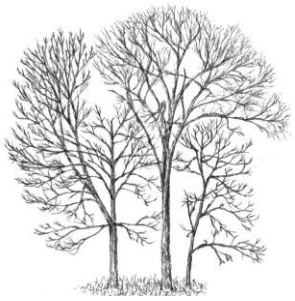
**Name** _____ **Date** _____

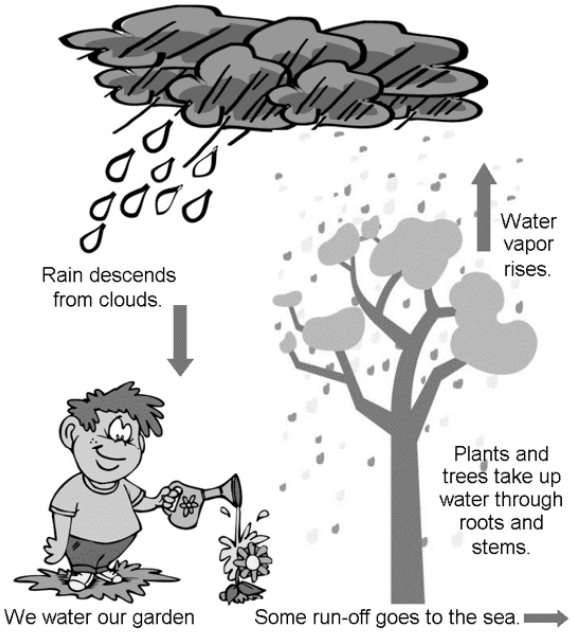
# The Earth—Resources, Interactions, and Cycles

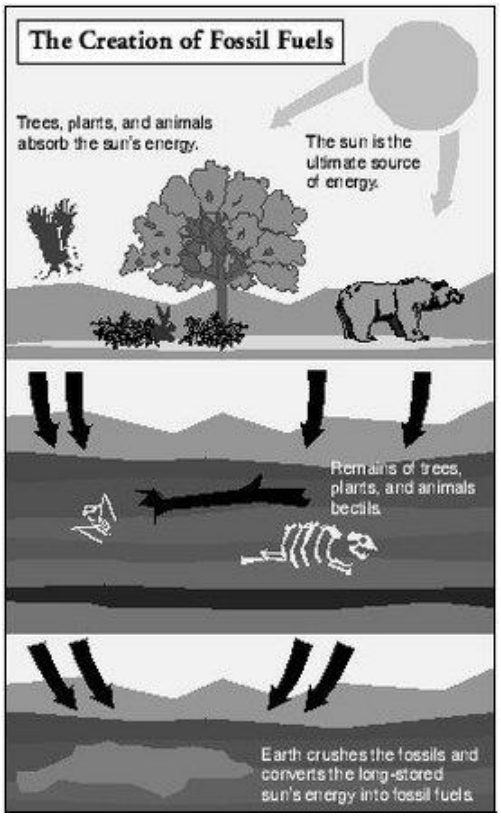
| Key Words | | |
|---|---|---|
| atmosphere | bacteria | carbon cycle |
| climate | condense | cycles |
| evaporate | fossil fuels | inexhaustible |
| interactions | natural resource | nitrates |
| nitrogen cycle | nonrenewable | ocean |
| precipitation | renewable | sediments |
| water cycle | water vapor | weather |

A **natural resource** is something found in nature that people can use to meet their needs. All of the Earth's natural resources can be classified into three types: renewable resources, nonrenewable resources, and inexhaustible resources.



A **renewable resource** is something that can be replaced in a relatively short period of time (a lifetime or less). A renewable resource can be replaced by natural processes like growth and reproduction. Some examples of renewable resources are plants and animals. For example, wood can be replaced by planting and growing new trees. If a tree is planted every time one is cut down, that resource will eventually grow and become useful to people. The two most important gases in our atmosphere—nitrogen and oxygen—are considered renewable because they can be replaced during the nitrogen and carbon cycles. Water—needed by all living things to survive—is also considered a renewable resource. Its supplies are constantly being resupplied through the water cycle.






