

Miami-Dade County Public Schools Science



Success Academy

Grade 8 Student Packet Session 5

Strand D: Processes that Shape the Earth

Benchmark:

SC.D.1.3.1 The student knows that mechanical and chemical activities shape and reshape the Earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers.

SC.D.1.3.4 The student knows the ways in which plants and animals reshape the landscape (e.g. bacteria, fungi, worms, rodents, and other organisms add organic matter to the soil, increasing soil fertility, encouraging plant growth, and strengthening resistance to erosion).

2010-2011

Curriculum and Instruction



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INTERACTIVE LABORATORY DEMONSTRATION

Student Exploration: Rock Cycle

Name: _____ Date: _____

Strand D: Processed that Shape the Earth

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Vocabulary: deposition, erosion, extrusive igneous rock, intrusive igneous rock, lava, lithification, magma, metamorphic rock, rock cycle, sediment, sedimentary rock, soil, weathering

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

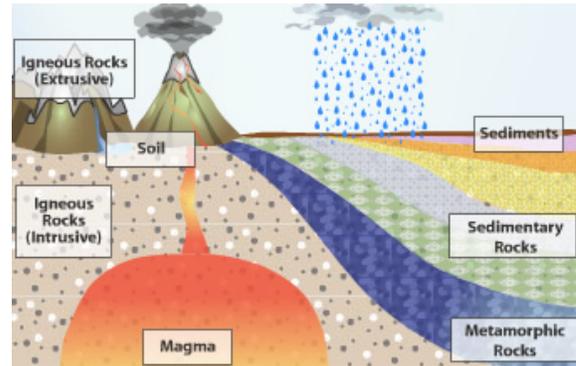
1. What happens to hot **lava** after it erupts from a volcano?

2. How does rock turn into **soil**?

3. The Mississippi River carries tons of tiny rock fragments called **sediments** into the Gulf of Mexico. What do you think will happen to these sediments after a few million years?

Gizmo Warm-up

Over millions of years, rocks are broken down and transformed into other rocks. The *Rock Cycle Gizmo*[™] illustrates the different transformations that make up the **rock cycle**. Before exploring the Gizmo, take a look at the image.



1. What types of rocks are shown?

2. **Magma** is molten (liquid) rock under Earth's surface. Based on the image, how do you think magma turns into **extrusive igneous rock**?

3. After the **Extrusive igneous rock** button to the right of the image was clicked – Were you correct?

Activity: The rock cycle	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> Click Start again. 	
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Question: What is the rock cycle?

1. Observe: A cycle is a path with the same start and end. Create a rock cycle with the Gizmo.

A. Click **Magma**. How hot is magma?

B. Click **Crystallization (below ground)**. What kind of rock is formed when magma cools below the surface?

C. Click **Exposure and weathering**. What forms when rocks break down?

D. Click **Erosion and deposition**. In what ways are sediments transported?

E. Click **Lithification and compaction**. (**Lithification** is hardening into rock.) What kind of rock is formed from sediments?

