Name _____ Date _____

SC.4.E.6.1 Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure). **SC.4.E.6.2** Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.

Rocks and Minerals

A **mineral** is a nonliving solid with a crystal form. Diamonds are minerals, and so is salt. Metals, such as copper, silver, and gold, are minerals. Minerals form in nature. They can be found under the ground, in caves, and in rocks. Earth has more than 4,700 minerals.

Not all minerals are shiny or clear or the same shape. Mineral crystals may have different shapes, but each kind of mineral always has the same crystal form because the particles in a crystal pattern are repeated. The repeated form is what determines a crystal. Salt crystals do not look like diamond crystals or pyrite crystals.

Physical Properties of Minerals

Minerals have many physical properties, such as color, hardness, streak color, cleavage, crystal structure, luster, and magnetism.

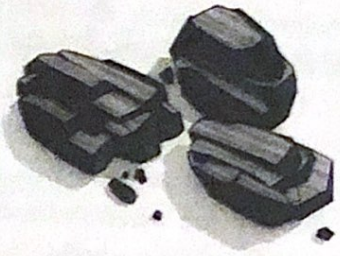
Hardness is one of the best properties to use to figure out what kind of mineral you are studying. Hardness is a mineral's ability to scratch another mineral. You can scratch talc easily, but you cannot scratch a diamond. Hardness is measured on the Mohs scale. The softest minerals, such as talc, score a 1. The hardest minerals, such as diamonds, score a 10.

Mohs' Hardness Scale	
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Feldspar
7	Quartz
8	Topaz
9	Corundum
10	Diamond

Color is the color the mineral appears. Rubies are red, and quartz is usually white or pink. **Streak** color is the color of the line left when rubbing a mineral over a streak plate. Graphite, the mineral in pencil lead, leaves a black or gray streak. The streak color is not always the same as the mineral's color. **Luster** is how shiny a mineral is. Luster is the way a mineral reflects light. Gold is shiny even when it is only specks in a rock.

Name _____ Date _____

Benchmark Review
SC.4.E.6.1, SC.4.E.6.2



Cleavage describes minerals that break with sides that are smooth and straight. It also tells you the shape of the cleavage surfaces. These surfaces carry geometry names, such as square prism or hexagonal prism. Mica is a mineral that breaks in thin sheets or cleavage lines.

Rocks

Minerals combine to make up rocks. There are three types of rocks: igneous, metamorphic, and sedimentary. Each type of rock forms differently.

Igneous Rocks

Rock formed by a volcano is **igneous** rock. This type of rock begins as molten rock, called **magma**, deep inside Earth. Magma can move upward toward Earth's surface. Igneous rocks form when the magma cools and hardens.

Volcanic lava cools and forms several kinds of igneous rock. Common igneous rocks include pegmatite and granite. Lava rocks include pumice and obsidian. Pumice is rough and is the only rock that floats. Obsidian is like glass. Long ago, humans broke off pieces of obsidian to use as spear tips and cutting tools.

Metamorphic Rocks

Metamorphic rocks are rocks that have been changed by high heat and pressure. High heat and pressure change the way a rock looks, and may change the minerals that make the rock into other minerals.

Both igneous rocks and sedimentary rocks can become metamorphic rocks. Shale is a common, gray sedimentary rock. Under heat and pressure it becomes slate. Add more heat and pressure, and slate becomes schist.

Marble is a metamorphic rock that began as limestone. It has the same color as limestone, but it is much harder.

Changes take place deep under Earth's surface to form metamorphic rocks. Mountains often contain metamorphic rock because they form when two large land masses push together. The land rises up, twists, and breaks. The pressure and heat make the metamorphic rock, and more pressure breaks the rock.

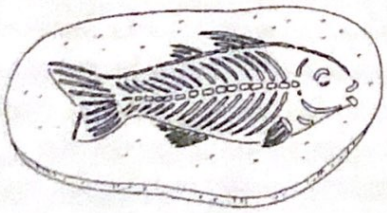
Name _____ Date _____

Benchmark Review
SC.4.E.6.1, SC.4.E.6.2

Sedimentary Rocks

About three-fourths of all rocks on Earth's surface are sedimentary rocks. Wind, water, ice, plants, and animals break down rock exposed on Earth's surface. The particles broken off rock are called sediment. Sediment collects in river and lake bottoms, and sea and ocean floors. Over time, pressure increases and particles become glued or cemented into rock.

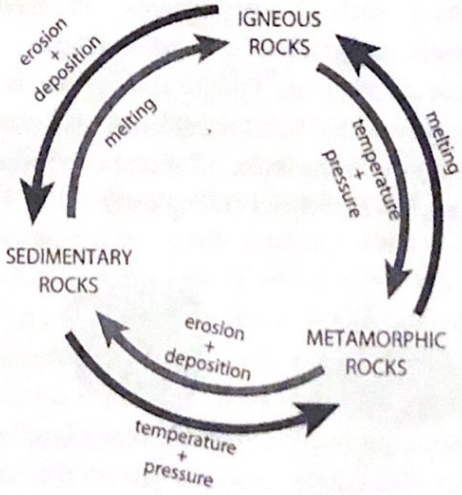
Common sedimentary rocks include limestone and shale. Because of the way sedimentary rock is formed, the remains of dead animals and plants may be found pressed into the rock. These remains, called **fossils**, are only found in sedimentary rock.