**Nonrenewable resources** are formed over very long periods of time and cannot be replaced or renewed. You might say that they are used faster than they can be replaced. **Fossil fuels** such as petroleum (oil), natural gas, and coal are all nonrenewable resources. These resources formed from the remains of plants and animals that died millions of years ago. We burn fossil fuels to run our car engines, heat our homes, power our machinery, and create electricity. Scientists believe we are using these resources faster than new energy sources can be found. If we do not use these resources carefully, someday they will be all used up. Rocks above and below the Earth's surface contain many valuable minerals and other resources. Some types of rocks are very common, while others are only available in limited supply. Because it takes millions of years for rocks and minerals to be replaced once they are taken from the ground, these natural resources are classified as nonrenewable.

**Inexhaustible resources** are always available. Inexhaustible resources are in such large supply that they cannot be used up by human activity. Energy from the sun is an example of an inexhaustible resource. Geothermal heat from deep within the Earth and wind power are also considered inexhaustible resources. People cannot use these resources up!

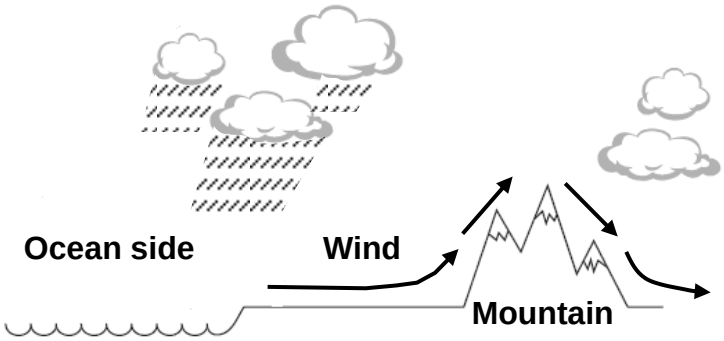
Classify each of the resources in the table to the right by checking the correct box. Remember, renewable resources are replaced in a short period of time. Nonrenewable resources take millions of years to form. Inexhaustible resources cannot be used up.

| | **Renewable** | **Nonrenewable** | **Inexhaustible** |
|---|---|---|---|
| Gold | ☐ | ☐ | ☐ |
| Iron ore | ☐ | ☐ | ☐ |
| Wind energy | ☐ | ☐ | ☐ |
| Nitrogen gas | ☐ | ☐ | ☐ |
| Coal | ☐ | ☐ | ☐ |
| Water | ☐ | ☐ | ☐ |
| Oak trees | ☐ | ☐ | ☐ |
| Rubber plants | ☐ | ☐ | ☐ |
| Wild Salmon | ☐ | ☐ | ☐ |

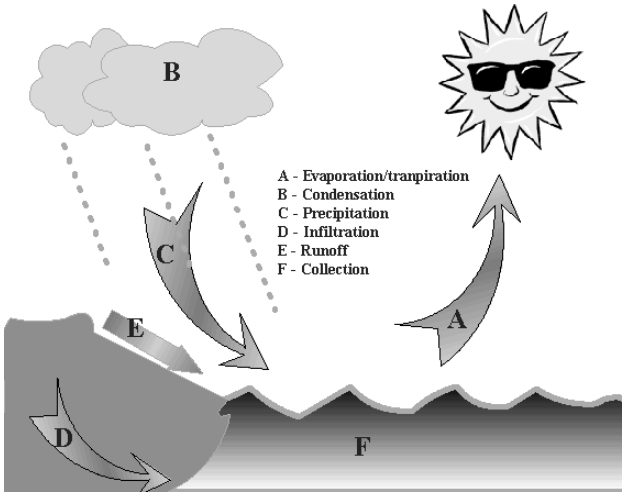
The Earth's landforms, oceans and atmosphere all interact with each other. This interaction has important effects on the Earth, such as typical weather patterns. One

example of this interaction is in the relationship between rivers, oceans, and landforms. Rivers erode sediments from the land and carry them to the oceans. Most of the ocean floor is covered with these sediments, having taken millions of years to accumulate. Ocean currents carry some of the sediments back to the coastline, where sandy beaches form due to deposition. Tides and waves can erode the shoreline, weathering the rock and dissolving minerals.

