UNIT 5: Earth and Space, Part 2

Lesson 3: Alternative Energy Resources

Learning Goal

Identify alternative energy resources.

Materials

For student groups
- 17 miniature marshmallows
- 32 toothpicks
- resealable plastic bag

Engage

Teacher Instruction

- Read the instructions in the student edition.
- Instruct student groups to complete the task.
- Circulate through student groups to facilitate understanding of the task and to address questions and concerns.

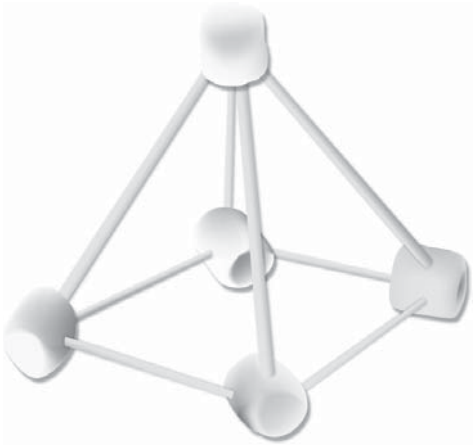
Teacher Note

Distribute the exact number of marshmallows and toothpicks listed. Student groups may ask for extra marshmallows to complete an additional pyramid. Do not make extra marshmallows available.

Let's Engage!

Page 127

1. Use the materials in the resealable plastic bag to build a pyramid as shown below.
2. Using the materials in your bag, build as many pyramids as you can. Do not share materials with other groups.



Facilitation Questions

- How many pyramids did you build? *Each student group should have been able to build three complete pyramids.*
- Were all the materials used? *No, there were materials left over.*
- Why wasn't a fourth pyramid built? *Our group did not have enough marshmallows.*

- Were any other sources of marshmallows available? *Yes, we could have combined our marshmallows with marshmallows from other groups to create another pyramid.*
- Would there be any other sources of marshmallows available once the leftover marshmallows were combined and used? *No, there would not be another source for marshmallows.*
- What other materials could you use to build another pyramid? *Answers will vary and may include sticky tack, clay, and/or play dough.*

Explore

Materials

For student groups
- plastic pinwheel
- access to water
- plastic bucket
- large cup or beaker

Teacher Instruction

- Read the instructions in the student edition.
- Allow ample time for students to develop and test their plans.
- Circulate through the student groups to address concerns and/or questions and to remind students of the rules of the task.

Teacher Note

A large plastic bowl or food container may be used in place of the plastic bucket.

Let's Explore!

Page 127

Make It Move

1. Find three ways to make the pinwheel turn.
   - Use only the materials provided by your teacher.
   - You may not touch the pinwheel blades with your hands or fingers.
2. Discuss with your group what the task and rules mean.
3. Develop a plan for completing the task.
4. Work together to make the pinwheel turn.

Facilitation Question

- How did your group make the pinwheel turn? *Answers will vary and may include blowing on the blades of the pinwheel, pouring water on the blades of the pinwheel, and gently striking the blades of the pinwheel on the edge of a desk or shoe.*