With sedimentary rock, the bottom or lower layers are usually older than the upper layers. If you look at a cliff and see several layers of rock, you will know two things. First, each layer represents a different period of time when sediment collected. Second, unless something unusual happened, the top layer is the newest layer. Every layer that you move down from the top is older than the one above it.

The Rock Cycle

Rock is continuously recycled. A volcano erupts and new igneous rock forms. Wind, water, and other agents break down the rock into particles. The particles are eroded and deposited elsewhere. The particles, over time, become sedimentary rock. Earth has an earthquake, or folding, of sedimentary rock. That rock goes deep under Earth's crust. There, under heat and pressure, it melts, and eventually becomes magma for either igneous rock or metamorphic rock. Once the changed rock reaches Earth's surface, the process of wearing the rock down, eroding it, and depositing it begins again.



Name _____ Date _____

Benchmark Review
SC.4.E.6.1, SC.4.E.6.2

Student-Response Activity

1. Explain how each type of rock is formed.

Igneous rock _____

_____

Metamorphic rock _____

_____

Sedimentary rock _____

_____

2. You have an unknown mineral. What are three ways you could test this sample to find out what mineral you have?

_____

_____

_____

3. Feldspar is a mineral, and so is quartz. When they form together, they make a rock. How would you explain the difference between minerals and rocks?

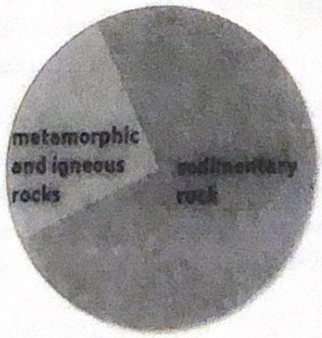
_____

_____

_____

_____

4. Observe the circle graph. Why do you think there is so much more sedimentary rock on Earth's surface than metamorphic and igneous rocks?



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Name _____ Date _____

Benchmark Assessment SC.4.E.6.1, SC.4.E.6.2

Fill in the letter of the best choice.

1. Which group contains only igneous rocks?
   - (A) pumice and porphyry
   - (B) slate and schist
   - (C) sandstone and limestone
   - (D) gold and copper

2. René has a mineral sample that she runs a nail over as a test. Which property is she testing?
   - (F) hardness
   - (G) luster
   - (H) streak
   - (I) texture

3. A rock forms under pressure at the bottom of a shallow sea. What kind(s) of rocks form?
   - (A) igneous and sedimentary rocks
   - (B) metamorphic and igneous rock
   - (C) metamorphic rock
   - (D) sedimentary rock

4. Sam gently strikes a mineral sample with a hammer. The sample breaks along a flat surface. Which physical property of minerals does this show?
   - (F) cleavage
   - (G) luster
   - (H) magnetism
   - (I) streak

5. Observe the picture.

Which type of rock is being formed?
   - (A) igneous rock
   - (B) limestone rock
   - (C) metamorphic rock
   - (D) sedimentary rock

Name _____ Date _____

Benchmark Review SC.4.E.6.3, SC.4.E.6.6

SC.4.E.6.3 Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. **SC.4.E.6.6** Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).

Natural Resources

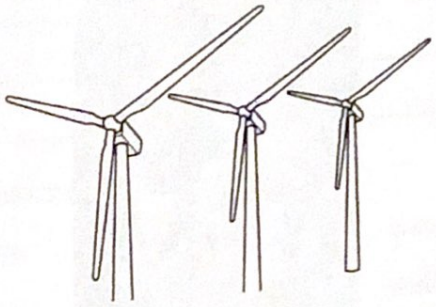
Earth provides you with many natural resources. Resources are the materials you use for building, growing crops, heating and lighting homes, making useful goods, and enjoying yourself. Resources may be renewable resources, such as wind, water, and sun. They may be nonrenewable, such as oil, natural gas, and stone.

You can use resources in their natural state, such as paving stones, coal, or natural gas. You can also make other things using resources. Shoes, plastic, pencils, and glass are made from resources. Shoes are made from plastic, rubber, and leather. Plastic is a petroleum product. Pencils are made from wood and graphite. Glass is made from silica, usually in the form of sand.

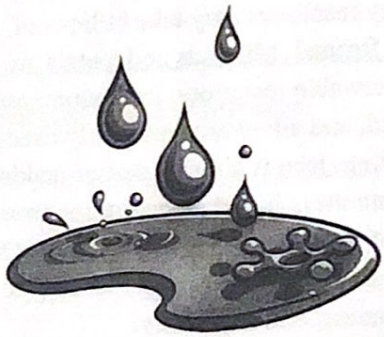
Renewable Resources

Renewable resources are resources that can be grown or replaced within a fairly short period of time. A forest is a renewable resource. Even if all trees are cut down, replanting will replace those trees within a human lifetime. Plants and animals are grown, used, and replaced.

