

2ND GRADE

MINERAL AND ROCK EXPLORATIONS

Summary: Students explore rocks and minerals. Students learn about the differences between minerals, sedimentary rocks, igneous rocks, and metamorphic rocks. By studying samples of each rock or mineral, students will begin to see similarities between samples within each group. Students also learn the uses for different rocks and minerals by looking at pictures.

Intended Learning Outcomes for 2nd Grade:

Objective 1: Framing questions. Conducting Investigations. Drawing conclusions.

Objective 2: Connecting ideas with reasons.

Objective 3: Ideas are supported by reasons.

Utah State Core Curriculum Tie:

Standard 2 Objective 1:

Explain how smaller rocks come from the breakage and weathering of larger rocks. Describe rocks in terms of their parts. Sort rocks based upon color, hardness, texture, layering, particle size and type.

Preparation time: 30 min

Lesson time: 50 min

Small group size: works best with one adult for every 5 students

Materials: For a class of 30 students, make two bags of each of the 4 types so that 6 stations can be set up. If a smaller class, four stations may be enough.

Minerals: Most schools have a supply of many of these minerals or they may be purchased from different companies, unless noted these are from Carolina.com.

Quartz, GEO3498B, pack of 10, \$8.00

Talc, GEO3520B, pack of 10, \$8.45

Pyrite, GEO3486B, pack of 10, \$19.95

Magnetite, GEO3476B, pack of 10, \$16.75

Graphite, GEO3452B, pack of 10, \$21.25

Fluorite, GEO3448B, pack of 10, \$14.95

Rocks: Most schools have a supply of many of these rocks or they may be purchased from different companies, unless noted these are from Carolina.com.

Sandstone, GEO2010B, pack of 10, \$7.60

Basalt, GEO1012B, pack of 10, \$7.60

Obsidian, wardsci.com, 47V5742, pack of 10, \$8.75

Pumice, GEO1130B, pack of 10, \$7.60
Granite, GEO1080B, pack of 10, \$7.60
Marble, GEO2054B, pack of 10, \$7.60
Gneiss, GEO 2046B, pack of 10, \$7.60
Schist, wardsci.com, 47V0297, pack of 10, \$13.95
Slate, GEO2084B, pack of 10, \$7.60
Limestone, GEO1198B, pack of 10, \$10.10
Chalk, wardsci.com, 47V4662, pack of 10, \$10.95
Coal, GEO1188B, pack of 10, \$7.60

Magnifying lenses

Magnets

Cup

Spatula

Background information:

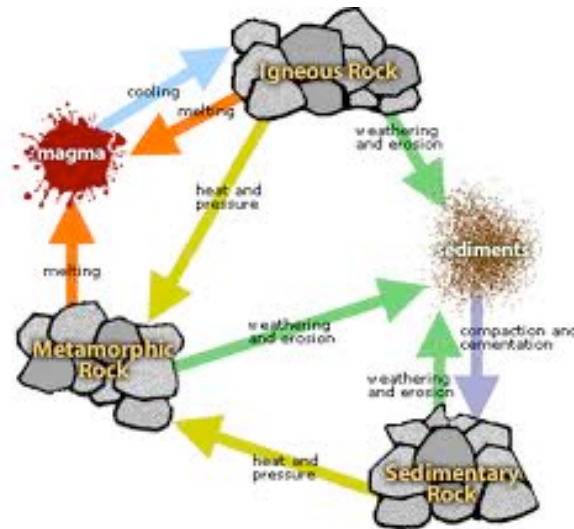
Minerals are naturally occurring pure substances. No matter how tiny of a piece of mineral you have it is the same as all other pieces of that same mineral. Minerals have a very orderly structure that is usually, but not always, seen as crystals. There are more than 3000 known minerals on Earth. Combinations of different minerals make up all the rocks on earth.

Geologists tell minerals apart based on nine properties: color, luster, density, crystal form, cleavage (smooth, flat surface pattern when a mineral is broken), fracture (irregular pieces formed when broken), tenacity (toughness), hardness (ability to scratch or be scratched), and transparency. Minerals have many different uses that are usually dependent on their properties.

Rocks are made up of more than one kind of mineral. Rocks belong to one of three groups: sedimentary, igneous or metamorphic. Sedimentary rocks make up about $\frac{3}{4}$ of the rocks at the Earth's surface. They form when sand, mud, organic materials, and other types of sediment collect. When this sediment is pressed together, due to the weight of water or Earth, it forms fairly soft rocks. Many times layers and pieces of sediment can be seen in sedimentary rock. Fossils are found in sedimentary rock. Igneous rocks begin as hot, fluid material that comes from deep under the Earth's surface. Intrusive igneous rock is formed from magma under ground. Intrusive igneous rocks cool slowly and many times the individual mineral crystals can be seen. Extrusive igneous rock is formed from lava above ground. Extrusive rocks cool very quickly and minerals are generally not seen leaving a glassy shiny rock or one with air bubbles trapped inside. Metamorphic rocks occur when sedimentary and igneous rocks change due to temperature and pressure underground. Many times wavy ribbon-like layers with shiny crystals can be seen in metamorphic rocks.

