

Activity—Rock Identification

Standard III

Objective 1

Connections

Standard III

Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs of plants provided by soil.

Objective 1

Identify basic properties of minerals and rocks.

Intended Learning Outcomes

1. Use science process and thinking skills.
3. Understand science concepts and principles.

Background

Rocks are combinations of minerals found naturally on or in the Earth. Rocks record the history of the Earth in their structure. Rocks can be identified by properties such as color, crystal size or texture, banding patterns, presence of pores, and other characteristics (see student rock identification background sheet).

Invitation to Learn

Show students a rock such as a piece of granite. Ask them to describe the rock. Ask them what happened to make the rock look the way it does. Explain to students that the rock has a “story” and it can be told if you know about rocks. For example, if you chose to show them a piece of granite (igneous rock), the story might go like this: “I started life as a hot, hot liquid. Slowly I rose toward earth’s surface and started to cool. As I cooled, minerals I was made of started to “find” each other and form crystals. I started to look speckled and very pretty. I cooled completely off and rose a little higher in Earth’s crust. Soon, rain, water and even a glacier scraped off the rock on top of me. I was exposed to the light for the first time!”

Instructional Procedures

1. Have the students read the background material about the three types of rocks.
2. Give each group a set of ten rock samples and a hand lens. Give them time to explore and study the rocks. Have them sort the rocks by appearance according to the descriptions they have read (sedimentary, igneous, metamorphic). They should record their observations in their log or on the “Kinds of Rocks” chart.

Materials

- Set of rocks for each group of students (sedimentary: sandstone, conglomerate, shale; igneous: obsidian, granite, pumice, basalt; metamorphic: marble, gneiss, schist)
- Hand lens
- Student Rock Identification Background sheet
- Rock chart
- Rock poster or rock field guides

- Students should identify each rock. Use the rock poster or field guide to check.

Curriculum Integration

Math/Science—Describe and identify geometric shapes.

Possible Extensions/Adaptations/Integration

- Make a sedimentary rock. Fill a clear jar with pebbles, sand, twigs, and leaves. Add 1/4 cup (50 ml) Epsom salts (available at a drugstore). A jar with straight sides works best. Add water until there is only about 2 inches (5 cm) of space left at the top. Put the lid on the jar and shake. Once all of the ingredients begin to float, they should be called sediments. When thoroughly mixed, place the jar on a flat surface. Check the jar every hour or so. You will be able to see the heavier layers settle to the bottom first. When everything has settled, carefully pour the water out and let the layers dry completely. You will have a homemade sedimentary rock. The Epsom salts (magnesium and sulfur) act as glue to hold the rock together.
- Here is a delicious, memorable way to make the 3 types of rocks. Materials needed are a bag each of chocolate, butterscotch, and white chocolate chips, small portion cups, sandwich bags, and gummy worm pieces.
 - Sedimentary rocks**
Melt some of the three types of chips in a double boiler. This is the sedimentary “mud.” Give each student a portion cup with 2–3 of each type of chip. This represents different kinds of rocks. (Optional: They could “weather” them by cutting them in pieces with a plastic knife.) Give each a piece of gummy worm to represent a fossil. Pour “mud” into their cups. (Remind them that mud found on lake/ocean bottoms is cold. But be careful that students do not burn themselves on the melted chocolate.) When their rock is hard, students could cut it in half to find their “fossil” and pieces of rocks.
 - Metamorphic rock**
Give each student a few of each type of chip. Place them inside a sandwich bag. Squeeze the bag between hands. This represents heat and pressure. The chips will partially melt. When the rock has hardened, students will still be able to see the different “minerals” and rocks that make up their metamorphic rock.

c. Igneous rock

Melt some of the 3 types of chips in a double boiler. Have students put in samples of each. Note that the final color is different from the colors of the 3 "minerals" and rocks that make up this igneous rock. Pour melted mixture into portion cups for each student.

3. This activity demonstrates layering. Collect various types and colors of fabric. Cut into rectangles (4" x 12" or so). Place the fabrics on top of each other to represent the layers often seen in sedimentary rocks. Now fold the material over to represent the upheaval and movement in the earth. Cut the whole thing in half. Have the students examine the layers. This activity could also be done with clays of different colors.
4. Combine rock identification with the geography of Utah. Identify where the rocks might be found.

Assessment Suggestion

Have each student pick one of the ten rocks and write its "story" (see Invitation to Learn). Stories could be bound into a class rock book and used for review.

