

Rocks and the Rock Cycle

Teacher's Guide High/Middle School

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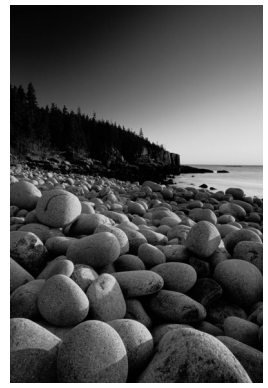
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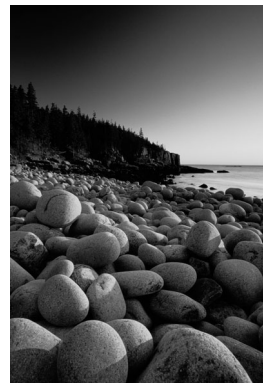
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A Message from our Company ...

Dear Educator:

Thank you for your interest in the educational videos produced by the *Visual Learning Company*. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

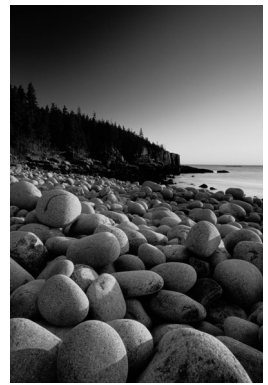
We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and lead Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



Standards Correlations

National Science Education Standards

(Content Standards: 5-8, National Academy of Sciences, c. 1996)

Science as Inquiry - Content Standard A:

As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

Earth and Space - Content Standard D:

As a result of their activities in grades 5-8, all students should understand that:

- Some changes in the solid earth can be described as the “rock cycle.” Old rocks at the earth’s surface weather, forming sediments that are buried, then compacted, heated and often recrystallized into new rock. Eventually, those new rocks maybe brought to the surface by the forces that drive plate motions, and the rock cycle continues.

Benchmarks for Science Literacy

(Project 2061 - AAAS, c. 1993)

The Physical Setting - Processes That Shape the Earth (4C)

By the end of the 12th grade, students should know that:

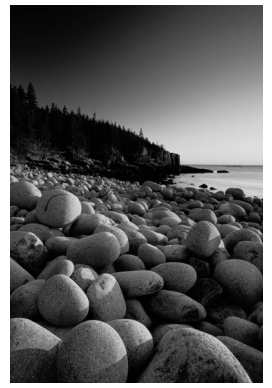
- The formation, weathering, sedimentation, and reformation of rock constitute a continuing “rock cycle” in which the total amount of material stays the same as its forms change.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students should be able to do the following:

- State the definition of a mineral;
- Provide the definition of a rock, and differentiate between the definition of a mineral and a rock;
- Describe some of the different ways igneous rocks may be formed;
- Differentiate between magma and lava;
- Describe how temperature and pressure within the earth turn solid rocks into molten rock;
- Explain why the grain size of igneous rocks is determined by the environment in which they are formed;
- Explain some of the different ways sedimentary rocks may form;
- List some examples of sedimentary rocks;
- Explain how metamorphic rocks are formed via heat and pressure;
- List some examples of metamorphic rocks;
- Diagram and label the different parts of the rock cycle; and
- Describe some of the different processes in the rock cycle, and how rocks are recycled from one form to another.



Assessment

Preliminary Test:

The Preliminary Test, provided in the Student Masters section, is an assessment tool designed to gain an understanding of student preexisting knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions titled “You Decide” that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post-Test:

The Post-Test, provided in the Student Masters section, can be utilized as an assessment tool following student completion of the video and student activities. The results of the Post-Test can be compared against the results of the Preliminary Test to assess student progress.