The rock cycle is a scientific concept that describes how rocks change through time. Rock components are never created nor destroyed but are constantly recycled into new rocks. When rocks come close to the surface of the

Earth they can be weathered, eroded and compacted into sedimentary rocks. When liquid magma cools either below or above the surface of the Earth it becomes igneous rock. When rocks get forced back down into the Earth they can be heated, pressed and melted into metamorphic rocks. Therefore, rocks can be changed into one form or another depending on the Earth's forces that are acting upon them.



Pre-lab discussion: Hold up a mineral and a rock. Ask the students if they can predict which is the mineral and which is the rock. From this prediction, explain the differences between minerals and rocks. Ask if any students know the three types of rocks and go over their differences. Ask them if people use rock. Look for all the different types of rock that may be in the classroom or in their home.

Instructional procedure:

I. Mineral and Rock Stations: This lab can be completed by either moving bags through the room or moving the students from table to table. At each 'station' have a copy of the specific mineral or rock directions, the specific mineral or rock picture of uses page, 4 or 5 mineral or rock samples of each type, and any associated tools to perform tests on the minerals or rocks. Placing the directions, pictures and rock samples in a large ziploc bag makes for an easy way to manipulate the lab.

A. IGNEOUS ROCKS -- Forms when magma in the earth cools and then hardens.

basalt -- Look at this rock with the magnifying lens. This rock very commonly comes out of volcanoes and when it hardens it can form very rhythmic patterns. This rock is often used as flooring where the rhythmic patterns can be seen.

obsidian -- Rub this rock in your hands and feel how smooth it is. This rock forms when the magma cools very quickly which results in a smooth texture. Use the magnifying lenses to study the lines in this rock. This rock was used as a source of arrowheads because it is very strong and can be made sharp. It is also used in jewelry.

pumice – Have students hold this rock in their hands. Predict what will happen when they put this rock in a cup of water. Do the experiment and describe what happens. This rock has an abrasive quality and is used to rub dry skin from the body or as a cleaning abrasive. Rub it on your arm and see how it feels.

granite -- Look at this rock with the magnifying lenses. See if you can find at least 3 different minerals that form this rock. This rock is very beautiful, hard and tough and is used in homes for countertops.

B. SEDIMENTARY ROCKS -- These rocks are formed when layers of other living and non-living matter is compressed by pressure or heat.

sandstone -- Use the magnifying lens to see if you can find the lines created when this rock was formed due to pressure. Gently rub two sandstone rocks together and describe what happens. Red sandstone can also be used to build. See the picture of a building in India.

limestone -- Gently rub two limestone rocks together. Describe what happens. Limestone is used to make concrete. When it is heated it produces lime, which is an important chemical in steel production and water purification. Limestone is also used for building walls in homes and landscaping.

chalk -- Use the chalk to make light marks on a slate rock. This was how teachers used to write their lessons for students. They used a slate board and chalk. Chalk is made of a calcium salt formed mostly from microscopic plants that were compressed in the ocean.

coal -- Hold the coal in your hands. Notice how messy your hands get. This is a fossil fuel that burns very easily and produces energy. It consists of plants that were compressed over millions of years on land. When coal is burned off it puts off gases that are very damaging to our environment.

C. METAMORPHIC ROCKS -- These rocks used to be igneous or sedimentary rocks that were put under great pressure or heat and became a new type of rock. Metamorphic rock form much of the earth's crust.

marble -- Use the magnifying lens to study the marble. Notice the bright shiny pieces that make it beautiful. Also see the lines created by all the pressure this rock was under. Marble is used in homes and in sculpture. Feel how hard this rock is and imagine carving this man out of it.

gneiss -- Use the magnifying lens to study the gneiss. See if you can find at least three minerals that make up this rock. Gneiss is used to make statues, paperweights and bowls. The picture shows that gneiss is also used to make countertops.

schist -- Use your magnifying lens to study the layers that formed this rock. Notice the shiny minerals inside it as well. Think about how many minerals you think make up this rock. These can be used on buildings floorings to make beautiful structures.

slate -- This rock formed from the sedimentary rock shale and is composed of very small pieces of mud and silt. Use the magnifying lens to see the layers that formed this rock. Slate is often used as a roofing material or as flooring.

D. MINERALS -- A pure substance, several minerals together make up a rock.

fluorite -- Look at the different colors in the fluorite samples. Fluorite is considered by many to be the most beautiful crystal in the world because of its many colors. Look with the magnifying lens at the crystal shapes and layers in the fluorite. The fluoride in our toothpaste comes from fluorite.

magnetite -- Place a magnet near this mineral and see what happens. We get iron from this mineral. Magnetite was used by early explorers to make a needle compass.

graphite -- Rub graphite on the piece of white paper and see what happens. We use graphite in our pencils.

quartz -- Look at this substance and notice that it is clear. This is the major component of most sand and is used to make glass. Quartz crystals are used in watches to help determine how long a second is by vibrating.

pyrite -- Look at the shiny substances in this mineral. It looks like gold and during the gold rush many people thought that it was and they would be rich. That is how it got its name 'fools gold'. Pyrite is used in jewelry.

talc -- Use a spatula to scrape some of this mineral. Describe what happens and how it feels when you rub the powder between your fingers. Talcum powder is made from this mineral.