handout and go over **Remarkable Recycling!** with your group. Ask kids how recycling works in their neighborhood—do they drop recycling off at the curb or do they take it to a recycling center? Have they noticed any products made out of recycled material? You might bring in a few examples to show them, like recycled boxes, egg cartons, or paper. Ask them what each of the "chasing arrows" on the recycling symbol means (see sidebar, "In the Loop").



Now have kids turn to the **Make Recycled Paper** activity. Ask them if they know what kind of fibers paper is made of. (It's wood!)

LEAD THE ACTIVITY

An adult should supervise pulp-making at the blender. Be safe! Never turn on a blender until the lid is firmly secured.

TALK ABOUT IT

When everyone is finished, have kids display their paper and ask them the questions at the end of the activity sheet. Your discussion should get these points across:

- The three "chasing arrows" in the recycling symbol stand for collecting recyclables, turning them into new products, and using recycled products.
- The recycling step they just participated in is the second arrow—turning recyclables into new products.
- Kids can learn to identify items that can be recycled as well as products made out of recycled materials.

CLEAN UP

This activity is wet! Reuse old dishtowels or rags for cleanup. DO NOT pour leftover pulp into sinks. The paper fibers may clog pipes and drains. Pulp can be poured onto compost piles or on the ground outside. When the pulp dries, dispose of the dry mash in the recycling bin.

Reduce Junk Mail



Kids design a campaign to cancel unwanted catalogs, and learn a way other than recycling to protect the environment—reducing the amount of waste in the first place.

PREPARE AHEAD

1. Read through *Too Much Stuff? Reduce!* (p. 12) and the *Reduce Junk Mail* activity (p. 13). Make a double-sided handout of these pages for each kid.

2. Gather a few catalogs of your own to cancel during your demonstration; try it out at home ahead of time.

3. A computer or phone is optional, but using them will make the activity much more hands-on. That way, kids can participate—or at least watch how it's done.

INTRODUCE THE ACTIVITY

1. Distribute the handout and go over *Too Much Stuff? Reduce!* with your group. Ask kids if they've noticed whether their families receive a lot of junk mail. What happens to all these advertisements, credit card offers, leaflets, and catalogs? Do kids think junk mail is a problem? If so, why? Ask them which they think is better for the environment: reducing the amount of junk mail their families receive, or recycling it.

2. Now have kids turn to the *Reduce Junk Mail* activity. Tell them you're going to show them how to reduce the number of catalogs their families get.

LEAD THE ACTIVITY

Walk them through the three ways of canceling catalogs listed on the activity sheet. Demonstrate on a computer, or, if multiple computers are available, have kids try it themselves.

1. Using a single Web site. Many Web sites will cancel multiple catalogs for you. The two listed on the activity sheet are nonprofit and have a reputation for effectiveness.

2. Using individual Web sites. Explain that it's sometimes tricky to navigate through company Web sites. Point out how easy some Web sites make it to SIGN UP for catalogs online but not necessarily to CANCEL them!

3. By phone. Using one with a speaker so kids can listen in would be ideal. If there's no phone, tell them what to expect: they'll most likely be routed through an automated phone tree.

Tips to Share with Kids

- If a family gets duplicate copies of a catalog, kids should compare the customer names and addresses. If one is spelled incorrectly, the computer mistakes it for an entirely different customer.
- Some catalog companies will offer to send their catalog less frequently, instead of canceling the subscription altogether. Some families may prefer this.
- Kids can encourage their families to use online catalogs. They are easy to use and sometimes offer Web-only specials.

TALK ABOUT IT

Discuss the questions in the last two sections of the activity sheet, getting these points across:

- Catalogs can be a tremendous waste.
- It's better to reduce the amount of catalogs than to simply recycle them.

Conclude the session by letting kids know that they've now done activities involving each of the three R's of environmental action: Reuse (the BYOB campaign), Recycle (making recycled paper), and Reduce (canceling catalogs).



INTRO

Remarkable Recycling!



Beyond the Recycling Bin

Many of us are pretty good at recycling—putting cans, plastic, glass, and paper in the recycling bin. But do you know what happens AFTER the recycling truck carts all that stuff away? It's transformed into brand-new products!

Turning Trash into Treasure

Some of the things made out of recycled trash are what you'd expect—soda cans become new soda cans, for instance. But who knew the crazy things you could do with recycled tuna fish cans! They can be melted down to make bicycle frames. And what about plastic milk jugs? They can be turned into a park bench or a picnic table!

