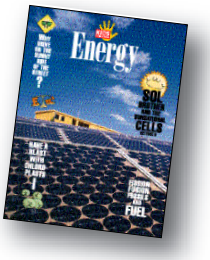
Teacher's Guide



Energy

Dear Educator,

Get fueled up to explore the natural and man-made energy that runs our cars, our computers, and our bodies! While reading **KIDS DISCOVER** *Energy*, your young scientists will learn about the fascinating topics at right.

This Teacher's Guide is filled with activity ideas and blackline masters to help your students enjoy and learn more from *Energy*. Select or adapt the activities that suit your students' needs best.

Thank you for making **KIDS DISCOVER** a part of your classroom.

Sincerely,

KIDS DISCOVER

P.S. We would love to hear from you! E-mail your comments and ideas to **teachers@kidsdiscover.com**

PAGES WHAT'S IN *ENERGY*

Meeting the Standards

✔ Physical Science
– *National Science Education Standards*

✔ Visit **www.kidsdiscover.com/standards** to find out more about how **KIDS DISCOVER** meets state and national standards.

• IN THIS TEACHER'S GUIDE •

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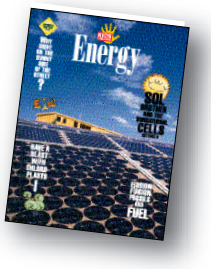
PREREADING ACTIVITIES



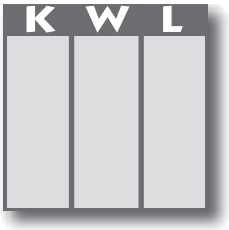
Before distributing KIDS DISCOVER *Energy*, activate students' prior knowledge and set a purpose for reading with these activities.

Discussion

To get students thinking about how this topic relates to their interests and lives, ask:

- ✔ *What are some ways that you use energy every day?*
- ✔ *What time of the day do you feel like you have the most energy?*

KWL Chart



On chart paper, draw three columns and label them **K** ("What we Know"), **W** ("What we Want to know" or "What we think we Will learn"), and **L** ("What we Learned"). Ask: *What do you already know about energy?*

List students' responses in the **K** column. In the **W** column, list students' questions and comments about what they want to learn or what they think they will learn by reading *Energy*. (See box below for key terms students may bring up.) At the end of the unit, have students fill in the **L** column listing what they learned. Finally, ask students to correct any inaccurate information written in the **K** column.

KEY TERMS

- ✔ **Galileo Galilei**
- ✔ **potential**
- ✔ **kinetic**
- ✔ **solar**
- ✔ **windmills**
- ✔ **steam**
- ✔ **atom**
- ✔ **heat**
- ✔ **coal**
- ✔ **light**
- ✔ **ultraviolet**
- ✔ **sugar**

Get Set to Read (Anticipation Guide)

Blackline Master

Copy and distribute the **Get Set to Read** blackline master (page 3 of this Teacher's Guide). Explain to students that this **Anticipation Guide** will help them find out what they know and what misconceptions they have about the topic. **Get Set to Read** is a list of statements—some true, some false. Ask students to write whether they think each statement is true or false in the **Before Reading** column. Be sure to tell students that it is not a test and they will not be graded on their answers. The activity can be completed in a variety of ways for differentiated instruction:

- ◆ **Have students** work on their own or in small groups to complete the entire page.
- ◆ **Assign pairs** of students to focus on two statements and to become "experts" on these topics.
- ◆ **Ask students** to complete the **Before Reading** column on their own, and then tabulate the class's answers on the chalkboard, on an overhead transparency, or on your classroom computer.
- ◆ **Review the statements** orally with the entire class.

If you predict that students will need assistance finding the answers, complete the **Page Number** column before copying **Get Set to Read.**

Preview

Distribute *Energy* and model how to preview it. Examine **titles, headings, words in boldface type, pictures, charts,** and **captions.** Then have students add new information to the **KWL** chart. If students will only be reading a few pages at one sitting, preview only the selected pages.

BE WORD WISE WITH POWER VOCABULARY!