F. Click **Increase temp. and pressure**. What kind of rock is formed?

G. Click **Melt**. What is formed when rocks melt deep underground?

2. Describe: Select the PATH tab. What are the steps in this rock cycle?

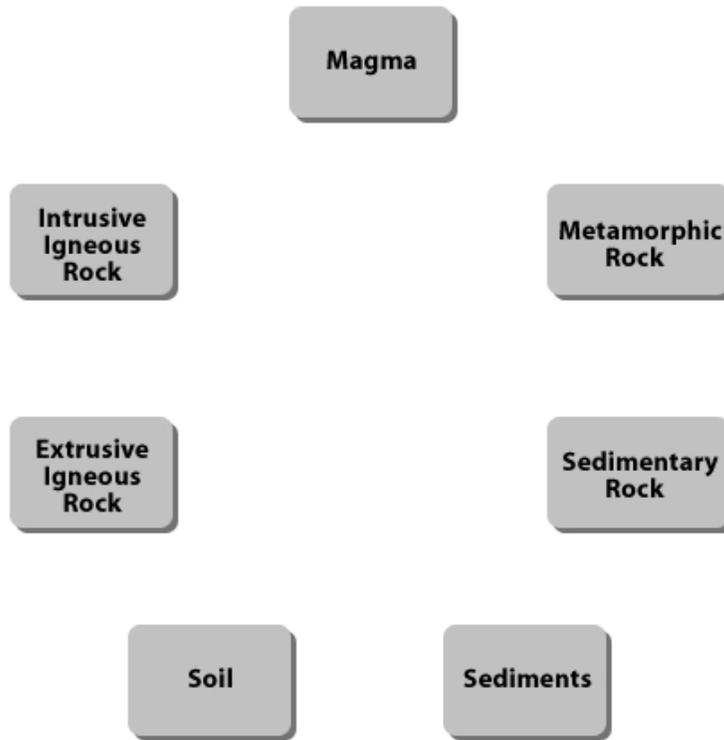
3. On your own: On the SIMULATION tab, the teacher will click **Start again**. In the spaces below, list three rock cycles. You can start anywhere, but each cycle must begin and end at the same point.

Cycle 1: _____

Cycle 2: _____

Cycle 3: _____

1. Diagram: The image below summarizes the different stations in the rock cycle. Draw an arrow to represent each possible transition from one rock type to another. Then label each arrow with the process that occurs, such as “**weathering**” or “**erosion and deposition**.”



2. Practice: List the steps that would cause each transformation below.

A. Intrusive igneous rock → sedimentary rock:

B. Metamorphic rock → sediment:

C. Sediment → sedimentary rock:

D. Sedimentary rock → sediment:

ASSESSMENT

NAME: _____

DATE: _____

Strand D: Processes that Shape the Earth

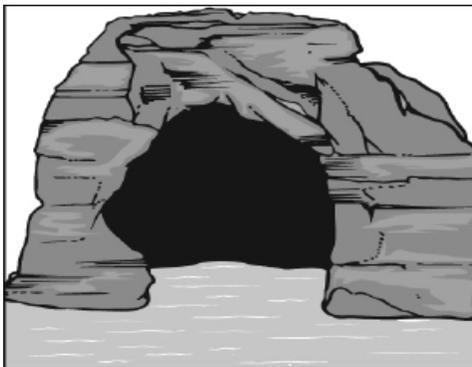
SC.D.1.3.1 The student knows that mechanical and chemical activities shape and reshape the Earth's land surface by eroding rock and soil in some areas and depositing them in other areas, sometimes in seasonal layers.

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Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1 Some ocean coastlines contain sea caves.



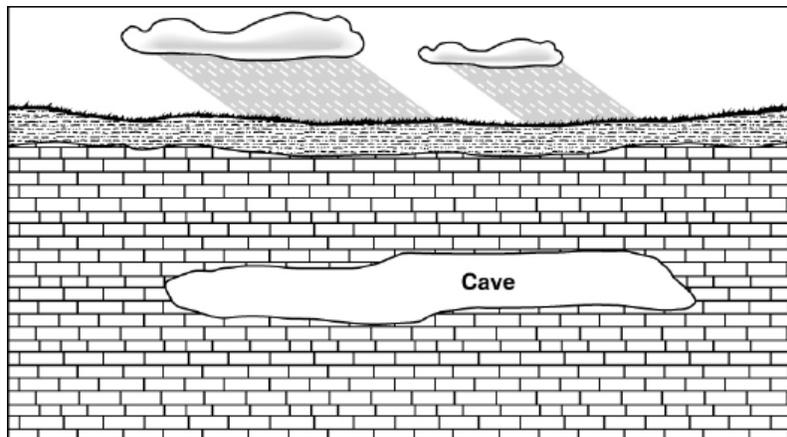
What main process forms sea caves in softer rock?

- A erosion by waves
- B deposition by tides
- C dissolving by groundwater
- D weathering by blowing sand

- _____ 2 Students examined a large crack found in a boulder where a tree was growing. Which kind of process were the students observing?