The **weather** is the condition of the atmosphere at the Earth's surface at any given time. It includes temperature, falling precipitation, and wind. **Climate** refers to the typical weather of an area over a long period of time. Weather results from the interaction of several systems—land features, energy from the sun heating the Earth's atmosphere, the rotation of the Earth on its axis, the creation of winds and the Earth's oceans. Because air cools as it rises over a mountain, the ocean side of a mountain often has heavy rainfall. The air loses its moisture and becomes drier by the time it reaches the other side of the mountain which has less rain. Differences in the temperature of land and ocean also affect climate. Air over land heats up and cools down more quickly than air over water. As a result, oceans and lakes stay cooler than land in summer and warmer than land in winter. This affects the winds in these areas.



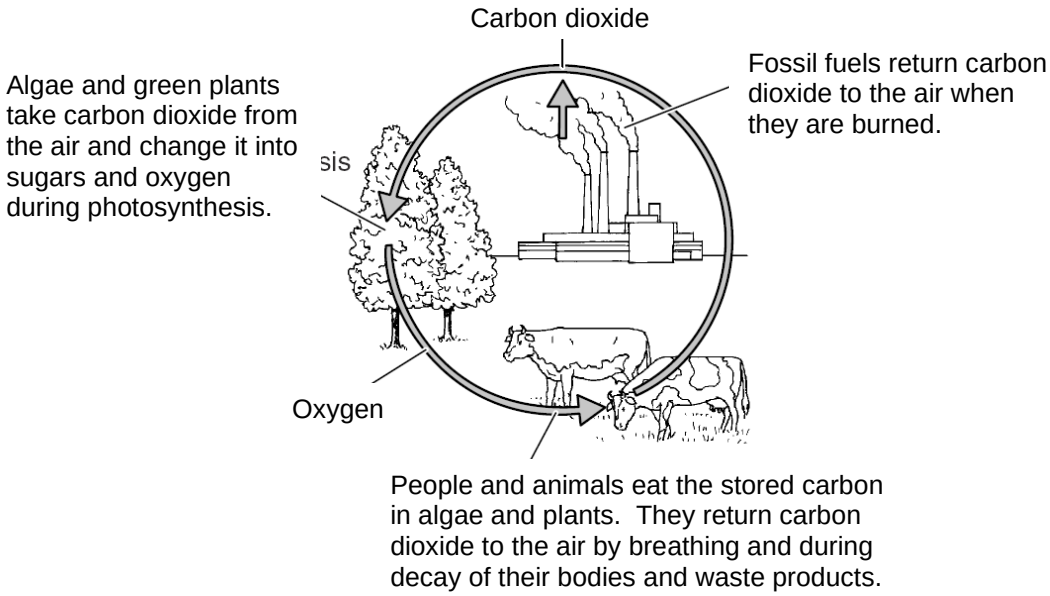

Many of the processes on the Earth's surface are **cycles**—processes that go through a series of steps in which the last step leads back to the first step. Then the process begins all over again. About 70% of the Earth's surface is covered with water. The amount of water on Earth has been fairly constant over time. The glass of water you drank yesterday may have fallen as rain last year or used by the dinosaurs millions of years ago. This is possible because of the **water cycle**. The water cycle is the movement of water from the atmosphere to the Earth's surface and back to the atmosphere. Energy from the sun causes water in oceans, lakes, rivers, streams, and even puddles on the ground to **evaporate**, or change from liquid to a gas called **water vapor.** Water vapor rises with warm air high up into the atmosphere. As the water vapor rises, it cools and then **condenses**, or changes from a gas to a liquid. As it