Introducing the Video

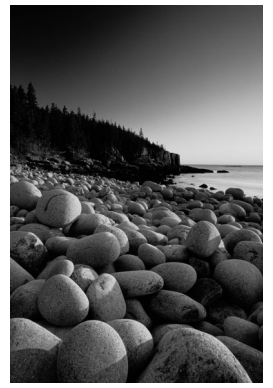
Before showing the video ask students to list some rocks they are familiar with. They may state such examples as marble, granite, or limestone. Develop as large of a list as possible and write the examples of rocks on the blackboard. Next ask students for ideas on how the rocks may be grouped. After discussing these ideas, explain to students that the rocks are grouped according to how they are formed. Explain that there are three main groups of rocks: igneous rocks, sedimentary rocks, and metamorphic rocks. Discuss the formation of these three different rocks types. Finally, as a class, attempt to place the rocks written on the board into the three groups. After having completed this task, tell students to pay close attention to the video for a more detailed explanation of the different rock types and also information about the rock cycle.

Video Viewing Suggestions

The Student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

The program is approximately 20-minutes in length and includes a ten-question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Student Assessments And Activities

Assessment Masters:

- Preliminary Test
- Video Review
- Post-Test

Student Activity Masters:

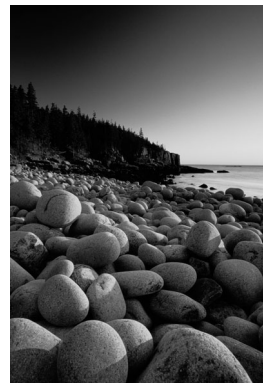
- Take a Closer Look: Sand
- Parts of the Rock Cycle
- Rock Cycle Field Trip
- Vocabulary of *Rocks and the Rock Cycle*



Video Script: *Rocks and the Rock Cycle*

1. The Grand Canyon - it's one of the most breathtaking sights on the face of the earth.
2. Each year, millions of people visit the canyon, which is over 227 miles, or 365 kilometers, long
3. ...and one mile or over 1600 meters deep.
4. Yosemite is another spectacularly beautiful place,...
5. ...with steep rocky domes, and . . .
6. . . . beautiful cascading waterfalls.
7. The rocky shores of the Atlantic coast . . .
8. . . . are home to many different animals including seals and birds.
9. The Rocky Mountains are steep, tall majestic mountains . . .
10. . . . with overpowering rocky peaks that cut across the continent.
11. The dominant theme and major attraction in all these places is rock.
12. While not visibly moving, rocks provide us with tremendous scenery...
13. ...and very useful materials which we use everyday
14. During the next few minutes we are going to explore the characteristics of rocks, . . .
15. . . . how rocks are formed . . .
16. . . . and the different parts of the rock cycle.
17. **Graphic Transition – What are Rocks Made of?**
18. **You Decide!** What makes these rocks different from these elk?
19. The main difference is that elk are living organisms and rocks are not
20. Rocks are nonliving substances made up of one or more minerals
21. What makes a substance such as gold a mineral?
22. A mineral is a natural inorganic substance.
23. In other words, minerals are formed in nature, and they are inorganic, which means they are not made from living things.
24. Minerals have a definite crystal structure.
25. Minerals also have a definite chemical make-up. Some minerals, such as this sulfur, are made of a single chemical or element...
26. ...whereas other minerals are made of more than one element. This quartz is made of the elements silicon and oxygen.
27. And this mineral, called hornblende, is made up of many elements.
28. **Graphic Transition – What is a Rock?**
29. Exactly what is a rock? A rock is a material from the earth that is made of one or more minerals.
30. Most rocks are made of more than one kind of mineral.
31. This rock, called granite, is often used as a building stone.
32. A close look at granite reveals several different kinds of minerals, including...
33. ...feldspar, quartz, mica, and hornblende.
34. While there are hundreds of different kinds of rocks...
35. ...all rocks can be classified into three main groups based on how they form.
36. They include igneous rocks, . . .

Script (cont.)