You have exclusive access to additional resources including Power Vocabulary blackline masters for every available KIDS DISCOVER title! These activities introduce students to 15 specialized and general-use vocabulary words from each KiDS DISCOVER title. Working with both types of words helps students develop vocabulary, improve comprehension, and read fluently. Follow the links from your Teacher's Toolbox CD-ROM and find your title to access these valuable resources:

- ◆ Vocabulary cards
- ◆ Crossword puzzle
- ◆ Word find
- ◆ Matching
- ◆ Cloze sentences
- ◆ Dictionary list

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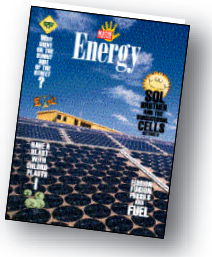
Name _____ Date _____



Get Set to Read

We use energy all day everyday. What do you really know about energy? In Before Reading, write *true* if you think the statement is true. Write *false* if you think the statement is not true. Then read KIDS DISCOVER *Energy*. Check back to find out if you were correct. Write the correct answer and the page number where you found it.

CHALLENGE: Rewrite each false sentence in a way that makes it true.

Before Reading		After Reading	Page Number
_____	**1.** Most of the energy we use on Earth comes from water.	_____	_____
_____	**2.** Wind energy is no longer used to get work done.	_____	_____
_____	**3.** More than 150,000 people were killed by the atomic energy released by the two atom bombs that were dropped in Japan during World War II.	_____	_____
_____	**4.** "White" light is actually composed of light of many colors.	_____	_____
_____	**5.** Green plants take in oxygen and water, use them to produce food, and give off carbon dioxide.	_____	_____
_____	**6.** The Egyptian pyramids were made without the use of tools.	_____	_____
_____	**7.** A magnetic levitation train travels on a cushion of air, cutting down on friction and enabling it to go faster while using less energy.	_____	_____
_____	**8.** Solar cars cannot go very far, but they can go very fast.	_____	_____

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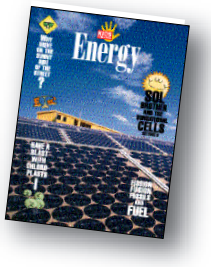
DISCUSSION & WRITING QUESTIONS



Use the following questions as oral discussion starters or for journaling. For additional in-class discussion and writing questions, adapt the questions on the reading comprehension blackline masters on pages 5 and 6.

Cover

Have students look at the cover. Ask:

- ✔ *Do you know what is pictured on the cover? What do you think they do? How are they related to the topic of energy?*

Pages 2–3

Some people are more energetic in the morning, right after they wake up. Others seem to have more energy in the afternoon or very late at night. Ask:

- ✔ *When do you have the most energy—in the morning, afternoon, or night?*

Pages 4–5

- ✔ *Has anyone ever been on a wind-powered boat like a sailboat? What was it like?*
- ✔ *Has anyone ever seen a windmill? What did it look like? Do you know what it was used for?*

Pages 6–7

On page 6, readers are asked to imagine what it would be like if there were no gas to fill up their cars. Ask:

- ✔ *How would you accomplish the things you need to get done without a car? How could you do what you need to do by using other forms of transportation that do not need gas to run?*

Pages 6–7

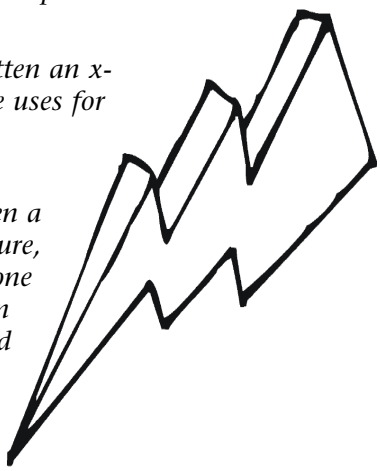
- ✔ *Do you think solar energy or hydroelectric power are options for ways to get energy for your area? Why or why not? What are some pros and cons with solar and hydroelectric power?*