Explain

Teacher Instruction

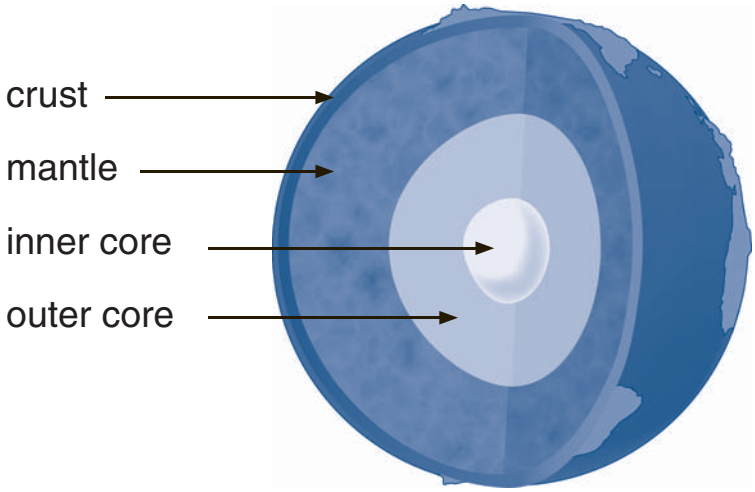
- Read and discuss "Natural Resources."
    - Ask: Why is exploring alternative energy resources important? *The amount of available fossil fuels is limited. Fossil fuels are not easily replaced.*
    - Ask: What did the toothpicks and marshmallows in the Engage activity represent? *The toothpicks and marshmallows represented natural resources.*
    - Ask: Which material represented a nonrenewable resource? Why? *The marshmallows represented a nonrenewable resource because they could not be easily replaced*.
- Read and discuss "Alternative Energy Resources."
    - Ask: Which material could have represented an alternative energy resource in the Engage activity? *Answers will vary according to which material the students thought to use. Possible responses could include sticky tack, clay, and play dough.*

Let's Explain!

Pages 128–132

Natural Resources

Natural resources are things found in the natural world that are useful to people. Some of those useful resources are found in Earth's crust.



You have already learned that fossil fuels are—

- natural resources
- found in sedimentary rock formations deep inside Earth's crust
- major sources of energy

It may seem that our natural resources will never run out. There always seems to be electricity to use and fuel for cars. The fact, however, is that some natural resources are being used at a rate greater than the rate at which they can be renewed. This type of natural resource is called nonrenewable.

Since fossil fuels are formed over long periods of time and are not easily replaced, they are considered nonrenewable resources.

Alternative Energy Resources

The word *alternative* means a possibility, or substitute, for something else. Alternative energy resources are energy sources other than nonrenewable resources, or fossil fuels.

Wind

Wind is an alternative energy resource. An unlimited amount of wind energy exists on Earth.

Remember the pinwheel? Did you blow on the blades to make them turn? If you did, you used wind energy to make the pinwheel turn.

Today wind turbines are used to produce electricity. A group of wind turbines is called a wind farm.

wind turbines

How is electricity produced by a turbine? Wind causes the blades of a wind turbine to turn. The turning of the blades runs the generator, producing electricity.

Solar Energy

You have already learned that the Sun is the major source of energy for Earth. The Sun provides enough energy in 1 minute to supply the world with energy for 1 year.

Energy from the Sun is called solar energy. Solar energy can be collected on solar panels. The collected solar energy is then changed into usable electrical energy.

solar panels

Geothermal Energy

Geothermal energy is heat energy found beneath Earth's crust. It collects in areas called reservoirs. Wells are drilled into geothermal reservoirs beneath Earth's surface. The hot water and steam from the reservoir go up through the wells to Earth's surface. The hot water and steam spin the turbines in a geothermal power plant. Electricity is produced.

Geothermal energy is an alternative energy resource.

Hydroelectric Energy

Hydroelectric energy is also an alternative energy resource. *Hydro-* is a prefix meaning water. Moving water contains energy. The amount of usable energy in moving water depends on how swiftly the water moves. Most often, a hydroelectric plant uses a dam to produce or generate electricity.

Think about—

- A river flows toward the ocean.
- A dam is built on the river.
- The dam holds back the water in the river.
- The water is collected in a reservoir.

Photograph by Karen Thompson

Lake Travis, Austin, Texas

Water is released from the reservoir. The moving water quickly flows through turbines at the base of the dam. The force of the moving water causes the turbines to turn.

Remember the pinwheel? Moving water caused the blades of the pinwheel to turn. As the turbines at the base of the dam turn, a generator converts, or changes, the energy of moving water into electricity.

Biofuels

The prefix *bio-* means life. Biofuels are fuels made from plants.

