Unit B: Components of Soil

Lesson 3: Understanding the Properties of Rocks

Student Learning Objectives: Instruction in this lesson should result in the students achieving the following objectives:

1. Identify properties of igneous rock
2. Identify properties of sedimentary rock
3. Identify properties of metamorphic rock

Recommended Teaching Time: 2 Hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has also been developed for use with this lesson plan
- http://www.fi.edu/fellows/fellow1/rocks/create/index.html

List of Equipment, Tools, Supplies, and Facilities:

Writing Surface
PowerPoint Projector
PowerPoint Slides
Transparency Master
Simple Microscope or Magnifying Glass

Terms: The following terms are presented in this lesson (shown in italics and on PowerPoint Slide 2)

- Igneous
- Sedimentary
- Metamorphic
- Magma

Interest Approach: Have the students go outside in groups of 3. Each group should collect 10 different rocks they can find in 10 minutes. Explain to them that they should try to find as many different looking rocks as they can. Once they finish this, they are to come back inside and sit quietly in a group. **(Note: If the rocks they gather are covered with soil, you may want them to be washed before the students bring them into the classroom).** When all the groups return, each group will one at a time show the different rocks collected. Odds are, they will all be similar rocks but if a group collects a rock that looks different, have them describe the difference in the rock compared to the rest. Use this sharing of information to lead into a discussion of Objective number one.

Summary of Content and Teaching Strategies

Objective 1: Identify properties of igneous rock

(PowerPoint Slide 3)

I. ***Igneous*** rocks are called fire rocks and are formed either underground or above ground.

A. Underground, they are formed when the melted rock, called ***magma***, deep within the earth becomes trapped in small pockets. As these pockets of magma cool slowly underground, the magma becomes igneous rocks.

B. Igneous rocks are also formed when volcanoes erupt, causing the magma to rise above the earth's surface. When magma appears above the earth, it is called lava. Igneous rocks are formed as the lava cools above ground.

C. Igneous rocks are the oldest types of rock.

(PowerPoint Slide 4)

1. Granite rocks are igneous rocks which were formed by slowly cooling pockets of magma that were trapped beneath the earth's surface. Granite is used for long lasting monuments and for trim and decoration on buildings.

(PowerPoint Slide 5)

2. Scoria rocks are igneous rocks which were formed when lava cooled quickly above ground. You can see where little pockets of air had been. Scoria is actually a kind of glass and not a mixture of minerals.

(PowerPoint Slide 6)

3. Pumice rocks are igneous rocks which were formed when lava cooled quickly above ground. You can see where little pockets of air had been. This rock is so light, that many pumice rocks will actually float in water. Pumice is actually a kind of glass and not a mixture of minerals. Because this rock is so light, it is used quite often as a decorative landscape stone. Ground to a powder, it is used as an abrasive in polish compounds and in Lava soap.

(PowerPoint Slide 7)

4. Obsidian rocks are igneous rocks that form when lava cools quickly above ground. Obsidian is actually glass and not a mixture of minerals. The edges of this rock are very sharp.

If possible go to the following website and show students the graphic animation of a volcano and the two different places that igneous rock can be formed: http://www.fi.edu/fellows/fellow1/rocks/create/igneous.htm . If you are unable to access the website then use TM: B3-1 – How Rocks are Formed to show the students how the Volcano has created these rocks. Have the students compare the rocks they collected to see if they match any of the pictures of the igneous rocks shown on the slides. Use a microscope or magnifying glass to see the different properties of the rocks.

Objective 2: Identify properties of sedimentary rocks.

(PowerPoint Slide 8)

II. For thousands, even millions of years, little pieces of our earth have been eroded--broken down and worn away by wind and water.

A. These little bits of our earth are washed downstream where they settle to the bottom of the rivers, lakes, and oceans. Layer after layer of eroded earth is deposited on top of each.

B. These layers are pressed down more and more through time, until the bottom layers slowly turn into rock.

C. ***Sedimentary*** Rocks are the middle aged rock.

(PowerPoint Slide 9)

1. Sandstone rocks are sedimentary rocks made from small grains of the minerals quartz and feldspar. They often form in layers as seen in this picture. They are often used as building stones.

(PowerPoint Slide 10)

2. Shale rock is a type of sedimentary rock formed from clay that is compacted together by pressure. They are used to make bricks and other material that is fired in a kiln.

(PowerPoint Slide 11)

3. Conglomerate rocks are sedimentary rocks. They are made up of large sediments like sand and pebbles. The sediment is so large that pressure alone cannot hold the rock together; it is also cemented together with dissolved minerals.