Additional Resources

Kits with rock, mineral, and fossil samples may be checked out
Geology Rocks by Cindy Blobaum (Williamson Publishing Co.), 1999
Rocks and Minerals Alfred A. Knopf, Inc. (Eyewitness Books), 1988
Rockhounds Information Page: www.rockhounds.com

Department of Natural Resources / Utah Geological Survey:
<http://geology.utah.gov>

Rocks and Soil by R. Sneddon (Raintree Steck-Vaughn Company),
1999

Rocks and Minerals Reader's Digest Children's Publishing, Inc.
(Weldon Own, Inc.), 1999

SURWEB www.surweb.org/ Go to Media Shows. Click on Earth +
Physical Science. Click on Geology. Choose Earth Science:
Where does sedimentary rock come from? Another site is on the
Learning Segments. Choose Science 4th Grade Utah Rocks +
Minerals

Pioneer's Online Library pioneer.uen.org/ Choose "Digital
Curriculum" - "Rocks + Mineral" a RealWorld Science video

Video: *Rocks and Minerals*. Series in Real World Science, Science in the Real World.M1541: Mazzarella Communications, 1999. Footage of various rock formations and a “field trip” to a quarry, mine and cave will give students the ability to recognize specific rocks and minerals. Colorful graphics and animation show the layers of the earth and how rocks are formed.

Homework & Family Connections

Start a rock collection at home. Use an egg carton to sort and store them. Use separate egg cartons for the three types of rocks.

Name _____

How Are Rocks Formed?

Question: How are rocks formed?

Here is a delicious way to learn and remember the three ways rocks are formed.

Materials:

3 flavors and colors of chips: chocolate (brown), butterscotch (tan), white

(These are the chips for making cookies.)

plastic baggies, small double boiler, plastic knife, gummy worms to represent fossils

SEDIMENTARY ROCKS

1. Melt some of each flavor of chips in the pot.
2. Take a few chips of each color and “weather” them by breaking them into smaller pieces. (The plastic knife would be helpful.)
3. Place the “weathered” chips into a small cup. Add a piece of gummy worm to represent fossils – which are only found in sedimentary rocks.
4. Pour some of the melted “mud” over the chips.
5. When the “sedimentary” rock has cooled and hard, cut it in half and examine it.
6. Explain how your chocolate rock is like a sedimentary rock. Then you can eat it.

METAMORPHIC ROCKS

1. Place several chips of different colors inside a plastic bag.
2. Apply heat and pressure by squeezing the bag between your hands until the chips have melted a little and have formed one chunky piece.

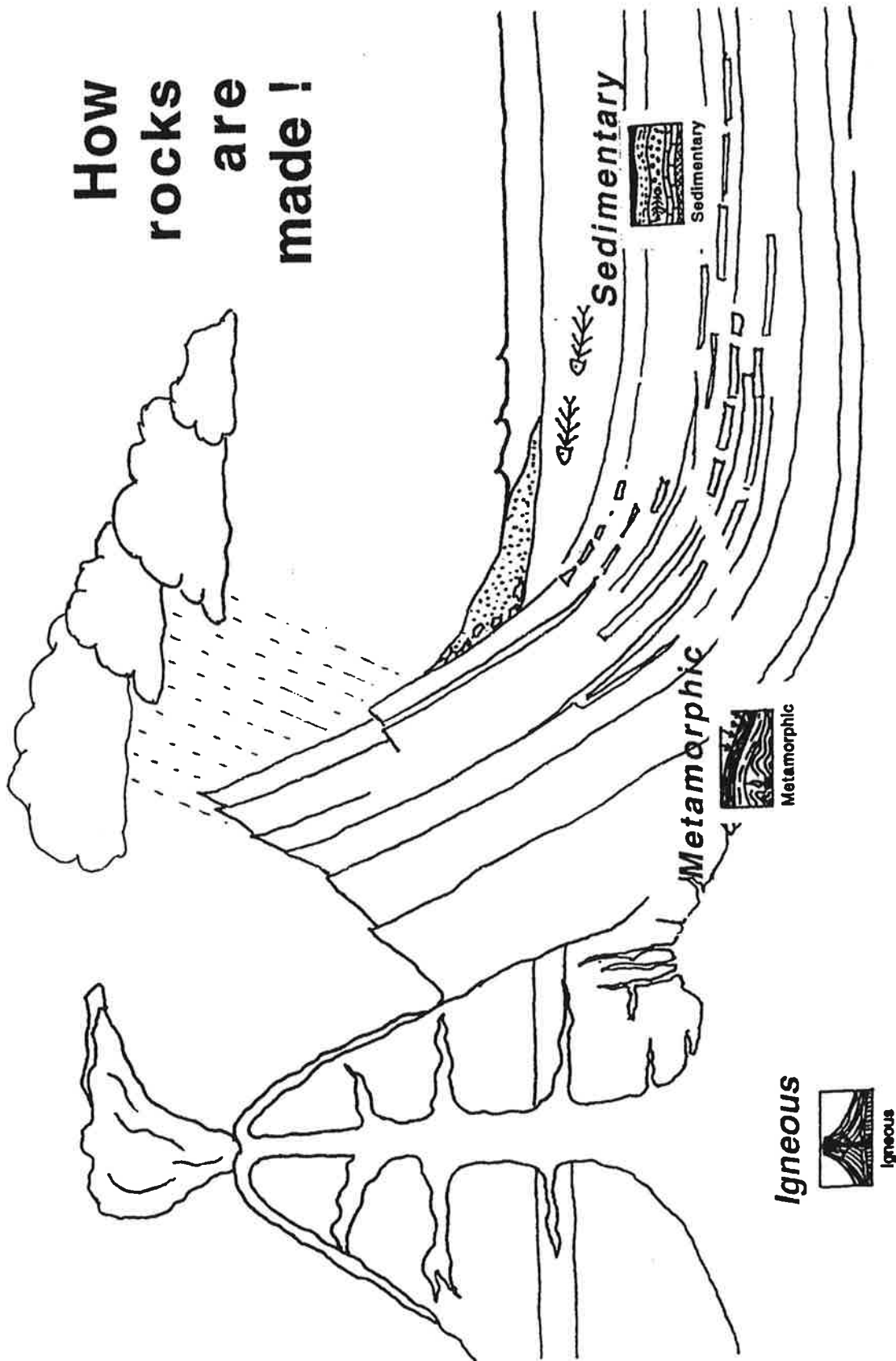
3. Let the chunk cool. Take it out, cut it in half and examine it.
4. Explain how it is like a metamorphic rock. Then you can eat it.

