SC.4.P.10.1 Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion. **SC.4.P.10.2** Investigate and describe that energy has the ability to cause motion or create change.

ESSENTIAL QUESTION

What Are Some Forms of Energy?

Engage Your Brain

Find the answer to the following question in this lesson and record it here.

How does this person use energy to ride the river's rapids?

_____

_____

_____

_____

ACTIVE READING

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

_____ _____

_____ _____

_____ _____

Main Idea and Details

In this lesson, you'll read about different kinds of energy. Active readers look for main ideas before they read to give their reading a purpose. Often, the headings in a lesson state the main ideas. Preview the headings in this lesson to give your reading a purpose.

What Is Energy?

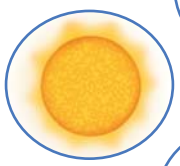
All the lights in your house need energy.
So do the refrigerator and washing machine.
Can you name three other things in your home or school that use energy?

ACTIVE READING As you read these two pages, find and underline a definition of *energy*. Then circle two sources of energy.

What do you and a car have in common? You both need energy. Gasoline is the car's source of energy. This car won't go anywhere if it runs out of gas.

▶ **Draw lines to match each item on the left with its source of energy.**



Name something that uses electricity as a source of energy.

_____

_____

Making an object move is a change. **Energy** is the ability to cause change in matter. So, everything that moves has energy.

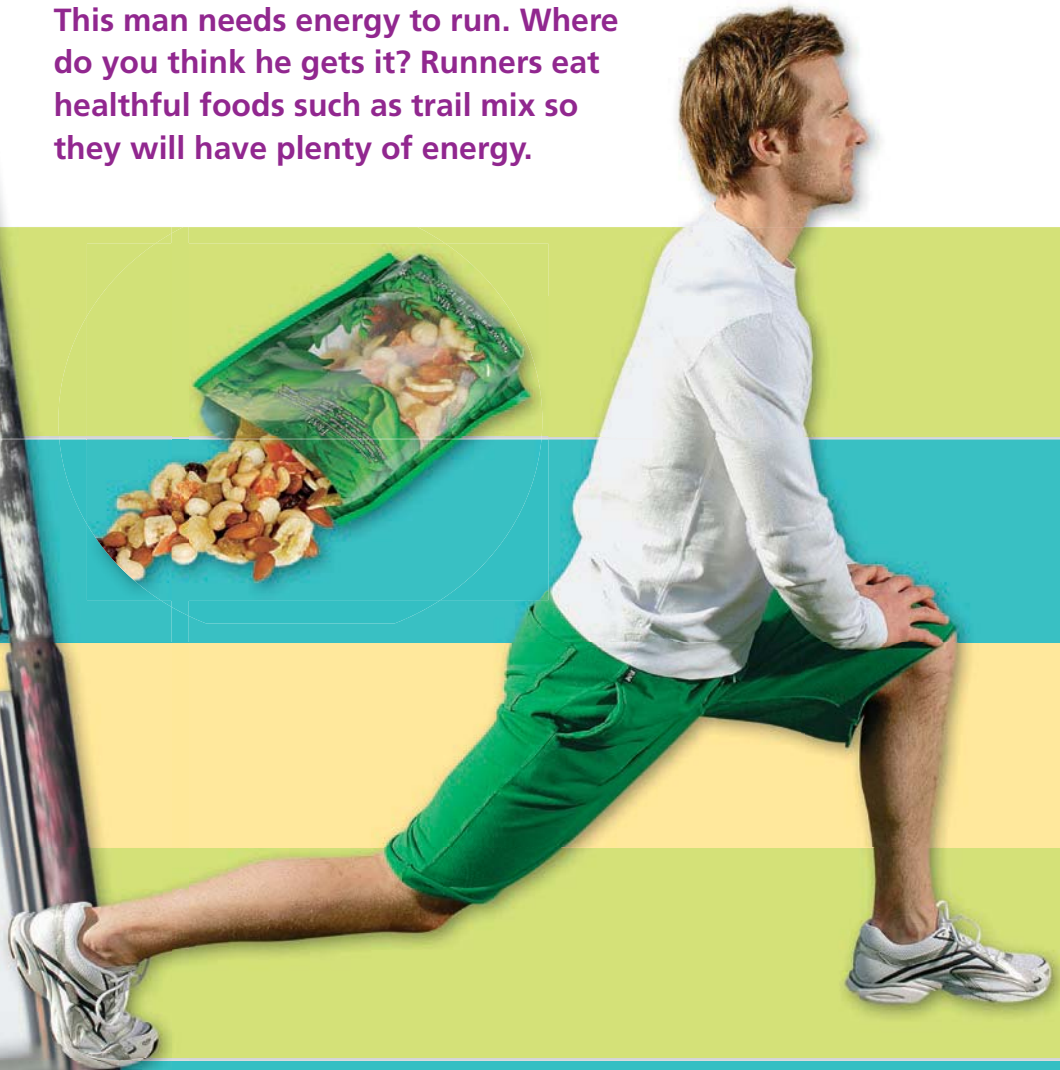
Where does energy come from? You can see some sources of energy on these two pages. What sources of energy have you used today?

