Identifying Rocks and Minerals

Background:

The material that makes up the solid parts of Earth is known as *rock*. Based on the processes that form and change the rocks of Earth's crust, geologists classify rocks into three major types by the way the rocks form. Igneous rock forms when magma (molten rock below the surface of the Earth), or lava (molten rock on the surface of the planet, cools and hardens. They can form underground or above ground and are found near volcanoes, and volcanic vents on the surface. Sedimentary rock forms when sediment deposits that form when rocks, mineral crystals, and organic matter have been broken into fragments, called *sediments*, are compressed or cemented together. Sedimentary rocks can also contain fossils. Fossils are found only in sedimentary rocks. Metamorphic rock forms when existing rock is altered by changes in temperature, by changes in pressure, or by chemical processes. They are formed deep underground by intense heat and pressure that is applied over a long period of time.

A mineral is defined as a naturally occurring inorganic solid that has a characteristic chemical composition, an orderly internal structure, and a characteristic set of physical properties. The whole earth is made of rocks and minerals. A rock is made up of 1 or more minerals. A mineral is composed of the same substance throughout. All rocks are made of minerals. You need minerals to make rocks but do not need rocks to make minerals.

We identify rocks and minerals through a few physical tests. Color- the color that you observe. Streak - the color of a mineral in powdered form. Luster- the way in which a mineral reflects light. Cleavage and Fracture- cleavage in geology, the tendency of a mineral to split; fracture is the manner in which a mineral breaks. Hardness- The measure of the ability of a mineral to resist scratching. The hardness of a mineral can be determined by comparing the mineral to minerals of Mohs hardness scale. *Mohs hardness scale* the standard scale against which the hardness of minerals is rated. Crystal Shape-A certain mineral always has the same general shape. Density the ratio of the mass of a substance to the volume of a substance; commonly expressed as grams per cubic centimeter for solids and is calculated: *density = mass ÷ volume*

Grade Level: Grades 2-5. Grades 6-8, Grades 9-12

Adapted from Ben Braaten's *Rock and Mineral Identification* Lab and Linda Hughes' *Properties of Three Rock Types*

Objectives:

-Students will be able to explain the difference between a rock and a mineral

-Students will be able to recognize that the earth is made up of rocks and that rocks come in many sizes and shapes

-Students will be able to understand the vital role of rocks and minerals in the Earth's cycles

-Students will use empirical evidence to make inferences

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Vocabulary:

Rock
Mineral
Gemstone
Igneous
Sedimentary
Metamorphic
fossil
Color
Streak
Luster
Cleavage and Fracture
Hardness
Crystal Shape
Mohs hardness scale

Materials:

FIPR Institute Rock and Mineral kit
Copper Strip
Glass Slide
Porcelain/ Streak Plate
Steel Nail
Hand Lens
Graduated Cylinder
Triple Beam Balance
Vinegar

Procedure:
Take your samples and test each one of them using the tests listed below. Be sure to record your data in your data section of your report.
PART 1: Identification Tests- use your hand lense when observing your samples

A. Color- Record the color of your sample
B. Streak- Using a dark colored streak plate rub the sample across it several times. Record the color of the streak that is left behind. Be sure to clean off the plate once you are done with this sample.
C. Luster- Note the luster of your sample. Possible lusters are metallic, nonmetallic, glassy, soapy, pearly or earthy.
D. Cleavage/ Fracture- Observe which type it would have.
E. Density- Use the triple beam balance and the graduated cylinder to determine the density of your sample.
F. Magnetism- Use the small magnet to determine if any of the samples are magnetic.
G. Hardness- Determine the hardness of each sample by using the following:
    1. Fingernail- Try to scratch the sample of your fingernail. If you can scratch it then it has a hardness of 2. If you can scratch your fingernail with the sample then go onto the penny.
    2. Copper strip- Try to scratch the sample with the copper strip. If the sample is scratched by the copper then the hardness is 3. If the sample isn't scratched by the copper then try the nail.
    3. Glass Slide- Try to scratch the glass slide with the sample. If it scratches the glass slide then try to scratch the nail with the sample. If the glass is scratched and nail isn't scratched then the hardness is 6.
    4. Steel Nail- Try to scratch the sample with a steel nail. If the sample is scratched by the nail then the hardness is 7-10.

Data:

See Data Sheet

Analysis/Conclusion:
Grades 2-5
1. What is the Earth made of?

2. How can we classify rocks by their sizes and shapes?

3. Why are rocks important to us?

4. What is the difference between a rock and a mineral?

5. What are gemstones?

Grades 6-8

1. Differentiate between a rock and a mineral

2. Compare and Contrast the three types of tocks
3. What role do gemstones play in rocks and minerals?
4. What mechanical and chemical activities shape and reshape the earth's land surface?
5. What type of rock can one find organisms that have grown, died, and decayed, leading to the production of new organisms from the old?
6. What is the relationship between observation and empirical evidence?
7. How do you use mass and volume to determine density and why is this an important property

Grades 9-12

1. How do rocks shape the Earth?
2. How can rocks be classified?
3. What is the relationship between rocks and minerals?
4. How can you use physical properties to identify a mineral?
5. How do we use physical properties to describe a substance?
6. How can I identify and classify substances using physical properties and why is that important?
7. What influence do chemical properties of a mineral's have on the physical properties?
8. What influence do the agents of erosion have on the Earth's surface?
9. What influence does mechanical and chemical weathering have on surface features?
10. How does the climate in Florida impact the rate of weathering?