Pages 8–9

- ✔ *Has anyone ever gotten an x-ray? What are some uses for x-rays?*

Pages 10–11

- ✔ *Has anyone ever seen a geyser, either in nature, such as at Yellowstone National Park, or on television? What did it look like?*



Pages 12–13

On page 13, readers learn that marathon runners often eat large quantities of pasta the day before a race because pasta has carbohydrates that are easily converted to energy. Ask:

- ✔ *Are there certain foods that you feel give you more energy? What are the foods?*
- ✔ *Are there certain foods that make you feel less energetic? What are they?*

HELPING HAND

Read KIDS DISCOVER aloud to demonstrate fluency, expressive reading, and how to read nonfiction texts.

Pages 14–15

Robots can perform a variety of tasks. Ask:

- ✔ *If you had your own personal robot, what are some of the things you would program it to do for you?*

Pages 14–15

Computers can perform many tasks very quickly. Ask:

- ✔ *What are some positive results of having computers?*
- ✔ *What are some problems with computers?*

Pages 16–17

Car pooling saves energy. However, not everyone wants to join a car pool. Ask:

- ✔ *What are the reasons people might not want to join a car pool? What could you say in response to each of these reasons to help persuade people to join car pools?*

Pages 16–17

Riding a bike cuts down on pollution. Have students think of one time in the day they could ride their bike instead of riding in a car. Ask:

- ✔ *What are some of the positive aspects of riding a bike? Why do you think people don't ride bikes as often as they might to get where they have to go?*

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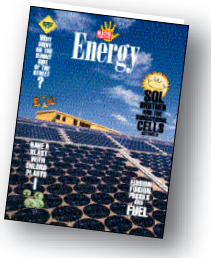

Name _____ Date _____

It's in the Reading

After reading KIDS DISCOVER *Energy,* choose the best answer for each question. Fill in the circle.

Find your answers on the pages shown in the book icon next to each question.

1. The energy that an object has while moving is called _____ energy.

- ❍ **A.** kinetic
- ❍ **B.** reserved
- ❍ **C.** potential
- ❍ **D.** natural

2 3

2. Wind-powered clipper ships were the fastest sailing ships until the development of _____.

- ❍ **A.** windmills
- ❍ **B.** steam engines
- ❍ **C.** paddleboats
- ❍ **D.** commercial oil drilling

4 5

3. In nuclear fission, energy is produced by _____.

- ❍ **A.** combining two atoms
- ❍ **B.** removing atoms from a molecule
- ❍ **C.** putting energetic atoms in water
- ❍ **D.** splitting an atom

6 7

4. The main idea of this section is that _____.

- ❍ **A.** fossil fuels are the best source of energy
- ❍ **B.** bioenergy is the cheapest alternative to fossil fuels
- ❍ **C.** nuclear power is not safe
- ❍ **D.** there are lots of possibilities for alternative energy sources

6 7

5. The human eye can detect _____.

- ❍ **A.** X-rays
- ❍ **B.** infrared light
- ❍ **C.** the visible spectrum
- ❍ **D.** all of the above

8 9

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It's in the Reading (continued)

6. **Hot water molecules differ from cold water molecules in that they _____.**

- ❍ **A.** move faster
- ❍ **B.** move slower
- ❍ **C.** have more mass
- ❍ **D.** have more potential energy

7. **Geysers often gush at regular intervals because _____.**

- ❍ **A.** parks have learned to regulate the steam to have the geysers go off at set times
- ❍ **B.** the steam contracts and expands as temperatures deep in the Earth fluctuate
- ❍ **C.** it takes a certain, constant amount of time for the steam to build enough to force the water out
- ❍ **D.** the rocks that heat the water have to become hot again first

8. **The small organs that hold chlorophyll in plant cells are called _____.**

- ❍ **A.** palisade cells
- ❍ **B.** chloroplasts
- ❍ **C.** vacuoles
- ❍ **D.** capillaries

9. **A _____ is an example of a simple machine.**

- ❍ **A.** bicycle
- ❍ **B.** toaster
- ❍ **C.** piano
- ❍ **D.** lever

10. **Burning garbage and tires to produce electricity, building sun-powered or battery-powered cars, and developing more useful bicycles are all examples of _____.**