Where does this toy get its energy?

_____

_____

This man needs energy to run. Where do you think he gets it? Runners eat healthful foods such as trail mix so they will have plenty of energy.



Get Moving!

Have you ever been on a roller coaster? When roller coaster cars climb a hill, they seem to stop at the top for just a moment. Then they speed down to the bottom. How does energy make this happen?

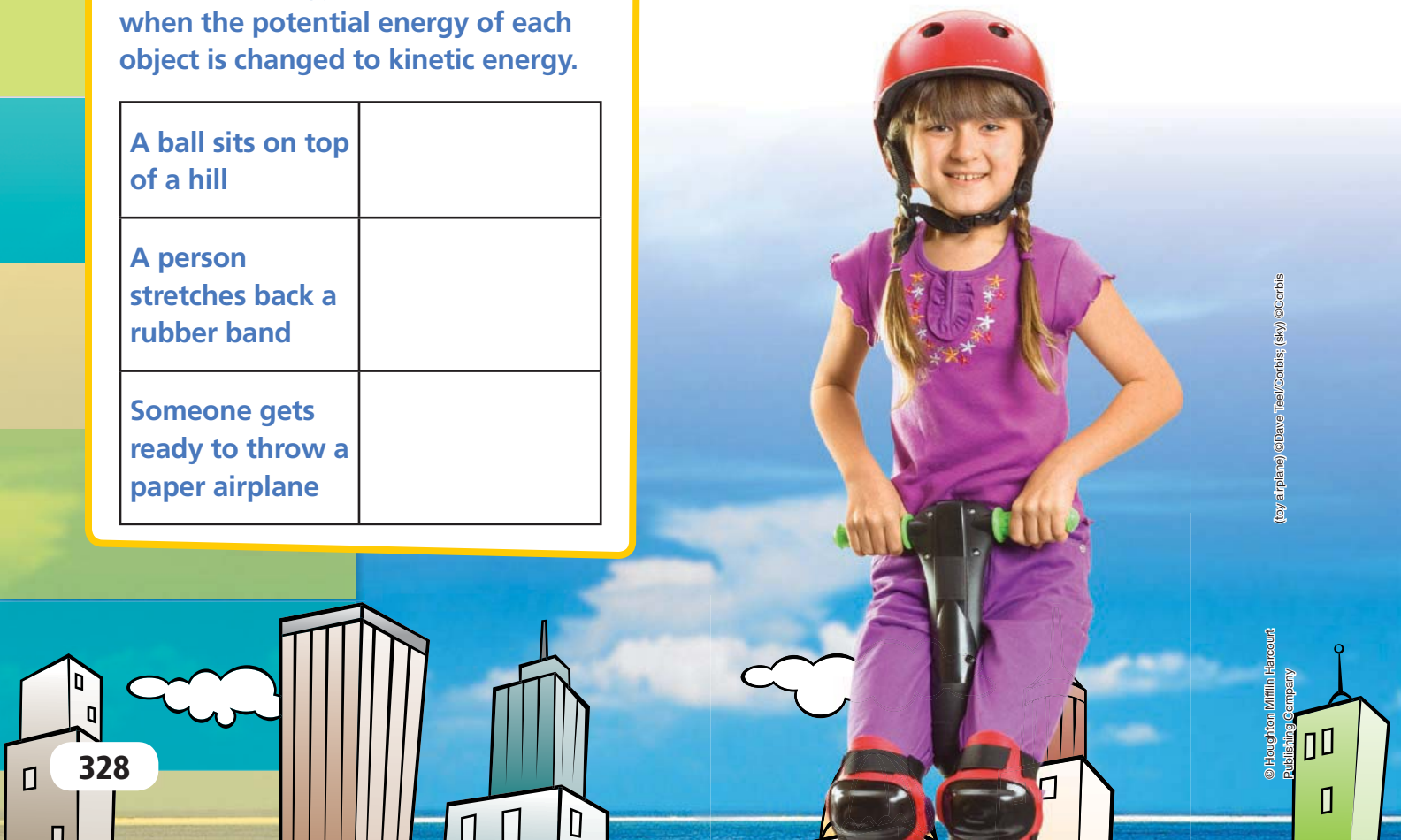
ACTIVE READING As you read these two pages, find and underline the definition of *mechanical energy*. Then draw circles around the two parts of mechanical energy.