Jackets Made from Water Bottles? You Must Be Kidding!

Nope, it's true! You might be wearing one right now. Water and soda bottles can be recycled into fleece for jackets and fiber filling for sleeping bags and ski jackets. It takes about 25 bottles to make a fleece jacket.

How Fast "Can" This Be Recycled?

Recycled aluminum soda cans can be back in action as new soda cans in just 60 days!

Giving Old Paper a New Lease on Life

Did you know that you use recycled paper all the time? Paper is made of wood fiber, and the fibers can be recycled many times. Old newspapers are used to make new newsprint and egg cartons. Cardboard boxes are made into new boxes. Writing paper is made into new white paper, tissue, and paper towels.

Let's Save Some Trees!

Do you remember what the biggest source of trash in landfills is? (Hint: it was mentioned in the Make a Garbage Dump Pizza activity.) If you said paper, you're right! Imagine if all this paper was recycled instead of being dumped! Recycling a ton of paper can save more than a dozen trees. In this activity, you're going to make your own recycled paper!

In the Loop

Each of the "chasing arrows" in the International Recycling Symbol represents a step in the recycling process.

1. Collecting recyclable material

3. Using recycled products



2. Turning old materials into new products



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ACTIVITY

Make Recycled Paper

INVESTIGATE! ...→

**You're going to create a new product out of recycled materials!
Make 100% recycled paper out of old, used paper.**

You'll be using some of the same techniques that paper companies use to recycle. You'll turn old scrap paper into pulp, and then back into paper.

MATERIALS

- Used paper
- Shallow plastic tray
- 2 cups of water
- Blender
- 2 measuring cups, one each for wet and dry ingredients
- 2 pieces of flexible fiberglass screen, cut in 3-inch squares
- Old towel, or 2 sheets of paper towel, folded in quarters
- Piece of sponge

1. Make the Paper Pulp

- Tear paper into small pieces, about the size of your thumbnail, and place them in your plastic tray. When you have two handfuls, take your tray to the blender.
- With an adult, place one cup of loosely packed paper pieces in the blender. Add two cups of water. Blend 30 seconds on low, then another 30 seconds on high. Pulp will be smooth and thin—about 20% paper and 80% water.
- Pour the pulp into your plastic tray and take it back to your work area.

2. Capture and Squeeze

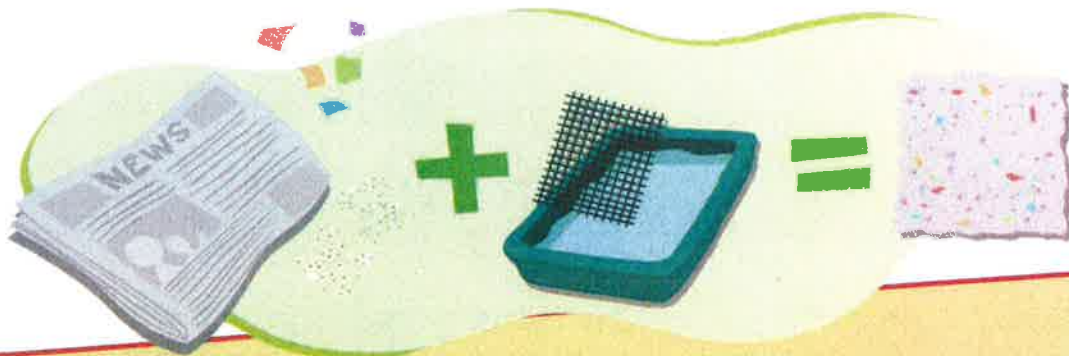
- Submerge a piece of window screen into the tray of pulp. Hold the edges and slowly lift the screen straight up through the pulp. This captures a thin layer of wet wood fibers on the surface of the screen. Hold it over the tray for a few seconds to let excess water drip off.
- Place a second piece of screen on TOP of the wet fibers. Squeeze the screens together over the tray until they stop dripping.
- Put your pulp "sandwich" onto a towel or paper towels. Push against the screens with a sponge to remove more water.

3. Peel and Dry

- Carefully lift the top screen. You'll see a layer of wet paper.
- Use your fingertips to loosen the paper along one edge, then peel it off the bottom screen. Work slowly so you don't tear your paper.
- Place the damp paper square onto a piece of dry scrap paper to dry.
- When cleaning up, DO NOT pour leftover paper pulp into a sink. It will clog pipes and drains.