- ❍ **A.** ways people are working to conserve energy
- ❍ **B.** winning science fair projects
- ❍ **C.** poor uses of resources
- ❍ **D.** ways people are polluting the environment

11. **Which energy innovation holds the most promise for meeting our energy needs? Use information from the reading to support your answer.**

_____

_____

_____

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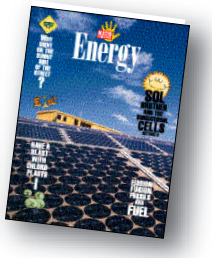

Name _____ Date _____

Everything Visual

Diagrams combine words and pictures to help us better understand the topic. Study the diagrams on pages 6–7 and 12–13. Then answer the questions.

1. **Explain the difference between fission and fusion, using the diagram on pages 6–7.**

_____

_____

2. **The diagram shows a uranium atom being used in the fission process and hydrogen atoms being used in the fusion process. Based on the diagram, which element is heavier—uranium or hydrogen? How can you tell?**

_____

_____

3. **Do you think the pictures in this diagram are accurate representations of atoms? Why or why not?**

_____

_____

4. **The diagrams on pages 12–13 have insets that enlarge parts of the diagrams. Use the diagram on page 12. Describe the location of palisade cells. What purpose do you think they serve?**

_____

_____

5. **Describe the insets on the diagram on page 13. What do they show? How are they useful?**

_____

_____

6. **How are the diagram of the plant and the diagram of the human digestive system related?**

_____

_____

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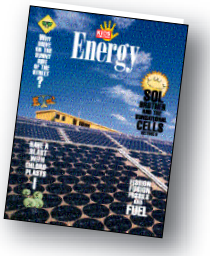
CROSS-CURRICULAR EXTENSIONS



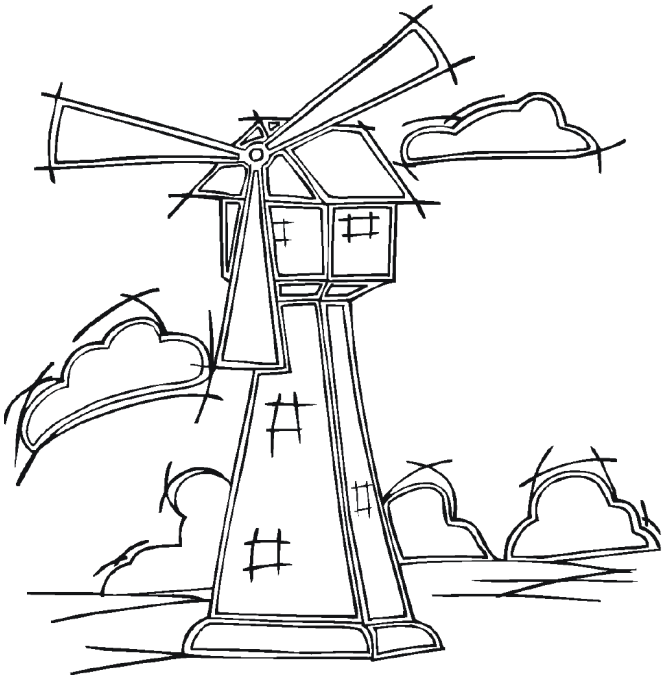
Have students try these activities to expand their knowledge and interest in energy.

Math, Language Arts

On page 6, students learn that scientists estimate that we may run out of oil by the year 2050. Have students calculate how old they will be in 2050. Students can then write a paragraph telling what they imagine their life will be like then and how the world will be different. Encourage students to include how they think the use of energy will have changed by then.

Science, Language Arts

Have students select one aspect of energy featured in the issue. Students may select solar energy, wind power, fossil fuels, geothermal energy, nuclear energy, energy conservation, a famous energy scientist, or another aspect. Encourage students to design their own magazine based on this one aspect. After researching the topic, students should divide the information into topics that they will present on each page spread. Then they can draw pictures and write information in captions. Students should also include a cover with catchy cover lines. Encourage students to refer to KIDS DISCOVER as an example.



