

4th Grade 2nd Day

Science Literacy Connection 1

Properties of Rocks

Standard 3: Students will understand the basic properties of rocks, the processes involved in the formation of soils, and the needs to plants provided by soil.

Objective 1: Identify basic properties and minerals of rocks.

- c. Sort rocks by appearance according to three basic types: sedimentary, igneous and metamorphic (e. g., sedimentary - round-appearing minerals and rock particles that are cemented together, often in layers; igneous – with or without observable crystals that are not in layers or with or without air holes or glasslike; metamorphic – crystals/minerals, often in layers).
- d. Classify common rocks found in Utah as sedimentary (i.e., sandstone, conglomerate, shale), igneous (i.e., basalt, granite, obsidian, pumice) and metamorphic (i.e., marble, gneiss, schist).

4th grade science: Word Splash and Predict

In the content areas, reading can be overwhelming to students. Starting with smaller chunks of text can help, but sometimes the amount of text still overwhelms students.

Word Splash is a pre-reading strategy that can help students hone in on the important facts and vocabulary of a passage prior to reading so that the reading is less intimidating to conquer. It is also a way to pre-assess background knowledge and use teachable moments (teaching the unknown concepts before reading).

1. Give students a broad introduction to what is going to be learned. (Today we are going to read about a rocks.)
2. Give students access to the passage that is to be read and ask them to read it two times. Have them read the first time for general comprehension. As they read the second time, have students make a note of words that are related to the topic – words that are related to social studies, science, or math content.
3. After time has expired, have students share the words they found related to the topic. (The teacher can write them on the board or students could be allowed to come up to write them as well. There are many ways that this can be accomplished.)
4. After getting a good number of terms, ask the students to make a prediction about the content of the lesson for the day.
5. Note that the definition to some of the science words are found at the end of the passage.

Getting to Know Rocks (from 4th grade TRB, page 10.3.1)

We live on a rocky world! Rocks are all around us. We live on rocks even though we can't always see them. These rocks are sometimes hidden deeply beneath our feet, and sometimes they are exposed on Earth's surface so we can see them. On mountaintops, where the soil is very thin, rocks often poke through.

All rocks are made of mixtures of different minerals. Minerals are the building blocks from which rocks are made. People who study rocks make observations of rocks they discover. They identify the different minerals in the rocks they find. How can they do this? Each mineral has a certain color (or colors), appearance, shape, hardness, texture, crystal pattern, and possibly a smell that sets it apart from another. As scientists test each mineral's characteristics, they are able to tell which minerals are in the rocks.

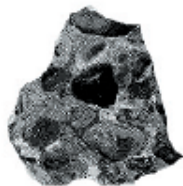
Rocks can change over a period of time. The rocks we see today may have looked differently millions of years ago. How rocks change depends on the type of rock and where it is found on Earth. Rocks on Earth's surface are changed by weathering. Weathering of rocks can be caused by the action of plants, wind, heat, or water. The roots of plants can grow into the cracks and soft parts of rocks. As the roots grow larger, they break off pieces of rock from the main rock. Plants can also grow on the rocks when the conditions are right. The acids in plants dissolve parts of the rocks that the plants are closest to. Wind blows sand and dirt onto the surface of rocks and wears them away. Heat from the sun causes rocks to expand. At night the rocks contract. This constant expansion and contraction will eventually break up the rocks.

When running water carries rocks down a river or stream, the water knocks the rocks against each other and they break apart. Water can also dissolve the soft parts of rocks and leave holes or water lines where rocks are worn away. However, most weathering is caused by the action of water as it runs into the cracks of rocks. During the day when snow thaws, water seeps into the cracks of rocks. At night when the temperature gets cold, the water freezes. As it freezes, it expands and breaks the rocks apart.