- F Oxidizing
- G Deposition
- H Weathering
- J Decomposition

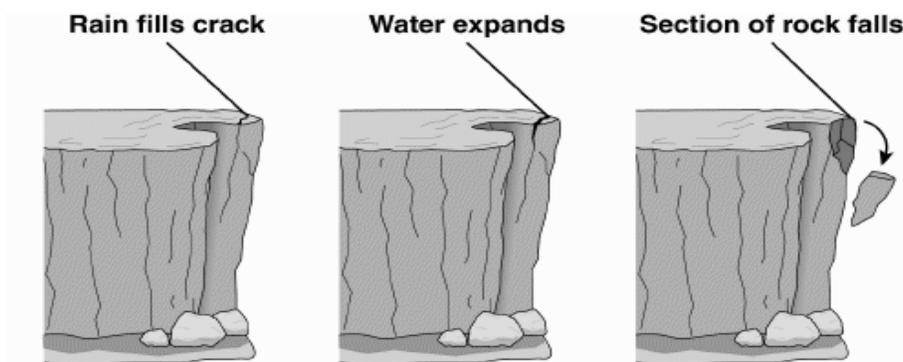
3 The diagram shows a cave within a limestone formation.



What major process is responsible for the formation of the cave?

- A chemical weathering
- B volcanic activity
- C mass movement
- D river erosion

4 As rain falls on the top of a cliff, water seeps into the cracks of the rock. As the temperature reaches 0°C , the water expands and breaks the rock apart. Eventually, the rock falls to the ground.



Which statement BEST describes the process shown?

- F Creep
- G Abrasion
- H ice wedging
- J chemical weathering

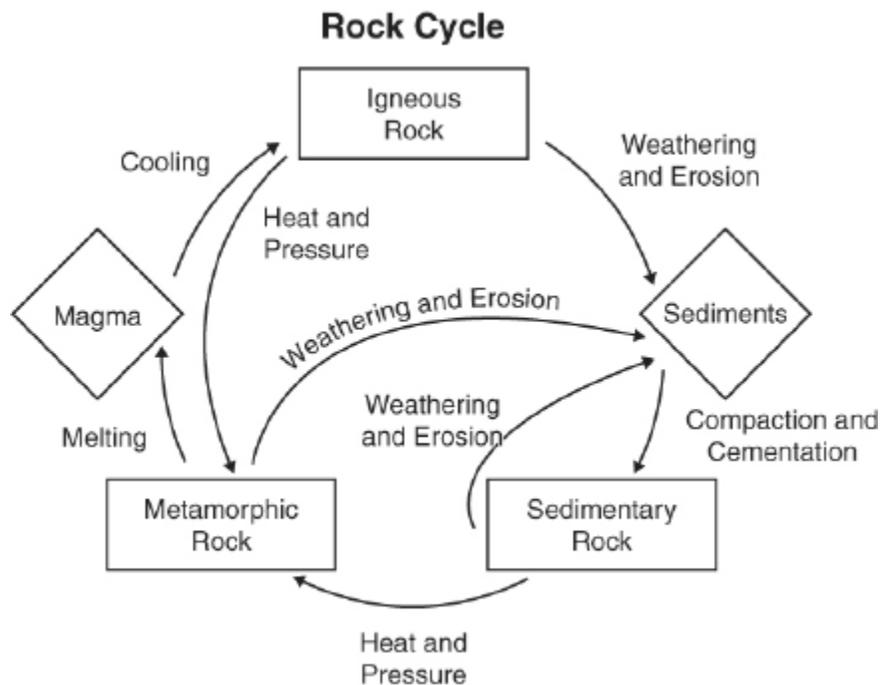
5 Before rock can become soil, it must undergo certain processes. One process in the formation of soil involves plants. How can plants chemically change rocks into soil?

- A They weather rocks with acid.
- B They strip the rocks of minerals.
- C They break rocks into small pieces.
- D They increase the density of the rocks.

6 The weathering of landforms depends on various factors. Which area would MOST likely have the fastest rate of chemical weathering?