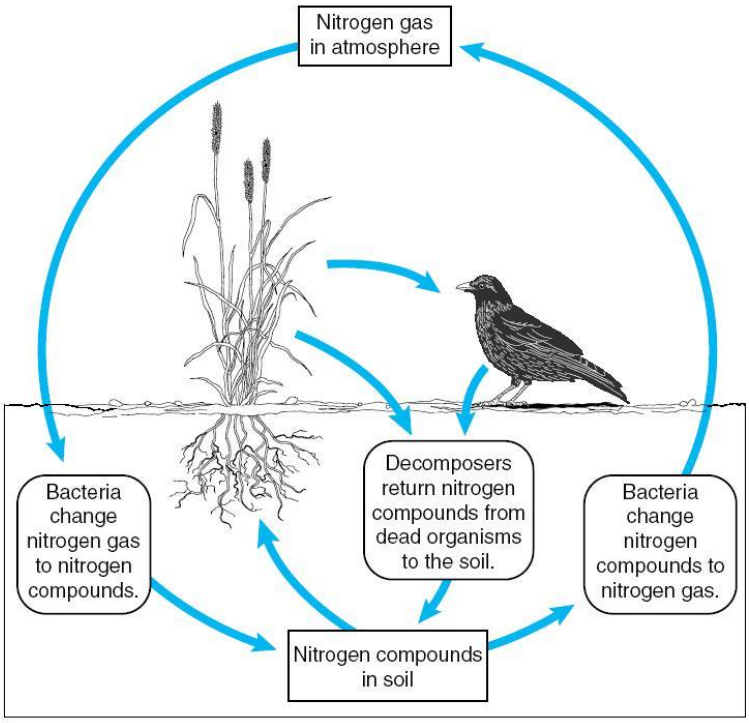
condenses, the tiny droplets of water stick together to form clouds. Gravity pulls the drops of water back to the Earth as some form of precipitation (rain, snow, sleet or hail). Some of the precipitation evaporates immediately, but most of it eventually drains back into the oceans, where the process begins all over again.

Carbon is a chemical that is necessary for life on the Earth. It is found in all living things. Carbon is continuously recycled among the atmosphere (as carbon dioxide), plants, and animals. Study the following diagram to see how the **carbon cycle** works.

**Carbon Dioxide/Oxygen Cycle**




**The Nitrogen Cycle**




Life on Earth also depends on nitrogen being available. Like the water and carbon cycles, the nitrogen cycle reuses the same material (nitrogen) in various forms. Our atmosphere is about 70% nitrogen. However, the nitrogen in the air is not in a form that people, animals or plants can use. Instead, small organisms called **bacteria** turn this nitrogen into useful **nitrates**. Study the diagram to see how the **nitrogen cycle** works.

**1.** Which of the following resources is NOT a fossil fuel?

**A** Petroleum
**B** Coal
**C** Natural gas
**D** Wind

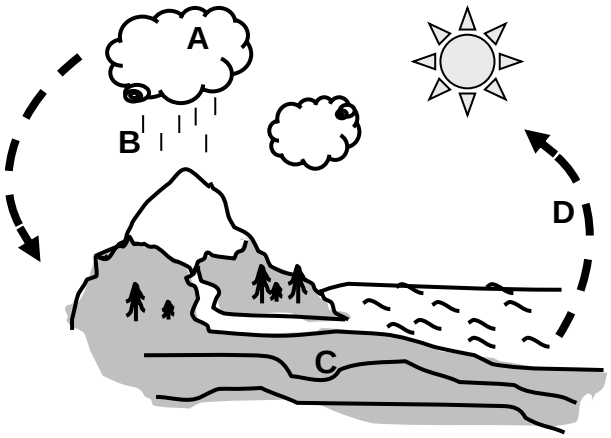
**2.** Which of these resources used for building homes is renewable?