Something in motion, such as the girl on the pogo stick, has kinetic energy. **Kinetic energy** is the energy of motion. Something at the top of a hill, such as a roller coaster car, has potential energy. **Potential energy** is the energy something has because of its position or condition.

Mechanical energy is the total potential energy and kinetic energy of an object.

▶ **Everything in the left column has potential energy. Tell what happens when the potential energy of each object is changed to kinetic energy.**

A ball sits on top of a hill	
A person stretches back a rubber band	
Someone gets ready to throw a paper airplane	



The girl pushes the pogo stick's spring down. The spring now has potential energy. When the spring spreads out, the pogo stick goes up and has kinetic energy.

As the roller coaster cars climb to the top of a hill, they gain potential energy. The higher the cars go, the more potential energy they have.

As the cars go down a hill, their potential energy decreases because it changes to kinetic energy. The roller coaster cars have more kinetic energy when they move faster. At each point along the ride, the mechanical energy of the cars is the sum of their potential and kinetic energies.

This roller coaster goes fast because of mechanical energy. That's good, because a slow roller coaster isn't much fun!

Flash and Boom!

You see lightning flash across the sky. Then you hear a boom that's so loud, it makes your heart pound. These are two forms of energy.

Light energy is produced and used in different ways. Light is a form of energy that can travel through space. Plants use light from the sun to make food. The same energy from the sun allows us to see. Another source of light energy is electricity. If we couldn't use electricity to produce light energy, it would be difficult to work or play in the evening.

Another form of energy is sound. Sound is made when something moves back and forth. This back-and-forth motion is called vibration. Sound can be described in different ways. For example, pitch describes how high or low a sound is. Loud sounds have more energy than quiet sounds. Can you think of an example of a loud, high-pitched sound?

DO THE MATH

Solve Real-World Problems

How far away was that lightning strike? As soon as you see a flash of lightning, count the seconds until you hear thunder. Then divide the number of seconds by 5. This gives you the approximate distance in miles.

35 seconds _____

20 seconds _____

40 seconds _____

Lightning can be hotter than the surface of the sun. It makes the air around it rapidly expand. This causes the boom of thunder.