- F freezing and dry regions
- G warm and moist regions
- H cool and humid regions
- J hot and dry regions

7 A diagram of the rock cycle is shown.



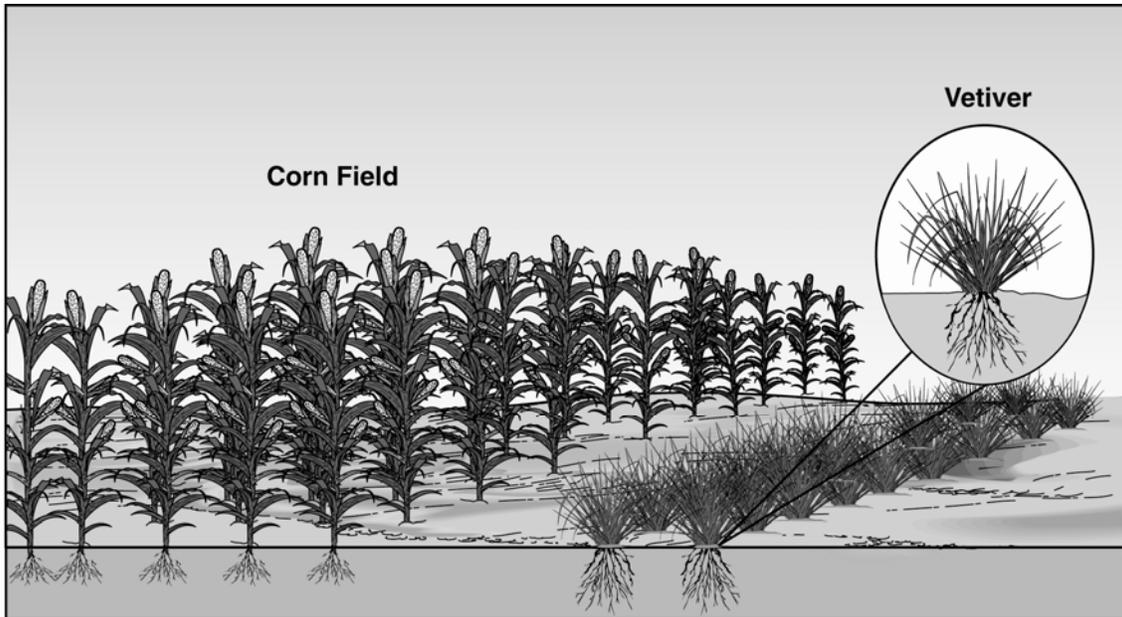
Which process accounts for the formation of horizontally layered rocks?

- A compaction and cementation
- B weathering and erosion
- C Melting
- D Cooling

8 Many homes are built on the sides of hills. What can be done to prevent houses from collapsing or sliding down the hill after a heavy rainfall?

- F increasing the slope of the hill
- G adding plants and trees to the hill
- H removing vegetation from the hill
- J adding inorganic matter to the hill

9 Vetiver grass is planted by farmers along the borders of corn fields.



Which process does the vetiver grass MOST likely help farmers reduce?

- A chemical weathering
- B insect infestation
- C freezing of crops
- D water erosion

10 A scientist was examining a large boulder that was covered with lichens (a combination of fungi and algae). He chipped a piece of the rock and placed it under a microscope. He observed that the surface of the rock was breaking down underneath the lichen. Which was the scientist MOST likely observing?

- F the interaction between abiotic factors
- G the effects of chemical weathering
- H the process of deposition
- J the effects of abrasion

EXTENSION STUDENT VERSION

Activity 1: Weathering and Erosion

NAME _____

DATE _____

Stand D: Processes that Shape the Earth

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SC. D.1.3.3- The student knows how conditions that exist in one system influence the conditions that exist in other systems.

Objectives:

As a result of this lesson the student will be able to:

- Identify various types of weathering and erosion.
- Discover the effects that occur with each type of weathering and erosion.

Background:

Weathering refers to the group of destructive forces that change the physical and chemical character of rock near the earth's surface. *Mechanical weathering* (or physical disintegration) is the breaking down of rocks into smaller pieces. The change in the rock is physical with little or no chemical change. *Chemical weathering* is the decomposition of rock from exposure to water and atmospheric gases (principally carbon dioxide, oxygen, and water vapor). As rock is decomposed by these agents, new chemical compounds form. Examples of mechanical weathering include: frost action, abrasion, and pressure release. Examples of chemical weathering include: rusting, acid breakdown, and solution weathering.

