Renewable or Nonrenewable?

Grade: 4
State Standards:
Grade: 4; Science 3: Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept students know ecosystems can be characterized by their living and nonliving components.
Groups of two
Preparation Time: 25 minutes
Activity Time: 50 minutes
Key Words: renewable, nonrenewable and perpetual resources

OBJECTIVE

Students will:
1. Define renewable, nonrenewable and perpetual resources.
2. Classify items as being made from renewable or nonrenewable resources.
3. Identify four ways to conserve fossil fuel, minerals, plants and animals.

MATERIALS

"Natural Resources" worksheet (one per pair of students)
"Everyday Items" worksheet (one per pair of students)
"Renewable Resources" worksheet (one per pair of students)
"Nonrenewable Resources" worksheet (one per pair of students)
"Renewable or Nonrenewable?" worksheet (one per student)
Glue (one bottle per pair of students)
Scissors (one per pair of students)
Newspaper (one sheet per student)

BACKGROUND

Natural resources can be classified as renewable, nonrenewable, and perpetual. Resources are considered renewable if they can be replenished within a relatively short period of time.

Nonrenewable resources must be considered gone forever once used up because they take millions of years to regenerate. Oil is an example of a nonrenewable natural resource.

Perpetual resources are forms of naturally recurring energy beyond human management, such as energy from the sun. Natural resources are extracted from the Earth to use in their existing form and often changed in form during the manufacturing process, which turns natural resources into products. Fossil fuels include oil, coal, and natural gas. Oil or petroleum is drilled and extracted from the Earth. The resulting crude oil is refined into hundreds of petroleum products including fuel for cars. Minerals such as aluminum, iron and silica are mined from the Earth, extracted and used as components in manufacturing products such as aluminum, steel and glass. Plants are harvested as food crops, as trees for wood and fiber, or for horticultural purposes. Animals can be kept as

pets and used as livestock, or the hides of some animals can be used to make leather for goods.

If we reduce, reuse, recycle and compost materials, then we eliminate waste rather than manage it in our landfills.

PROCEDURE

Be prepared to put students in pairs for part of the activity.

Discussion

1. Hold up the plastic container, aluminum can, steel can, glass bottle, apple, paper, and leather belt.

2. Put up the "Natural Resources" overhead, and cover up the bottom half (the pictures of the items). Tell the students that all of these items are derived from natural resources and that these resources are either nonrenewable or renewable. Explain that nonrenewable resources exist on Earth in limited amounts, e.g., fossil fuels (coal, oil, natural gas) and many minerals (e.g., iron, gold, and bauxite, the source of aluminum). Fossil fuels are nonrenewable natural resources because they take millions of years to form. Most minerals are also nonrenewable resources. Explain that renewable resources are replaced naturally or through human-assisted actions within a relatively short amount of time, such as a human lifetime. For example, plants, such as trees, can be replanted indefinitely.

3. Hold up the items, one at a time, and ask student volunteers to classify them as made from a nonrenewable or renewable resource. Uncover the rest of the overhead, and review the items that were not discussed (i.e., gasoline, bike helmet, etc.). Briefly explain how natural resources are taken from the Earth and made into products.

4. Let students know that resources can also be classified as perpetual resources. These are forms of naturally recurring energy that are beyond human management, e.g., sun, wind, falling water, tides. Put up the "Water Cycle" overhead, and explain how the water cycle is an example of a perpetual resource.

5. Introduce the concept of conservation. Ask students whether there are ways that they can use fewer resources. Share one way that students can conserve natural resources. For example, by riding a bike to school instead of driving in a car, students can conserve fuel, which comes from a nonrenewable resource.

6. Create an overhead of the lesson rubric and share the expectations for this lesson with the students.

Activity

1. Divide the class into pairs. Give each pair of students the following worksheets: "Everyday Items," "Renewable Resources," "Nonrenewable Resources." Also give them a pair of scissors, and glue.

2. Instruct each pair to cut out the items and classify them by gluing them into one of the two possible categories: renewable or nonrenewable resources.

3. Review with the whole class which items they classified as renewable or nonrenewable resources.

Wrap-Up

1. Ask students what they think will happen to nonrenewable resources if we continue using them and dumping them in the landfill. (They will be depleted and the landfill will take up valuable agriculture land and natural resources.)