History, Geography, Science

On page 7, students learn that a horrible nuclear disaster occurred at Chernobyl in the former USSR (now Ukraine) in 1986. Have students research what happened during this disaster, how large an area was affected, and what the long-term effects have been. Students can also locate the Ukraine on a map or globe. If possible, show students an old map that has the USSR on it, and have students compare the map with a modern one.

Science

Erupting volcanoes are visible evidence of geothermal (land heat) energy. Have students work in pairs to research how and why volcanoes erupt. Their reports should include a labeled diagram of the parts of a volcano.

HELPING HAND

Promote reading, speaking, and listening skills by having students read KIDS DISCOVER aloud in pairs.

Math, Geography

On page 16, students learn that a model of a magnetic levitation train was clocked at a speed of 281 miles per hour. Using that figure, have students compute how long it would take a train traveling at that speed to go between two cities in the United States, such as Boston and Washington D.C., New Orleans and San Francisco, and Seattle and Miami.

Science

Have students work in groups to research one kind of electromagnetic radiation: ultraviolet, microwaves, radio waves, or X-rays. Students should give specific details about the topic they choose, including how it helps get various jobs done.

Social Studies, Language Arts

World War II and the dropping of the atom bomb by the United States are mentioned on page 6. Have students research World War II and write a short report on an aspect of the war that they find interesting. Topics may include the reasons the United States entered the war, Hitler, or Pearl Harbor. Have students read their reports aloud in class.

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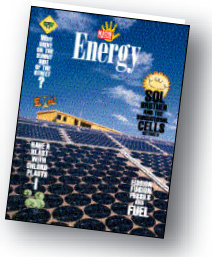
Name ANSWER KEY Date _____



Get Set to Read

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CHALLENGE: Rewrite each false sentence in a way that makes it true.

Before Reading		After Reading	Page Number
	1. Most of the energy we use on Earth comes from ~~water~~ **the sun**.	*False*	*p. 2*
	2. Wind energy is ~~no longer~~ **still** used to get work done.	*False*	*p. 5*
	3. More than 150,000 people were killed by the atomic energy released by the atom bombs that were dropped in Japan during World War II.	*True*	*p. 6*
	4. "White" light is actually composed of light of many colors.	*True*	*p. 8*
	5. Green plants take in ~~oxygen~~ **carbon dioxide** and water, use them to produce food, and give off ~~carbon dioxide~~ **oxygen**.	*False*	*p. 12*
	6. The Egyptian pyramids were made ~~without~~ **with** the use of tools.	*False*	*p. 14*
	7. A magnetic levitation train travels on a cushion of air, cutting down on friction and enabling it to go faster while using less energy.	*True*	*p. 16*
	8. Solar cars cannot go very ~~far~~ **fast**, but they can go ~~very fast~~ **long distances**.	*False*	*p. 17*

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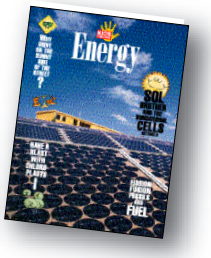
Name ANSWER KEY Date _____



It's in the Reading

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Find your answers on the pages shown in the book icon next to each question.

1. The energy that an object has while moving is called _____ energy.

- ● **A.** kinetic ***(content vocabulary)***
- ❍ **B.** reserved
- ❍ **C.** potential
- ❍ **D.** natural

2 3

2. Wind-powered clipper ships were the fastest sailing ships until the development of _____.

- ❍ **A.** windmills
- ● **B.** steam engines ***(details)***
- ❍ **C.** paddleboats
- ❍ **D.** commercial oil drilling

4 5

3. In nuclear fission, energy is produced by _____.

- ❍ **A.** combining two atoms
- ❍ **B.** removing atoms from a molecule
- ❍ **C.** putting energetic atoms in water
- ● **D.** splitting an atom ***(cause and effect)***