Erosion is the picking up or physical removal of rock particles by an agent such as water, wind, or glacial ice (glaciers.) Weathering helps break down a solid rock into loose particles that are easily eroded. Most eroded rock particles are at least partially weathered, but rock can be eroded before it has weathered at all. A stream can erode weathered or unweathered rock fragments.

Materials:

Part I		Part II
Safety goggles (1 per student)	Effervescent tablet (Alka-Seltzer)	Shallow pan
5 Medicine droppers	Ice cubes	Dirt
Tap water	Plastic cups	Water
Sugar cubes	Sand	Sand
Plastic container with lid	Chalk	Ice cubes with sand inside
vinegar	Steel wool	
Shallow pan	Gravel	
Limestone pebbles (Florida rock, from your yard)	Paper towels	

Part I: Weathering Activities

Procedure:

1. Perform the activity (activities) indicated by your teacher.
2. Make and record observations as you perform the activity.
 - Experiment 1. Compare and record the reaction of antacid tablets in water. The comparison is a whole tablet vs. crushed tablet.
 - Experiment 2. Compare and record the reactions of chalk (limestone) in water and vinegar (acid rain).
 - Experiment 3. Test and record the effect of water on steel wool.
 - Experiment 4. Test and record the effects of sugar cubes and gravel shaken together in a jar.
 - Experiment 5. Test and record the effect of water on small pieces of common rock (limestone). Place rocks in a plastic container. Add enough water to cover the rocks, seal container, and shake for 10 minutes. Observe the water.

Discussion Questions:

1. What are the two types of weathering?

2. What is the result of each types of weathering?

3. Which of the above activities demonstrate mechanical weathering and which demonstrate chemical weathering? How do you know?

Part II: Erosion Stations

Procedure:

1. Perform the activity (activities) indicated by your teacher.
2. Make and record observations as you perform the activity.
 - Activity 1. Demonstrates beach erosion. Using a pan, make a sand pile at one end and pour water at the other end. Slide the pan back and forth to create wave movement. Record observations.
 - Activity 2: Freeze ice cubes with sand in them and then move the sand ice cubes over different surfaces, sand, water, dirt, etc. Record observations.
 - Activity 3: Place sand in a small bowl and the use a hair dryer to move the sand. Note if different speeds are possible. Record observations.
 - Activity 4: Place a pile of ice cubes on a mound of dirt. Observe and record what happens as it melts.

Discussion Questions:

1. How does erosion occur?

2. What is the result of each type of erosion?

3. In your own words explain the difference between weathering and erosion.

Activity 2: Classifying Rocks

Source: Essential Labs 7th grade

NAME _____

DATE _____

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Objectives/Purpose:

- Use rock properties to classify them into igneous, sedimentary, and metamorphic.
- Discuss the rock cycle as a means to shape and reshape the Earth's surface.

Background Information:

The Earth and the rocks from which it is made have been a symbol for stability. The Earth is far from stable. It is a dynamic place, constantly changing, moving, and being dramatically rearranged. Rocks are the solid material of the outer Earth. Rocks, composed of one or more minerals, are the cool skin of the Earth keeping us insulated from the heat within. Rocks are constantly changing from one form to another. The rock cycle shows this change and separates the rocks in three distinctive groups: igneous, sedimentary, and metamorphic. Igneous rocks form from cooling lava. Weathering processes break this rock into small pieces. These pieces that are called sediments can be carried out by running water to the ocean. The weight of the sediments exerts pressure on the pieces below, converting them into sedimentary rock. If this sedimentary rock is buried deep inside the Earth, the pressure and heat can change it into a metamorphic rock. Metamorphic rock that stays deep in the Earth can melt and become igneous or can be brought to the surface and be weathered into sediment, restarting the cycle.

Engage:

Discuss with classmates your interpretation of the following quote: "Observe always that everything is the result of change, and get used to thinking that there is nothing Nature loves so well as to change existing forms and to make new ones like them" (Meditations of Marcus Aurelius--a Roman emperor, 121-180) Reflect about this quotation. Relate it to the earth and the rocks.