2. Ask students whether they think renewable resources are always available forever.

Oil is a fossil fuel. It forms through the build up of plankton on the sea floor and slow heating in the Earth's pressure cooker over many million years. Over the past 200 million years, oil source rocks have produced somewhere in the region of 2.2 trillion barrels of oil. We can express the amount of energy in a barrel of oil using British Thermal Units (BTU). One barrel of oil provides energy equivalent to 5.8 million BTU. An average of 11,000 barrels of oil have been formed each year over the past 200 million years.

A million = 1,000,000
A billion = 1,000,000,000
A trillion = 1,000,000,000,000
A quadrillion = 1,000,000,000,000,000

Oil formation has produced energy equivalent to about 63.8 billion BTU per year. Globally we use about 400 quadrillion BTU of energy each year. It would take about 6 million years to produce enough oil to supply global energy consumption for one year (i.e. 400 quadrillion divided by 63.8 billion). Ask students if oil is considered a renewable resource.

Answer: We are using oil energy **six million times faster** than it is being produced. Oil is therefore a non-renewable resource.

3. Ask the students to turn to a partner to brainstorm some ways that they can conserve nonrenewable and renewable resources. (Use less, reuse, and recycle. If possible use renewable resources instead).

4. Pass out the "Renewable or Nonrenewable" worksheet, assign students to name one item from each of the four categories (fossil fuels, minerals, plants and animals) and explain how they can conserve natural resources.

Final Assessment Idea

Have students identify ten items in the classroom, writing the natural resource used to produce the item and whether the resource is renewable or nonrenewable.

Extensions:
Assign students to write a hypothetical story about a nonrenewable resource that has been depleted, explaining why it was depleted (overused) and what alternative resources, if any, can be used in its place. Using the Internet or school library, have students choose a natural resource that they would like to learn more about and research the answers to questions such as:
• Is it renewable or nonrenewable?
• Where is it found (locate on a world map)?
• Are there any efforts currently underway to conserve this natural resource?
Have students research and identify the different elements that make up types of minerals, fossil fuels, plants, animals and water using a periodic chart. Once they have identified the elements, ask students to locate and check off the element on a periodic chart.

ASSESSMENT

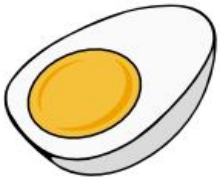
Students will know the difference between renewable and nonrenewable resources and the value of reduce, reuse, and recycle for our landfills and natural resource conservation

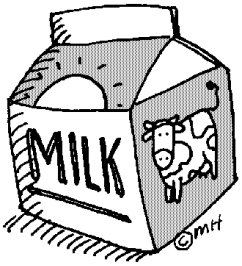
Natural Resources

These items are made from materials derived from natural resources. Which of these items are made from renewable or nonrenewable resources?