Think about—

- Gasoline is a fuel that is burned in a car engine to make the car run.
- Have you ever seen the word *ethanol* on a gasoline pump? Gasoline may contain ethanol. Ethanol is a biofuel made from corn.
- Ethanol is an alternative energy resource.
- Another example of a biofuel is biodiesel. Biodiesel is a fuel that can be made from vegetable oils or fats. Biodiesel is an alternative energy resource.

Facilitation Questions

- What is wind? *Wind is moving air. Wind is an alternative energy resource.*
- How is wind energy collected and turned into electricity? *Wind causes the blades of a wind turbine to turn. The turning of the blades runs the generator, producing electricity.*
- What is solar energy? *Solar energy is energy from the Sun. It is an alternative energy resource.*
- How is solar energy collected and used? *Solar energy is collected by solar panels and changed into usable electrical energy.*
- What is geothermal energy? *Geothermal energy is heat energy found beneath Earth's crust. It is an alternative energy resource.*
- How is geothermal energy collected and used? *Wells are drilled into geothermal reservoirs beneath Earth's surface. The hot water and steam from the reservoir rise up through the wells to Earth's surface. The hot water and steam spin the turbines in a power plant. Electricity is produced.*
- What is hydroelectric energy? *Hydroelectric energy is the energy in moving water. It is an alternative energy resource.*
- What is the purpose of a dam in producing hydroelectric energy? *A dam holds back the water of a moving river. The water is collected in a reservoir behind the dam. Water is released from the reservoir. The moving water causes the turbines to turn. Electricity is produced.*

- What are biofuels? *Biofuels are fuels made from plants. Biofuels are alternative energy resources.*
- What type of biofuel is made from corn? *Ethanol is a biofuel that is made from corn.*
- What is biodiesel? *Biodiesel is a biofuel made from vegetable oils or fats. It is an alternative energy resource.*

Materials

For student groups
- poster board or paper
- markers, crayons, colored pencils
- craft supplies

Elaborate

Teacher Instruction

- Read the instructions in the student edition.
- Allow ample time for student groups to plan and complete the activity.
- Have student groups present their work to the class.
- Display the posters.

Teacher Note

As an optional approach, you may allow students to create posters individually instead of in groups.

Let's Elaborate! Page 132

Create a poster to persuade people to—

- conserve fossil fuels
- begin using alternative energy resources

Be prepared to present your poster to the class.

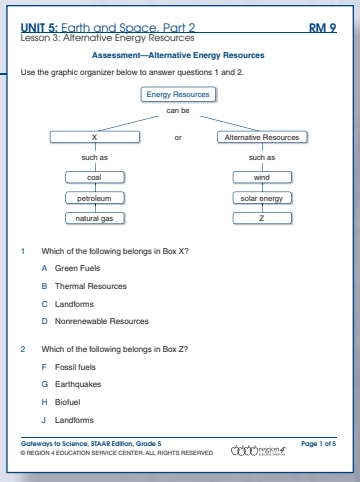
Evaluate

Materials

For each student
- RM 9

Teacher Instruction

- Instruct students to complete *RM 9: Assessment—Alternative Energy Resources*.



UNIT 5: Earth and Space, Part 2 RM 9
Lesson 3: Alternative Energy Resources

Assessment—Alternative Energy Resources

Use the graphic organizer below to answer questions 1 and 2.

Energy Resources
can be
X or Alternative Resources
such as such as
coal wind
petroleum solar energy
natural gas Z

1 Which of the following belongs in Box X?
A Green Fuels
B Thermal Resources
C Landforms
D Nonrenewable Resources

2 Which of the following belongs in Box Z?
F Fossil fuels
G Earthquakes
H Biofuel
J Landforms

Gateways to Science, STAAR Edition, Grade 5 Page 1 of 5
© REGION 4 EDUCATION SERVICE CENTER. ALL RIGHTS RESERVED.

RM 9 Answer Key

1. D
2. H
3. C
4. G
5. A
6. F
7. B
8. J
9. C
10. G