You Just Made 100% Eco-Friendly Paper!

When your recycled paper is dry, you can use the squares to decorate a poster or a card. How is your paper different from professionally recycled paper? How is it the same? In what step of the recycling process did you just take part?



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INTRO

Too Much Stuff? Reduce!

What IS All This Junk?

Does your family complain about all the junk that arrives in the mail? Each grownup in this country gets more than 500 pieces of unwanted mail every year—stuff they don't need and never asked for.

Straight from the Mailbox into the Recycling Bin

Much of this junk mail comes in the form of glossy, colorful catalogs. While some of these are welcome, often this junk mail goes straight from the mailbox into the recycling bin, without even being looked at! Worse, there are a lot of people who don't even bother to recycle: 44% of junk mail ends up dumped into landfills—unopened.

What Can You Do About It? Reduce!

When it comes to unwanted junk mail, it's not enough to just RECYCLE. We need to REDUCE all this junk mail so you don't have to recycle it.

But How? Stop Catalogs from Coming!

How do you get rid of all this stuff? Stop it from coming in the first place! With your parents' permission, you can call or e-mail companies and tell them your family wants to cancel their subscription.

Take Me Off Your Mailing List

Catalog companies send out a lot more than a single catalog per year—it's more like 4, 5, or 6! So, if you get them to take you off their mailing list, you've actually saved your family from getting a whole bunch of catalogs.

As Seen on TV: Kids Cancel 4,000+ Catalogs!

Kids can really make a difference when it comes to reducing junk mail. Students from the Park School in Brookline, Mass., teamed up to cancel 4,175 catalogs in a single month. That's a pile of catalogs that would stand 31 feet tall and weigh 1,117

pounds! The kids figured out that within a year they will have saved 47 trees from being chopped down. And it made them famous—they ended up being interviewed on NBC's *Today Show*!

Now it's your turn! In this activity, you'll find out how to cancel your family's unwanted catalogs.

What a Waste!

- Number of U.S. catalogs mailed each year → 19 billion
- Tons of paper used → 3.6 million
- Number of trees used → 53 million

Source: Catalog Choice



ACTIVITY

Reduce Junk Mail

Take
ACTION!



Here's a great way to make a difference that goes beyond recycling. Reduce the amount of paper going into landfills and recycling bins by canceling the catalogs you and your family don't need.

MATERIALS

- A stack of unwanted catalogs
- A computer (optional)
- A phone

First, Get Your Family Inspired!

Before you get started, talk to your family. Ask them if they like all the catalogs they receive. Explain why junk mail is bad and how you have a plan to stop the growing mountain of trash in their mailbox. Decide together which catalogs to cancel and which to keep.

Ready, Set, CANCEL!

- 1. Cancel a heap of catalogs all at once!** With parental approval and a little guidance, you can cancel a dozen catalogs in less than an hour using a single site! Go to pbskids.org/greens/go to get links to sites that will do the canceling for you, like Catalog Choice and the Direct Marketing Association's Mail Preference Service. Catalog Choice is free, and the Direct Marketing Service charges \$1, so an adult would have to be willing to use a credit card.
- 2. Cancel even more!** You can also contact individual company Web sites.
- 3. Make some calls.** If you don't have a computer, or prefer the phone, call the toll-free number on the catalog and ask them to take you off their mailing list.

The Wait Is Worth It

Don't hold your breath—it sometimes takes up to 12 weeks before the catalogs stop coming. But keep a list of what you canceled so you can track your success. Catalog Choice keeps tabs for you and will let you know when some catalogs need an extra phone call before they'll stop delivering.

Report Back

Did your family think canceling catalogs was a good idea? What did you say to convince them to cancel catalogs? How many did you cancel? Did some keep coming anyway? How did it feel to take action and stop all this useless junk in its tracks?

Take It to the Next Level

Why not brainstorm ways you can spread the news to others about canceling catalogs? Could you e-mail friends or relatives? Do you think your school might want to get involved? Turn it into a campaign!



LEADER NOTES

Global Warming and Our Carbon Footprint

With these two activities, kids investigate global warming in a concrete way, through a soda-bottle demonstration of the greenhouse effect; then they take action to reduce carbon emissions through a no-idling campaign.

DO BOTH ACTIVITIES IN THE SAME SESSION. After you've set up the greenhouse effect activity, it will take about 30 minutes for you to see final results. This waiting period is a great time to begin the no-idling activity.

INVESTIGATE!