Other renewable resources are part of the natural world. Sunlight, wind, water, and oxygen are renewable resources. For centuries, people used wind or water to power mills. Today, wind mills generate electricity.



Moving water turns turbines in hydroelectric plants and also generates electricity. We use water for cleaning, drinking, preparing food, swimming, and other uses.



Sunlight powers all plant life, which, in turn, supports animal and human life. Today, people harness the sun's power to make electricity and provide heat.

Some renewable resources can be recycled. Paper, a product made from wood, can be processed back into wood pulp and used to make new paper. Other renewable resources, such as rubber, cannot be recycled. Old tires cannot be used to make new tires. They can, however, be ground up and used in paving roads.

Name _____ Date _____

Benchmark Review
SC.4.E.6.3, SC.4.E.6.6

Nonrenewable Resources

Nonrenewable resources are natural resources that cannot be replaced within a reasonable amount of time.

Nonrenewable resources such as coal, natural gas, and petroleum cannot be replaced within a human lifetime. Called **fossil fuels**, these energy resources may take billions of years to be formed. Minerals and metals are also nonrenewable resources. Iron, aluminum, copper, gold, and silver are commonly used in manufacturing. Iron is a major part of making steel. Aluminum is found in everything from soda cans to light fixtures to automobiles. Gold, silver, and diamonds are used in industry, to make computers, and in jewelry.

While most metals can be recycled, they cannot be replaced. Humans can mine iron, but they cannot make iron.

Florida's Resources

Florida has an abundance of renewable and nonrenewable resources. Among the most important renewable resources are sunlight, water, and wind. The sun supports farming, fishing, generating power, and tourism.

Florida's nonrenewable resources include phosphate, oil, limestone, and silica. Phosphate, limestone, and silica are mined products. Phosphate is used in fertilizer. Limestone is a building material, and silica is used in making computer chips.

People in Florida use local resources to make a living. Florida's tourist industry makes use of the state's sandy beaches, ocean waters, and fishing opportunities. Many farmers take advantage of Florida's rich soil and warm climate to grow vegetables or manage groves that produce oranges and grapefruit. Florida limestone is a common stone in making cement and also as a building stone.

Wetlands and wilderness areas are among Florida's most valued natural resources. Thousands of people every year tour the Everglades to catch sight of cranes, egrets, and alligators.

Name _____ Date _____

Benchmark Review
SC.4.E.6.3, SC.4.E.6.6

Student-Response Activity

1. Define these terms.

renewable resource _____

_____

nonrenewable resource _____

_____

2. Sort these resources into renewable resources and nonrenewable resources.

oil	natural gas	limestone	timber	water
gold	coal	iron	sun	wind

Renewable Resources	Nonrenewable Resources

3. Why would a wetland environment in Florida be considered a natural resource?

_____

_____

_____

4. The use of resources can cause problems. What solutions can be used to save some of these natural resources? Fill in the blank spaces in this chart.

Possible Problems	Possible Solutions
1. Overfishing in Florida's waters	
2. Cutting trees down for timber	
3. Using too much limestone for building	

Name _____ Date _____

Benchmark Assessment SC.4.E.6.3, SC.4.E.6.6

Fill in the letter of the best choice.

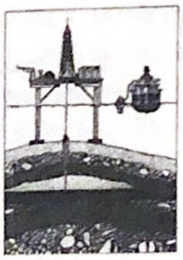
1. How do humans use wind as a resource?
   - (A) for cooling homes and buildings
   - (B) for heating their homes in winter
   - (C) for making electric power
   - (D) to run cars for going to work or school

2. Which is one way to reduce the use of natural gas?
   - (F) to use wind or solar power to produce electricity for homes
   - (G) to limit the amount of natural gas people are allowed to use
   - (H) to cut the amount people drive
   - (I) to stop truck travel on highways

3. A city in central Florida wants to change how it generates electric power for its citizens. The city currently uses coal, which is not expensive but causes air pollution. Which would be the **best** source to make electricity for the city?
   - (A) oil because it is nonrenewable, it causes air pollution, and is cheap
   - (B) water because Florida has plenty of water around it
   - (C) biomass because Florida can always grow more forests if it needs to, although burning wood does cause air pollution
   - (D) solar power because it is renewable, and it does not pollute the environment.

4. Students were asked to choose a resource and explain how it is used. Which student did not follow the assignment?
   - (F) Cara chose silicon, explained mining, and told that silicon is used in computer chips.
   - (G) Chan compared the use of coal to natural gas in generating electricity and explained the costs of each.
   - (H) Coco showed six soil samples and a list of fruits and vegetables grown in each type of soil.
   - (I) Callie made a poster showing where limestone is mined in Florida and buildings made of limestone.

5. This picture shows a drilling rig pumping oil from an oil reserve.



What problem might engineers face when collecting this resource?
   - (A) The oil reserve is underground.
   - (B) The reserve has too much oil to collect.
   - (C) Oil pollution might occur from an oil spill at the drilling rig.
   - (D) People no longer use oil, so collecting oil is a wasted effort.