**A** Oil
**B** Aluminum
**C** Lumber
**D** Copper

**3.** Which of the following is an example of condensation in the water cycle?

**A** Clouds forming in the atmosphere
**B** Water drops falling through the air
**C** Streams flowing into rivers
**D** Puddles evaporating on a hot day

**4.** What is the main difference between weather and climate?




**5.** In which part of the diagram above is water changing from a gas to a liquid?

**A** A
**B** B
**C** C
**D** D

**6.** During photosynthesis, plants make sugars, which contain carbon from the atmosphere. Animals eat plants and absorb these sugars. Later, animals burn these sugars for energy. What gas do animals produce that puts carbon back into the atmosphere?

**A** Oxygen
**B** Carbon dioxide
**C** Nitrogen
**D** Water vapor

**Directions: Unscramble some of the words from the article and write them on the lines next to their definitions. Then complete the sentences below using the words you unscramble.**

**7.** W R E E A H T _____ the condition of the atmosphere outside at any given time

**8.** W B R N E E E A L _____ a natural resource that can be replaced in a relatively short period of time

**9.** N N E E A L E B W N R O _____ natural resources that cannot be replaced; can be used up

**10.** S I S F S O F L L E U _____ natural resources formed from the remains of dead plants and animals millions of years ago

**11.** E E P T V A O A R _____ the process by which a liquid changes to a gas

**12.** N N C D E E S O _____ the process by which a gas changes to a liquid

**13.** Before precipitation can fall, water vapor in the air must _____.

**14.** Water spilled on the table does not disappear, the water _____.

**15.** Coal, petroleum, and natural gas are called _____.

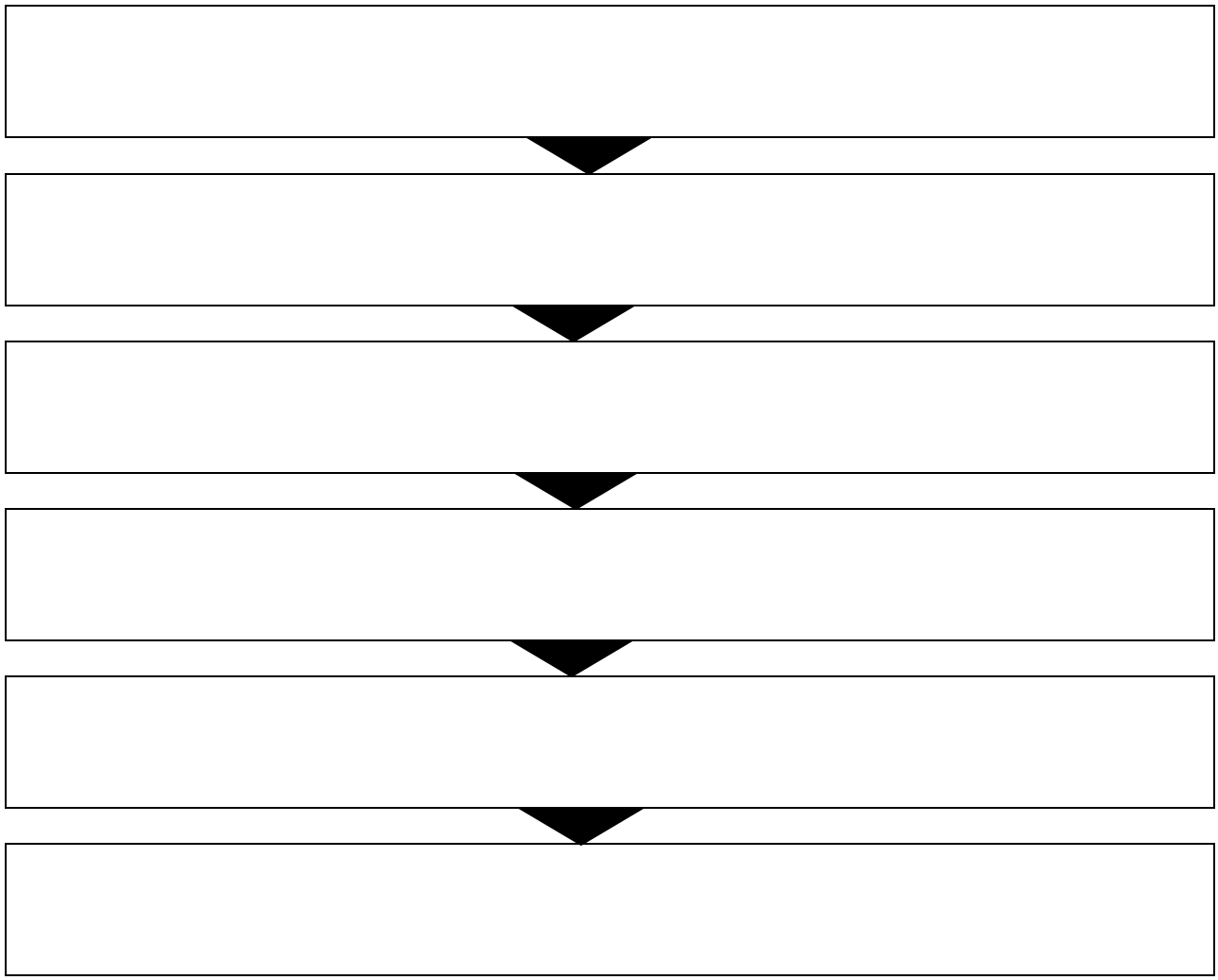
**16.** Rocks are an example of a _____ natural resource.