Global Meltdown

Kids learn about global warming using a soda bottle, ice-cube glaciers, and plastic-cup islands.

PREPARE AHEAD

1. Read through Global Warming (p. 16) and the Global Meltdown activity sheet (p.17). Make a double-sided handout of these pages for each kid.

2. Gather the materials on the activity sheet.

- You may need to supply a cooler for ice.
- Make sure you have a strong spotlight, and an extension cord, if necessary. (It will take about 30 minutes for the ice to melt.)

3. Test your spotlight at home to see how long it takes to heat the chambers and melt the ice.

INTRODUCE THE ACTIVITY

Distribute the handout and go over **Global Warming** with your group. Ask kids if they understand what the greenhouse effect is and how it can cause global warming. Now have kids turn to the **Global Meltdown** activity. Go over the steps and ask kids to make predictions about what will happen. In which bottle do they think the ice will melt faster, and why?

LEAD THE ACTIVITY

1. Have kids help set up—some kids to help with the spotlight and extension cord, some to prepare the cups, and some to add the rocks, water, and ice. This will take about 10 minutes. If you are short on time, set up everything but the ice in advance.

2. Observe. Have kids watch both containers and make observations every 15 minutes. Ask them if they notice any ice melting in either container. Which container seems warmer inside? Why do they think so? What might be causing this difference in temperature? **Make sure kids don't touch or look into the spotlight.**

3. What happens? Within the first 15 minutes, both bottles will get warm, but there may not be a dramatic difference in the melting. During the second 15 minutes, the covered bottle should start to heat up rapidly and the ice will begin to melt more quickly. After 30 minutes, most of the ice in the covered bottle should be gone and the water level should have risen visibly.



TALK ABOUT IT

Ask kids the questions at the end of the activity sheet. They should conclude that the ice melted faster in the covered bottle because it got hotter. The uncovered bottle allowed heat to escape and remained cooler, so its ice melted more slowly. The water level in the covered bottle is higher because the hotter temperature melted all the ice.

What does this demonstration say about the greenhouse effect? The plastic covering on one of the bottles acted like the greenhouse gases in our atmosphere do: it served as a barrier that would not let heat escape from the bottle. The trapped heat warmed the bottle and caused the ice to melt more rapidly than it did in the uncovered bottle.

Your discussion should get these points across:

- The greenhouse effect causes heat to be trapped in the atmosphere.
- It's called the greenhouse effect because it acts like an actual greenhouse: sunlight passes in through the glass and warms the greenhouse, but it cannot escape back out.
- Trapped heat from greenhouse gases leads to hotter temperatures on Earth. This is global warming.
- Global warming could have a number of consequences for our planet, including at least two that kids observed: melting glaciers and rising sea levels.
- There's a lot we can do to slow down global warming. Recycling, reusing, and reducing all cut down on greenhouse gases.

While you're waiting for the bottles to heat up, lead the no-idling activity that follows. You can revisit Global Meltdown every 15 minutes to observe its progress.



No-Idling Pledge

Kids begin by developing a modest strategy to get their parents to sign a No-Idling Pledge; then they brainstorm ways they can turn no-idling into a larger campaign.

PREPARE AHEAD

Read through Shrinking Our Carbon Footprint (p. 18) and the No-Idling Pledge activity (p. 19). Make a double-sided handout of these pages for each kid.



INTRODUCE THE ACTIVITY

1. Distribute the handouts and go over **Shrinking Our Carbon Footprint** with your group. Ask kids what the *carbon* in carbon footprint stands for, and see if they understand the term.

2. Now have kids turn to the **No-Idling Pledge** and discuss what they'd say to their family about why idling is bad for the environment. Do they think their parents will sign a No-Idling Pledge?

LEAD THE ACTIVITY

Have kids write up No-Idling Pledges for their parents. If there's time, they can also make posters with pictures and no-idling slogans.

TALK ABOUT IT

Have kids brainstorm ways they could expand the campaign beyond their family. If they want to do something at their school, like put up signs, they'd need to obtain permission from their principal. Your discussion should get these points across:

- Idling adds to our carbon footprint.
- There are effective ways kids can get people to stop idling.

Experiencing resistance. Kids may encounter adults who won't sign the pledge. School bus companies sometimes insist that their drivers keep buses idling to keep them warm for drivers and students in the winter. Sometimes they have concerns about keeping batteries charged while safety lights are on. Kids can work with school principals to encourage bus drivers to take the pledge.