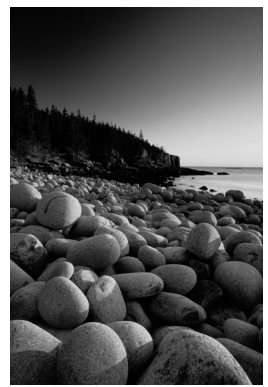
37. ...sedimentary rocks . . .
38. . . . and metamorphic rocks.
39. Let's first take a look at igneous rocks.
40. **Graphic Transition – Igneous Rocks**
41. This area of geothermal activity tells us that the interior of the Earth is really quite hot.
42. Boiling water in these springs is a result of water coming in contact with superheated rocks inside the earth.
43. Deep within the earth, very high temperatures are capable of melting rock.
44. Melted rock is called molten rock. Molten rock inside the earth is called magma.
45. Molten rock on the earth's surface is called lava.
46. Igneous rocks form when magma cools within the earth . . .
47. . . . or when lava cools on the earth's surface.
48. The rocks seen in this solidified lava flow are igneous rocks
49. This rock is called basalt.
50. Granite seen here in Yosemite National Park cooled inside the earth and was eventually brought to the surface.
51. Igneous rocks which cool quickly on the surface of the earth, such as this obsidian, tend to have small grains...
52. ...while rocks that cool slowly inside the earth, such as pegmatite, have larger grains.
53. Let's now take a look at another group of rocks called sedimentary rocks.
54. **Graphic Transition- Sedimentary Rocks**
55. This large expanse is part of the Colorado Plateau, a huge area covering thousands of square kilometers.
56. This area was once covered by a large body of water,...
57. ...which over eons deposited numerous layers of sediment.
58. These sediments built up deep layers which over time pressed together to form rock layers.
59. Many types of sedimentary rocks such as these were created by sediments that were compacted and cemented together.
60. Notice the layers of sediments seen in these rocks in southern Utah.
61. This sedimentary rock called sandstone was made from grains of sand pressed and cemented together.
62. The remains of dead plants and animals may also form sedimentary rocks.
63. This can occur in ocean environments where the remains of coral, shells, and other organisms fall to the ocean floor and eventually solidify to form limestone.
64. Coal is also made from the remains of ancient dead plants and animals that have been compacted.
65. Sedimentary rocks can also form chemically when mineral laden water leaves deposits such as in these geothermal springs.
66. Chemical sedimentary rocks, such as these cave formations, are formed when mineral-rich water evaporates leaving behind mineral deposits.
67. These are just a couple of the ways sedimentary rocks can form. Let's now take a look at metamorphic rocks.
68. **Graphic Transition – Metamorphic Rocks**



Script (cont.)

69. **You Decide!** What twisted this rock?
70. Powerful forces in the earth twisted this rock. Heat and pressure, as well as chemical reactions have the power to move, twist and change rocks . . .
71. . . . into new types of rocks.
72. Metamorphic rocks are rocks that have been changed from other rocks as a result of heat, pressure, and/or chemical reactions.
73. This thin gray metamorphic rock is called slate.
74. Slate can be used in building houses . .
75. . . . and is often used for roofing. Slate, a metamorphic rock, was changed via heat and pressure. . .
76. . . . from a sedimentary rock called shale.
77. Through heat and pressure, the particles in shale became compressed.
78. Similarly, the white metamorphic rock called marble, often used in buildings, was changed from . . .
79. . . . a sedimentary rock called limestone seen here.
80. Metamorphic rocks can also be created from igneous rocks.
81. For example granite, when altered by heat and pressure, may . . .
82. . . . form gneiss – a metamorphic rock.
83. **Graphic Transition – Weathering and Erosion**
84. These pebbles, seen here on the shore of this lake, are quite smooth. But they were not always so smooth.
85. **You Decide!** How did these pebbles get so smooth?
86. The wave action of water in the lake and the rubbing against other stones wore down the pebbles until they became rounded.
87. Similarly, the water rushing in this river rounded this large boulder.
88. The bricks in the building once had sharp, straight edges, but now they are dull and rounded.
89. Weathering is the process responsible for these changes.
90. Weathering is the breaking down of rocks and other materials on the surface of the earth.
91. There are many forces responsible for weathering, including ice breaking apart rocks . . .
92. ...and gravity pulling rocks downward.
93. The action of water, including rain, is one of the most important forces in the weathering of rocks.
94. Notice how the writing on this monument can barely be read.
95. This in large part is due to chemical weathering.
96. Acids found in rain and snow have eaten away at the stone.
97. Another, and perhaps the most powerful force responsible for wearing down and moving rocks is moving water.
98. Erosion is the process of moving weathered rocks and particles from one place to another.
99. A prime example is the Colorado River, seen which is responsible for helping to gradually erode the mile deep Grand Canyon.
100. **Graphic Transition – The Rock Cycle**