The sediments resulting from weathering may not stay in one place very long. The broken rock or sediments can be carried away by wind, moving water, or moving ice. This is called erosion. The sediments gather at the mouths of rivers or the bottom of lakes or shallow seas. Over time, layers of sediments continue to build in these bodies of water and press down on the layers beneath. Some minerals in the sediment dissolve in the water and act like cement, holding the sediments together. When this happens a solid mass of rock is formed. These rocks are called sedimentary rocks. Sedimentary rocks usually have rounded sediments, or particles, and are often layered. Some common types of sedimentary rocks found in Utah are: sandstone, conglomerate and shale.



Sandstone



Conglomerate



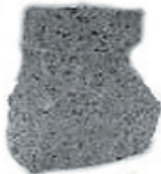
Shale

There are three types of rocks: sedimentary, igneous, and metamorphic. In the next few paragraphs you will learn how and where these rocks form. Igneous rocks form when melted rock rises up from inside Earth and cools. This cooling may happen below Earth's surface or on Earth's surface. When melted rock is below Earth's surface (magma), it takes many years to cool. As it slowly cools, the igneous rock formed may have crystals, which are very easy to see. When melted rock is above Earth's surface (lava), it doesn't take long to cool. Because the surface cools rapidly, these igneous rocks may have air holes in them or appear glasslike. They hardly ever form crystals and are never layered.

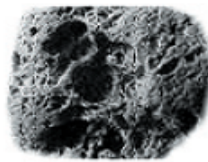
Many igneous rocks are found in Utah. Below are four igneous rocks that are very common in Utah. Obsidian looks like black glass. Native Americans often used this rock to make spears and arrow heads. Granite is often used as building material. It has visible crystals in it. Pumice floats on water because there are air pockets in this rock. Basalt is a heavy, dark rock because it has the element iron in it. It may have air holes throughout it also, but it doesn't float. Many people use this rock for decoration in their yards. Which of these igneous rocks formed inside Earth? Which ones formed on Earth's surface?



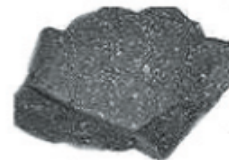
Obsidian



Granite



Pumice



Basalt

Metamorphic rocks are rocks that have been changed inside Earth by heat and pressure. Heat comes from volcanoes and hot rocks under Earth's surface. Pressure comes from the layers of rock pressing down on layers below them. Both heat and pressure must exist at the same time to form metamorphic rocks. Metamorphic rocks may have crystals or layers. Sometimes we call the crystals gems because they are rare or valuable. Some of the most valuable gemstones like rubies, sapphires and garnets are found in metamorphic rocks. Other kinds of metamorphic rocks may be used in buildings and art because of their beauty.

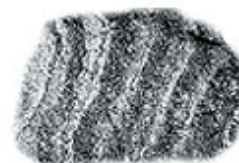
Metamorphic rocks found in Utah are marble, gneiss (nice) and schist. Marble starts out as limestone. Under heat and pressure the crystals in limestone recrystallize, making marble harder and stronger than limestone. Marble is used in buildings and carving statues. Gneiss begins as granite. Under heat and pressure the minerals line up with each other, giving the rock a banded appearance. Schist begins as clay sediments. Erosion transports the clay sediments through water to the bottom of a lake or shallow sea. As pressure increases and mineral cementing takes places, the clay turns into shale, a sedimentary rock. If heat is also added, it will help turn shale into slate, a metamorphic rock. If the heat and pressure continue, mica crystals begin to form in the slate. These mica crystals grow together, giving schist a very shiny and sparkly appearance.



Marble



Gneiss



Schist

Words to know:

metamorphic : rocks that has been changed by heat and pressure

minerals : solid materials formed in nature that has a specific crystal structure

weathering : the breaking down of rocks into smaller pieces called sediments

erosion : the movement of rock fragments from one place to another

freezes : turns to ice

igneous : rocks formed when magma, or melted rock, from deep inside Earth, rises and cools

sedimentary : rocks formed from sediments that have settled into layers

thaws : melts