(bkg) Thomas Allen/Digital Vision/Getty Images; (t, b) ©Westend61 GmbH/Alamy

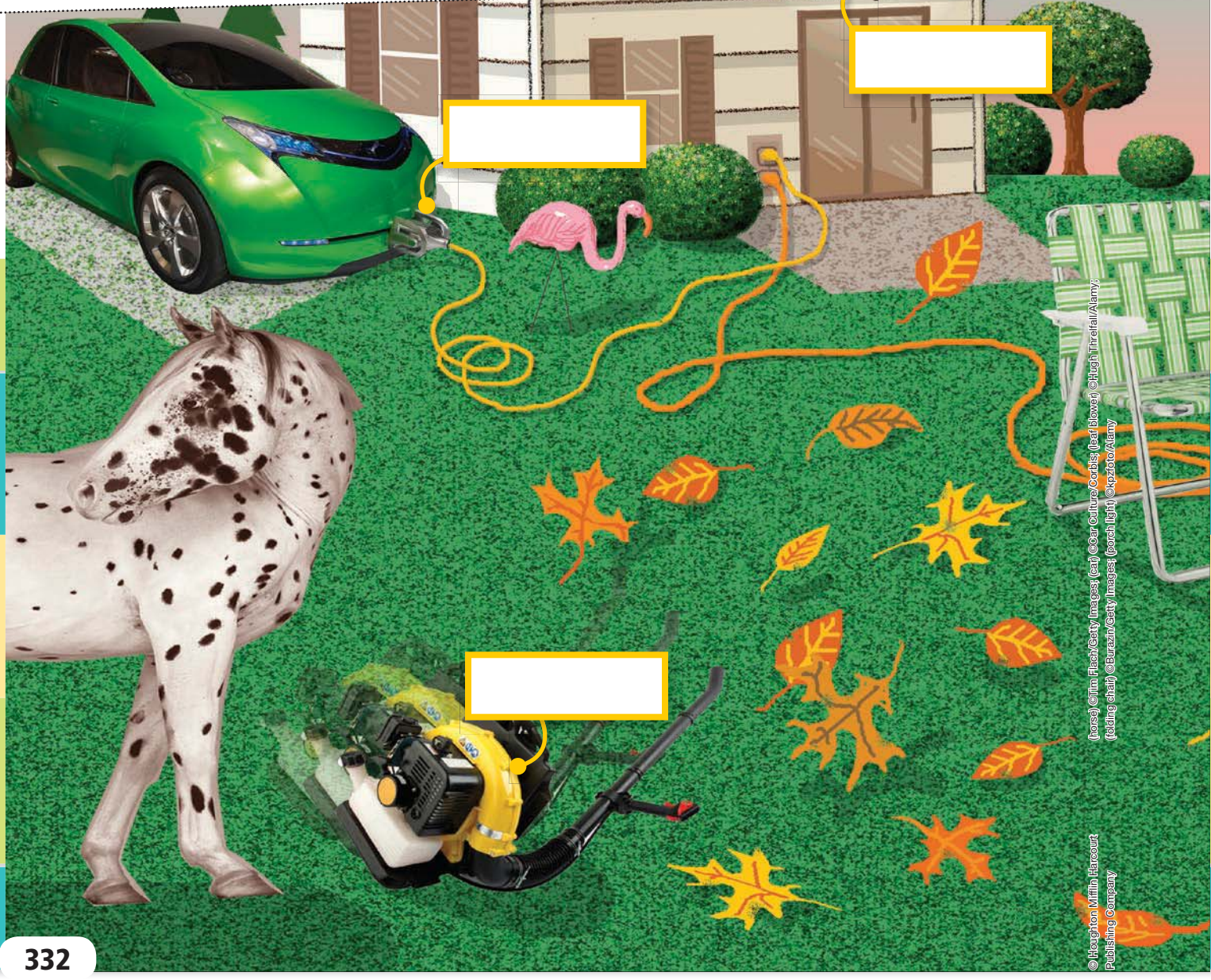
▶ Describe how each member of this musical group produces sound. Write your answers in the spaces provided.

(bkgd) ©James Key/Stock Connection/Alamy

Energy Is All Around Us

Do you think you could do without energy for one day? Without chemical energy, you couldn't mow the lawn. Without electrical energy, you couldn't power your MP3 player.