IGNEOUS ROCKS

1. Put 3 different kinds of chips into the pot and heat until the chips have completely melted.
2. Pour into small cups and let cool. Cut your sample in half and examine it.
3. Explain how it is like an igneous rock. Then you can eat it.

Explain how one type of rock can become another type of rock.

How rocks are made!



Identifying Rocks

Use the following descriptions to help you identify the rocks you have been given.

Record your findings on the “Kinds of Rocks” chart.

SEDIMENTARY rocks are formed from small particles of rock and other materials that are created through weathering. Most sediments are deposited by running water. Some are left by wind, glacial ice, or evaporation. The size of the sediments is determined by the speed of moving water. The faster the water, the bigger the rock it can move. Most sedimentary rocks were formed of sediments deposited or left by ancient shallow seas.

Sedimentary rocks usually have rounded sediments, or particles. They are often layered.

Some common sedimentary rocks found in Utah are sandstone, conglomerate, and shale.



Sandstone



Conglomerate



Shale

Shale is formed from particles of clay which were deposited in deep, quiet waters. It is usually red, brown, or gray. When it is wet it has a “muddy” smell.

Sandstone is formed from particles of sand that were deposited near the shore where there was wave action. It is rough and grainy to touch. It may have fossils in it. Under a hand lens, you usually see sand grains.

Conglomerates are sediments, pebbles, and other size rocks cemented together by minerals from water.

METAMORPHIC rocks are rocks that have been changed by heat and pressure. The heat comes from volcanoes and other hot rocks under Earth’s surface. Pressure comes from the layers of rock that press down on layers below them. Metamorphic rocks may have crystals or layers because they are formed from other rocks.

Some common metamorphic rock found in Utah are marble, gneiss (nice), and schist (shist).



Marble



Gneiss



Schist

Marble is a large crystal rock formed from limestone. Its color depends on the presence of different minerals. It is generally pink, red, yellow, brown, green, or black.

Gneiss is a coarse or rough rock. It has parallel streaks or bands of minerals in it. It may be formed from a variety of rocks, including granite and basalt.

Schist is a medium-grained rock. It is formed from shale or slate.

IGNEOUS rocks are formed when magma, or melted rock, from deep inside Earth rises and cools. This cooling may happen below the surface or on the Earth. When magma cools slowly below the surface, the igneous rock formed may have large crystals, which are very easy to see. Other igneous rocks form on the earth's surface and cool more quickly. Their crystals are usually extremely small. Igneous rocks are usually not layered. They may have air holes in them. Or they may be glasslike.

Some common igneous rocks found in Utah are obsidian, granite, pumice, and basalt.



Obsidian



Granite



Pumice



Basalt

Obsidian is a glass formed from rapidly cooled lava. It forms so quickly there is not time for crystals to grow. It has very sharp edges. Early people found this very useful for making tools such as arrow heads.

Granite is made up of mainly coarse (large) grains of quartz, feldspar, and mica. (Quartz is a colorless, transparent, hexagonal-shaped mineral. Feldspar is a glassy mineral. Mica is a translucent or colored mineral that comes in thin layers.) The individual grains in granite are large because they formed as the magma cooled slowly deep in the earth. Granite is usually speckled and varies in color from gray to red according to the different amounts of minerals.

Pumice is hardened lava froth. Because the froth contains gas bubbles, the rock is peppered with holes, like a honeycomb. Pumice floats in water.

Basalt is a common igneous rock. The grains in basalt are fine or small. It is often a heavy, dark colored rock. Large pieces of basalt may split into many-sided columns.