**17.** _____ resources include the food we eat.

**18.** In winter, the _____can change from warm one day to cold the next day.

# Event Chain

**Directions: Reread the article. Then put the events that lead to the formation of petroleum in the correct order in the event chain. Use the events listed below.**



Events List:

**A.** After millions of years of pressure and heat, the remains of the sea creatures turned into crude oil and natural gas.

**B.** To reach the crude oil, workers drill down from oil rigs through the layers of rock covering the oil and natural gas.

**C.** Further layers of mud and sand squashed the remains and buried them deeper and deeper.

**D.** Millions of years ago, small sea creatures died and fell onto the seabed.

**E.** These layers put pressure on the dead sea creatures and exposed them to temperatures of around 90$^{o}$C - 120$^{o}$C.

**F.** These dead marine creatures were covered in mud and sand which prevented them from decaying.

| | |
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| atmosphere | carbon cycle |
| climate | condense |
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| fossil fuels | inexhaustible |
| interactions | natural resources |
| nitrogen cycle | nonrenewable |
| precipitation | renewable |
| sediments | water cycle |
| water vapor | weather |

**Vocabulary Definitions**

| | |
|---|---|
| Atmosphere—the air that surrounds the Earth or any other planet | Carbon cycle—the movement of carbon dioxide and oxygen between organisms and the air |
| Climate—the general weather of an area over a long period of time | Condense—to change from a gas to a liquid |
| Cycle—a repeated sequence of events | Evaporate—to change from a liquid to a gas |
| Fossil fuels—a fuel that formed from the decayed remains of ancient plants and animals | Inexhaustible—a natural resource that can never be used up (solar energy, wind) |
| Interactions—the action of two or more things that have an effect on each other | Natural resources—materials in the environment that are useful to people |
| Nitrogen cycle—the movement of nitrogen between organisms and their surroundings | Nonrenewable—natural resources that cannot be replaced quickly enough to meet people's needs |
| Precipitation—any form of water that falls naturally from the clouds (rain, snow, sleet, and hail) | Renewable—resources that nature produces again and again in a relatively short period of time |
| Sediments—bits of rock, soil, sand, shells, and the remains of organisms | Water cycle—the change of water from one state to another as it moves between Earth's surface and the atmosphere |
| Water vapor—the gaseous state of water | Weather—the condition of the atmosphere outside at any given time |