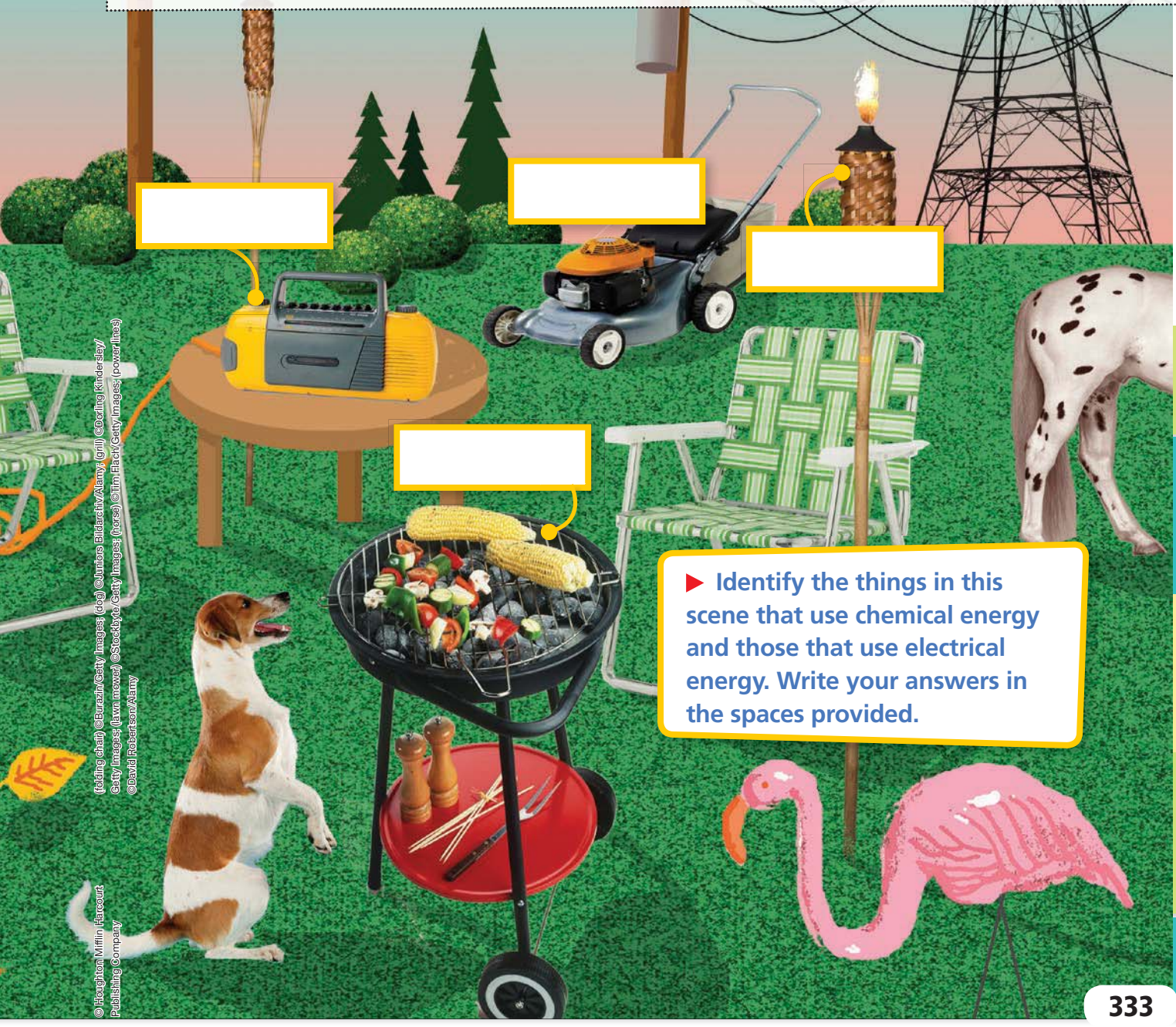
ACTIVE **READING** As you read these two pages, draw a circle around a use of chemical energy. Draw a box around a use of electrical energy.



Many things use chemical energy and electrical energy. **Chemical energy** is energy than can be released by a chemical change. Chemical energy from food gives us energy. Most cars run on gasoline, a source of chemical energy. Have you ever warmed yourself by a campfire? Fire is the release of chemical energy.

Electrical energy provides the energy for most of the devices you use, like computers and televisions. **Electrical energy** is energy that comes from electric current. Anything plugged into a wall outlet uses electrical energy.

Where does electricity come from? In most cities, electricity is generated using the chemical energy released during the burning of fossil fuels such as coal and natural gas. The sun and wind can also be used to generate electricity.



▶ **Identify the things in this scene that use chemical energy and those that use electrical energy. Write your answers in the spaces provided.**

Energy Can Change Forms

Can you read by the light of chemical energy? Can you use electrical energy to make something move? You can do both of these things, and more.

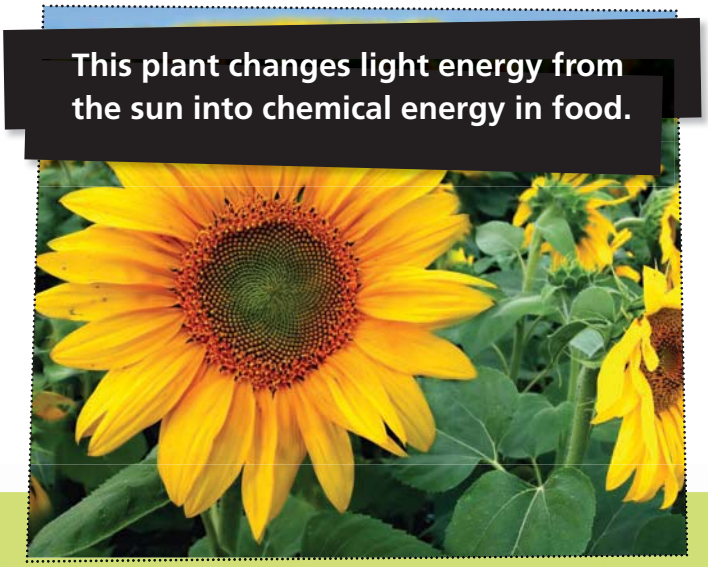
ACTIVE **READING** As you read these two pages, draw a line under two examples of energy changing forms.