(PowerPoint Slide 12)

4. Limestone rocks are sedimentary rocks that are made from the mineral calcite which came from the beds of evaporated seas and lakes and from sea animal shells. This rock is used in concrete and is an excellent building stone for humid regions.

(PowerPoint Slide 13)

5. Gypsum rocks are sedimentary rocks made up of sulfate mineral and formed as the result of evaporating sea water in massive prehistoric basins. It is very soft and is used to make Plaster of Paris, casts, molds, and wallboards.

If possible go to the following website and show students the graphic animation of a volcano and the places that sedimentary rock can be formed: *http://www.fi.edu/fellows/fellow1/rocks/create/sediment.htm* . ***If you are unable to access the website then use TM: B3-1 – How Rocks are Formed to show the students how the Volcano has created these rocks. Have the students compare the rocks they collected to see if they match any of the pictures of the sedimentary rocks shown on the slides. Use a microscope or magnifying glass to see the different properties of the rocks.***

Objective 3: Identify properties of metamorphic rocks.

(PowerPoint Slide 14)

III. ***Metamorphic*** rocks are rocks that have "morphed" into another kind of rock. These rocks were once igneous or sedimentary rocks. How do sedimentary and igneous rocks change?

A. The rocks are under tons and tons of pressure, which fosters heat buildup, and this causes them to change.

B. If you exam metamorphic rock samples closely, you'll discover how flattened some of the grains in the rock are.

C. Metamorphic rocks are the youngest type of rock.

(PowerPoint Slide 15)

1. Schist rocks are metamorphic. These rocks can be formed from basalt, an igneous rock; shale, a sedimentary rock; or slate, a metamorphic rock. Through tremendous heat and pressure, these rocks were transformed into this new kind of rock.

(PowerPoint Slide 16)

2. Gneiss rocks are metamorphic. These rocks may have been granite, which is an igneous rock, but heat and pressure changed it. You can see how the mineral grains in the rock were flattened through tremendous heat and pressure and are arranged in alternating patterns.

If possible go to the following website and show students the graphic animation of a volcano and the places that metamorphic rock can be formed: *http://www.fi.edu/fellows/fellow1/rocks/create/metamorph.htm*. ***If you are unable to access the website then use TM: B3-1 – How Rocks are Formed to show the students how the Volcano has created these rocks. Have the students compare the rocks they collected to see if they match any of the pictures of the metamorphic rocks shown on the slides. Use a microscope or magnifying glass to see the different properties of the rocks.***

Review/Summary: As a review, students should get into pairs. They should take their notes on each different type of rock and start to quiz each other. One student should give hints about a type of rock and the other student should name the rock and the type of rock that it falls under. Questions on PowerPoint Slide 17 can also be used as review.

Application: Students should go home and look at different rocks found around their home, school, and other places they go that represent those discussed in this lesson. On a sheet of paper they should name and describe each of the different types of rocks they have found and turn this paper in along with the different rocks they have found. If possible there should be ten different types of rocks.

Evaluation: Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. .A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1=c, 2=h, 3=f, 4=b, 5=g, 6=e, 7=a, 8=d

Part Two: Completion

1. Magma
2. Pressure, Heat
3. Sedimentary Rocks, Pressure

Part Three: Short Answer

1. Metamorphic-changing of other rocks, sedimentary-takes time to be made, igneous-have been made by volcanoes since the creation of earth.
2. Igneous, because of all the volcano action under the earth's surface that forms igneous rock.

Sample Test Name: _____

Test

Unit B Lesson 3: Understanding the Properties of Rocks

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. Sedimentary Rock	d. Gneiss	g. Gypsum
b. Igneous Rock	e. Granite	h. Obsidian
c. Metamorphic Rock	f. Shale	

_____ 1. This type of rock is formed by changes in other rocks.
_____ 2. This rock is found under Igneous Rock and formed when lava cools quickly above ground.
_____ 3. This rock is a Sedimentary Rock that is formed from clay compacted together.
_____ 4. This type of rock is formed from heat.
_____ 5. This rock is formed by evaporating sea water in massive prehistoric basins.
_____ 6. This rock is formed by slowly cooling pockets of magma.
_____ 7. This type of rock is formed by pressurized particles.
_____ 8. This rock was once granite but has been changed by pressure and heat

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. _____ is the term used for molten lava found underground.

2. Metamorphic rocks are rocks that have been changed due to _____ and _____.

3. _____ are caused from immense amounts of _____ placed on eroded parts of earth.

Part Three: Short Answer

Instructions. Use the space provided to answer the following questions.

1. Describe the age of rocks, youngest to oldest, and how you know this is the progression of age by the formation of rock.

2. Which type of rock is there more of in the world?

TM: B3-1

HOW ROCKS ARE FORMED