6 7

4. The main idea of this section is that _____.

- ❍ **A.** fossil fuels are the best source of energy
- ❍ **B.** bioenergy is the cheapest alternative to fossil fuels
- ❍ **C.** nuclear power is not safe
- ● **D.** there are lots of possibilities for alternative energy sources ***(main idea)***

6 7

5. The human eye can detect _____.

- ❍ **A.** X-rays
- ❍ **B.** infrared light
- ● **C.** the visible spectrum ***(details)***
- ❍ **D.** all of the above

8 9

It's in the Reading (continued)

6. **Hot water molecules differ from cold water molecules in that they _____.**

- ● **A.** move faster ***(compare and contrast)***
- ❍ **B.** move slower
- ❍ **C.** have more mass
- ❍ **D.** have more potential energy

7. **Geysers often gush at regular intervals because _____.**

- ❍ **A.** parks have learned to regulate the steam to have the geysers go off at set times
- ❍ **B.** the steam contracts and expands as temperatures deep in the Earth fluctuate
- ● **C.** it takes a certain, constant amount of time for the steam to build enough to force the water out ***(draw conclusions)***
- ❍ **D.** the rocks that heat the water have to become hot again first

8. **The small organs that hold chlorophyll in plant cells are called _____.**

- ❍ **A.** palisade cells
- ● **B.** chloroplasts ***(content vocabulary)***
- ❍ **C.** vacuoles
- ❍ **D.** capillaries

9. **A _____ is an example of a simple machine.**

- ❍ **A.** bicycle
- ❍ **B.** toaster
- ❍ **C.** piano
- ● **D.** lever ***(categorize)***

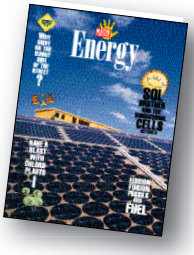
10. **Burning garbage and tires to produce electricity, building sun-powered or battery-powered cars, and developing more useful bicycles are all examples of _____.**

- ● **A.** ways people are working to conserve energy ***(main idea)***
- ❍ **B.** winning science fair projects
- ❍ **C.** poor uses of resources
- ❍ **D.** ways people are polluting the environment

11. **Which energy innovation holds the most promise for meeting our energy needs? Use information from the reading to support your answer.**

Answers will vary, but students should select one of the innovations from the text and provide support for how this technology is now used or could be used in the future.

Name ANSWER KEY Date _____



Everything Visual

Diagrams combine words and pictures to help us better understand the topic. Study the diagrams on pages 6–7 and 12–13. Then answer the questions.

1. Explain the difference between fission and fusion, using the diagram on pages 6–7.

Fission is the breaking up of one large atom into smaller parts. Fusion is the merging of two atom nuclei to form one larger one. Both have energy as a by-product.

2. The diagram shows a uranium atom being used in the fission process and hydrogen atoms being used in the fusion process. Based on the diagram, which element is heavier—uranium or hydrogen? How can you tell?

Uranium is heavier than hydrogen. You can tell because the diagram shows many more protons and neutrons in the uranium atom than in the hydrogen atoms.

3. Do you think the pictures in this diagram are accurate representations of atoms? Why or why not?

The pictures are not completely accurate because they cannot show the nuclei in detail. However, the basic principles of fission and fusion are illustrated.

4. The diagrams on pages 12–13 have insets that enlarge parts of the diagrams. Use the diagram on page 12. Describe the location of palisade cells. What purpose do you think they serve?

Palisade cells seem to be at the surface of the leaves. They may play a part in protecting the plant tissues and in controlling each stoma, which allows water and carbon dioxide into the parts of the plant where food is made.

5. Describe the insets on the diagram on page 13. What do they show? How are they useful?

One inset shows a cross section of the small intestine. The other shows a cross section of a small part of the small intestine. These insets are useful because they show how nutrients pass into the bloodstream.

6. How are the diagram of the plant and the diagram of the human digestive system related?

These two diagrams are related because they show the complete process of how energy from the sun fuels us. The plant converts energy from the sun into starches that we eat. These starches are broken down in the body to release energy for our bodies to use.

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