Chemical energy changes into light energy in a glow stick.

Energy can change from one form to another. Electrical energy changes to light energy when you turn on a light switch. You may also feel the heat energy given off by some light bulbs. Chemical energy in gasoline changes to mechanical energy when a driver presses the gas pedal to drive.

Glow sticks have a glass tube inside them. The glass tube has chemicals inside it. When you bend the glow stick, the tube breaks. The chemicals in the tube mix with other chemicals in the glow stick. When they mix, light energy is given off.

A remote control sends radio waves to the remote-controlled car. Radio waves are another form of energy, similar to light energy. The radio waves change to electrical energy to tell the motor what to do—start, stop, or go faster. The car also has batteries inside it. The batteries change chemical energy to electrical energy to move the car.



This plant changes light energy from the sun into chemical energy in food.

Changing Energy

Draw a picture that shows another way that energy can change form.

Sum It Up

Use information in the summary to complete the graphic organizer.

Energy is the ability to cause change in matter. Making an object move is a change. So, everything that moves has energy. Kinetic energy is the energy of motion. Potential energy is the energy something has because of its position. The mechanical energy of an object is the sum of its kinetic and potential energies. Light energy enables plants to make food and helps us see. Sound energy is caused by a vibrating object. Energy can change from one form to another.

Cause

Sunlight falls on this plant.

Sunlight is a form of energy.

Effect

1 _____

_____

_____

2 _____

_____

_____

You can hear the beat of the drum.