Materials:

Different samples of rocks (at least 16 different samples) per group
Triple Beam or electronic balance
Small bowl or beaker of water
One piece of paper per lab group (or use the back of page 15)

Explain

Procedure to Classify Rocks:

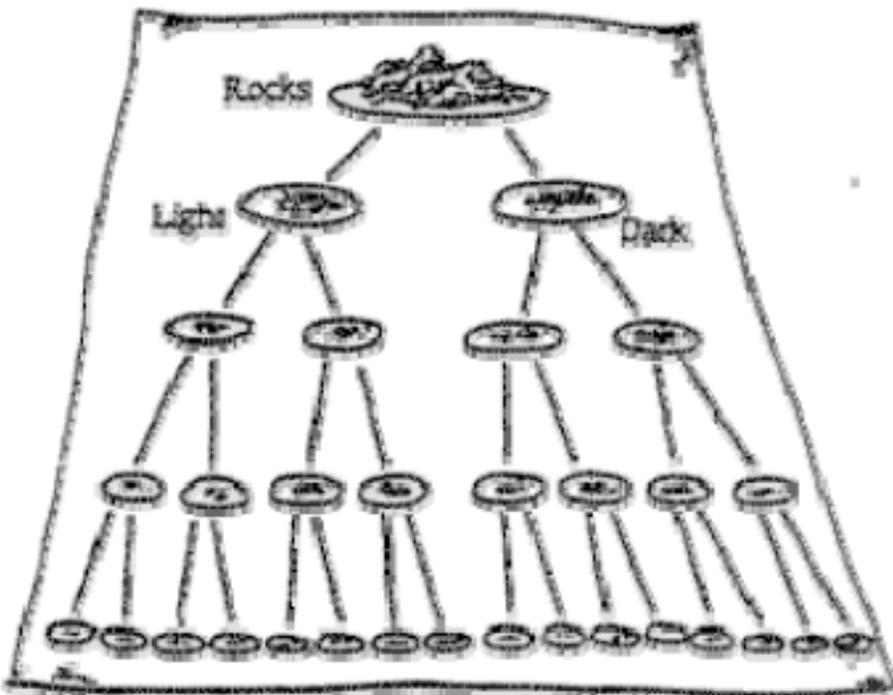
Students will classify rocks by properties following the directions and diagram below.

Part 1: Classifying Rocks by Their Physical Properties

Procedures:

1. Place all rock samples in a pile at the top of the paper. See Figure 1 below
2. Draw a circle around the pile of rocks.
3. Move all the dark samples to a separate pile.
4. Make a separate pile of light samples.
5. Draw a circle around each pile.
6. Observe the dark samples.
7. Choose a physical property that will allow you to divide the samples into 2 piles.
8. Draw a circle around each pile.
9. Write the property you used by each circle.
10. Repeat step 3 using the light samples.
11. Keep dividing the piles using physical properties.
12. Do this until each mineral is by itself.

Rocks Diagram (Figure 1)



Part 2: Classifying Rocks by Performing Physical Tests

Fill out the chart below using at least 8 samples of rocks per group. For each of the properties in the left, place an "X" in the chart to which it corresponds.

QUESTIONS	Rock Number							
	1	2	3	4	5	6	7	8
1. Does the rock have two or more colors?								
2. Does the rock have large mineral pieces?								
3. Does the rock have small mineral pieces?								
4. Is the rock sandy?								
5. Does the rock have many holes?								
6. Does the rock have layers?								
7. Does the rock have bands?								
8. Does the rock have an odor?								
9. Is the rock shiny?								
10. Is the rock rough?								
11. Is the rock heavy?								
12. Does the rock float in water?								
13. Does the rock make marks on paper?								

Evaluate:

1. How are the rocks alike?

2. How are they different?

3. Do they all have the same mass?

4. Are they hard or soft (easy to crush)?

5. Explain what the rock cycle describes.

6. Compare and contrast igneous and metamorphic rocks.

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