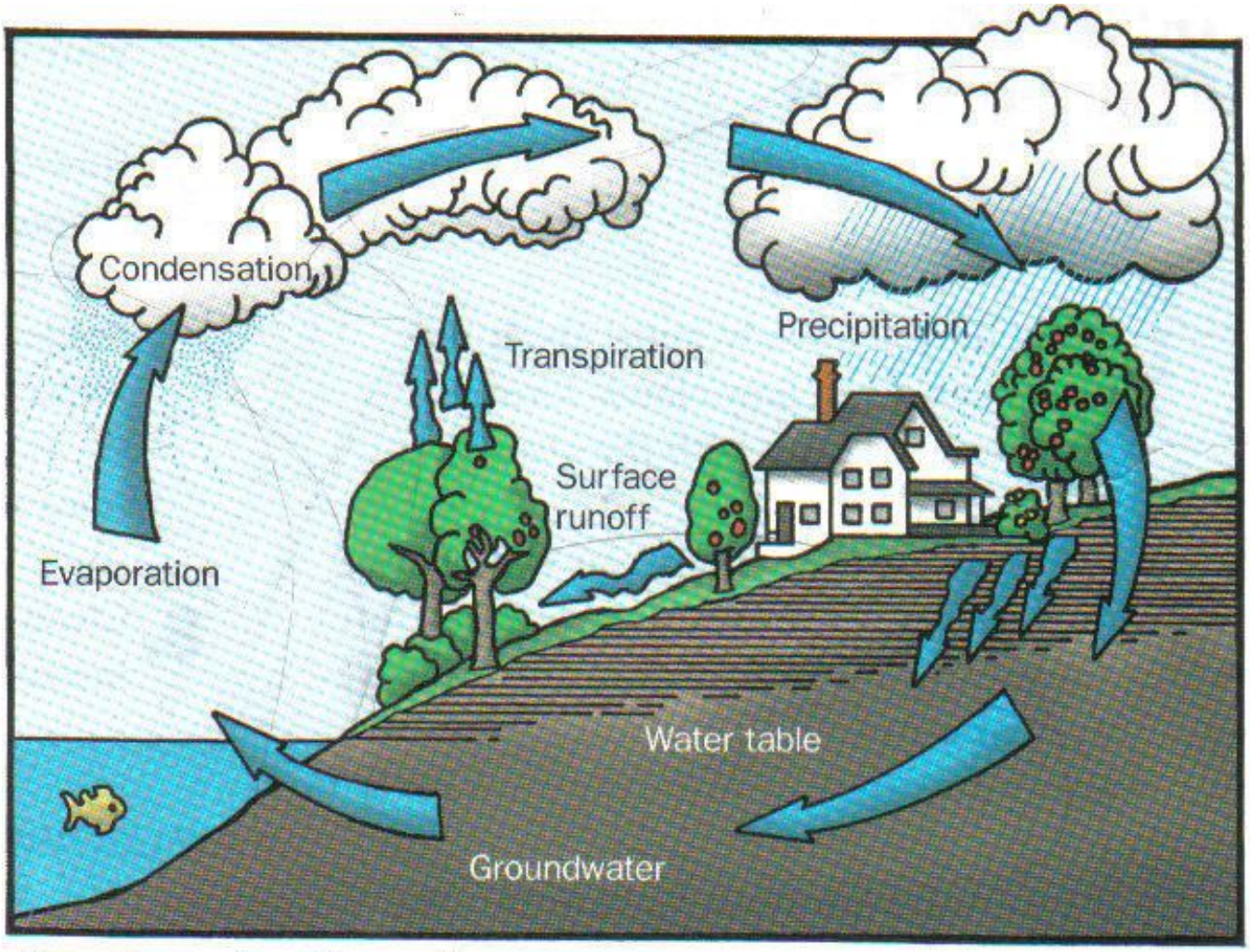
Everyday Items

Directions: Cut out each item and decide whether it is made from a renewable or nonrenewable resource.





The Water Cycle



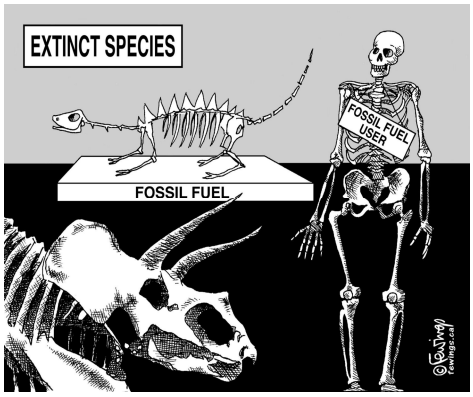
The water cycle on the earth

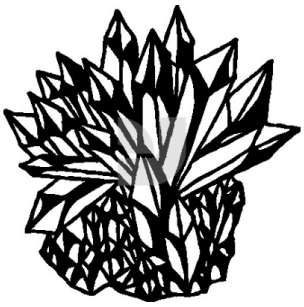
RENEWABLE RESOURCES

PLANTS **ANIMALS**

Glue your renewable pictures below:

NONRENEWABLE RESOURCES





FOSSIL FUELS **MINERALS**

Glue your nonrenewable items below:

Renewable or Nonrenewable

Directions: Write the name of one item from each of the four natural resource categories

(fossil fuels, minerals, plants, animals), and explain how to conserve the natural resources needed to produce it.

1a. Item made from fossil fuels:

1b. How can you conserve fossil fuel resources?

2a. Item made from minerals:

2b. How can you conserve mineral resources?

3a. Item made from plants:

3b. How can you conserve plant resources?

4a. Item made from animals:

4b. How can you conserve animal resources?