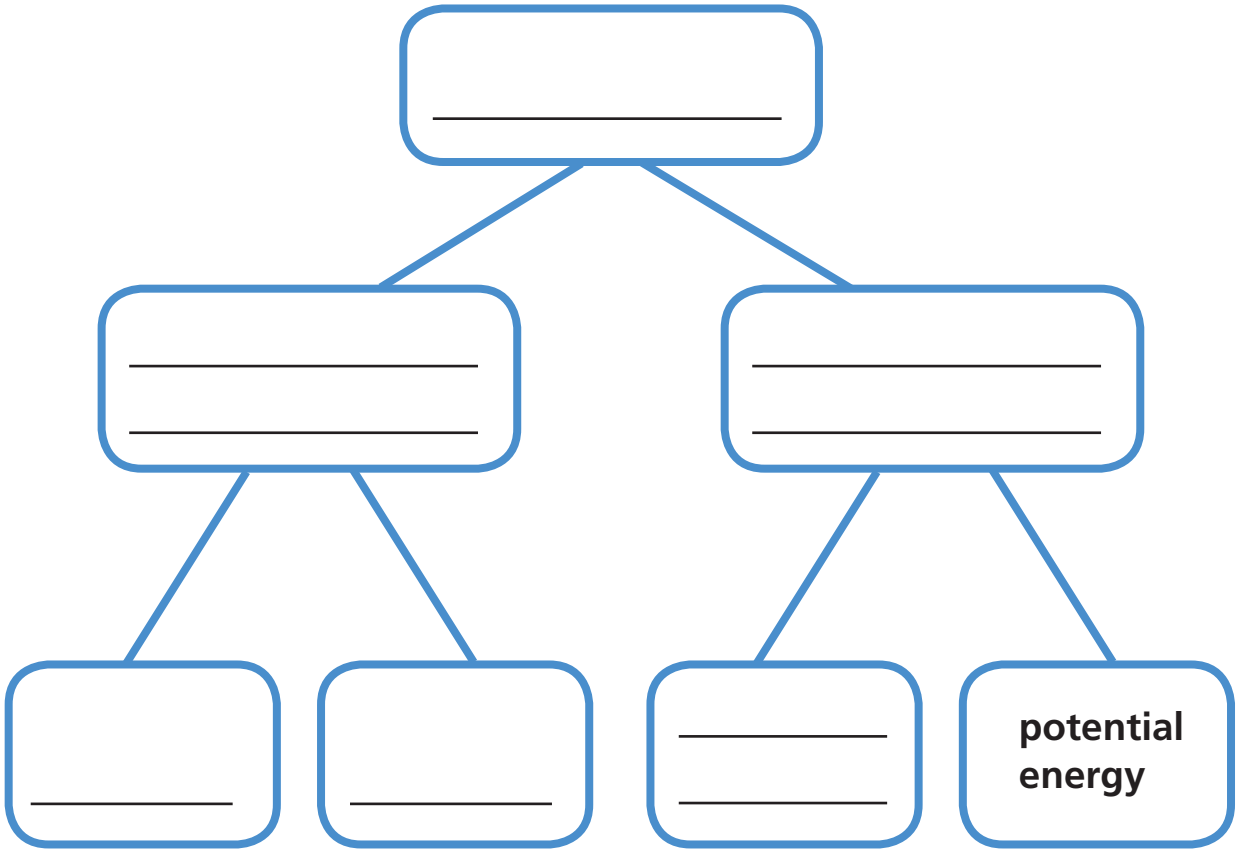
Brain Check

Name _____

Vocabulary Review

1 Choose words from the box to complete the Forms of Energy word web.

Forms of Energy



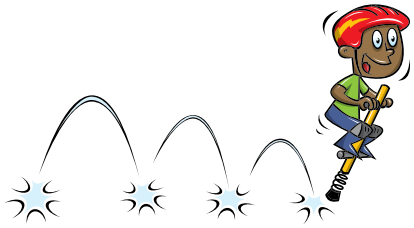
energy*	chemical energy*	mechanical energy*
kinetic energy*	food	gasoline

* Key Lesson Vocabulary

Apply Concepts

2 Use the words from the box to label each picture. Each term will be used once.

chemical energy	kinetic energy	potential energy
sound	light	



_____

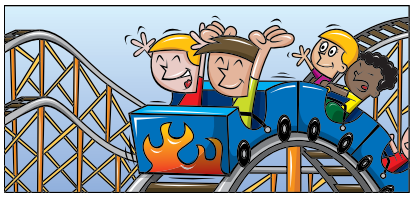
This boy has an up-and-down motion.

_____

You can feel the cello's vibrations.

_____

Food gives this bird the energy it needs to live.



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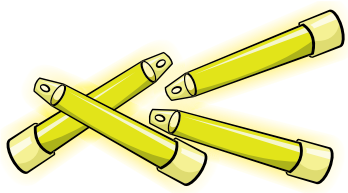
The roller coaster cars go to the top of the hill and stop for a moment.



_____

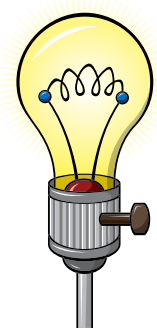
You can carry these glow sticks in the dark so people can see you.

3 A light bulb changes electrical energy into two other forms of energy. What are they?

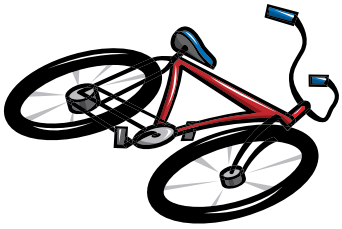
_____

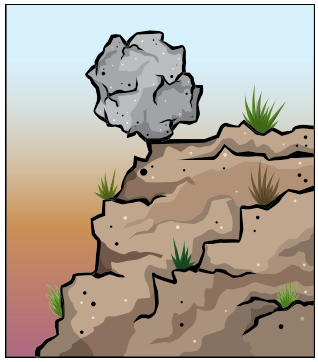
_____

_____



4 Which of these objects has potential energy? How do you know?





5 Describe how sound energy is produced when you strike the top of a drum.

6 Many forms of energy are around us and within us. Write three paragraphs in the form of an e-mail to a friend or family member describing some ways you use energy in a typical day. Tell your reader where the energy comes from and how it transforms into other forms of energy.

Take It Home!

See ***ScienceSaurus®*** for more information about energy.