Script (cont.)



101. There are millions of grains of sand on this beach
102. **You Decide!** Where did all this sand come from?
103. While the sand on this beach may have been here for many years, at some point it came from a rock.
104. When sand is viewed under a microscope, it's possible to see the individual mineral grains that make it up. These grains of sand come from a wide variety of rocks.
105. Weathering and erosion are responsible for breaking down and transporting sand to this beach.
106. This sand, which can also be referred to as sediment, may have come from an igneous rock, such as granite, . . .
107. . . . or from a metamorphic rock, such as this schist, . . .
108. . . . or from a sedimentary rock, such as this piece of sandstone.
109. These changes are part of the rock cycle. The rock cycle involves the continuous changing of rocks from one form to another.
110. This diagram helps illustrate the rock cycle.
111. When sediments are compacted and cemented together they have the potential to become a sedimentary rock as shown in this diagram.
112. This sedimentary rock, called a conglomerate, is made of many different sized sediments.
113. Similarly this shale is a sedimentary rock formed from fine particles deposited in lakes or the ocean.
114. When placed under heat and pressure shale becomes slate...
115. – a metamorphic rock.
116. This diagram illustrates how sedimentary rocks may form metamorphic rocks when placed under heat and pressure.
117. If exposed to high heat deep within the earth, slate or other metamorphic rocks can melt, becoming magma.
118. This magma may harden underground forming rocks such as granite,...
119. . . . seen here in these old horse hitching posts.
120. Or magma may be forced to the surface where it cools to form rocks such as this scoria,...
121. ...or basalt seen in these solidified lava flows.
122. Igneous rocks on the surface may in turn be exposed to weathering, resulting in the formation of sediments. This waterfall is gradually wearing down this granite.
123. These rocks will eventually be worn down into sediments to start the cycle once again.
124. **Graphic Transition – Complexities of the Rock Cycle**
125. In reality, the rock cycle is not quite as simple as we just discussed.
126. These green arrows show that sedimentary rocks and igneous rocks can be melted to form magma.
127. Sedimentary rocks don't always become metamorphic rocks.
128. These unusually shaped sedimentary rocks are continually undergoing weathering from wind and water which gradually wear down the rocks into sediment.



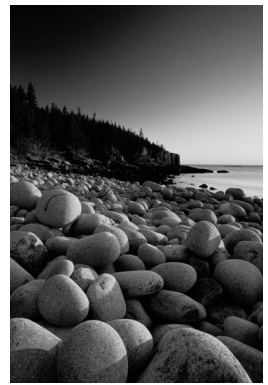
Script (cont.)

129. In some cases, metamorphic rocks, such as this slate, can be reduced to sediment via weathering
130. These relationships are illustrated by these blue arrows.
131. And these orange arrows show that igneous rocks and metamorphic rocks can be placed under heat and pressure to form metamorphic rocks.
132. For example, the igneous rock granite, when placed under heat and pressure, forms the metamorphic rock gneiss.
133. So, as you can see, the rock cycle is more like a rock web, exhibiting the many ways rocks are continually changing.
134. **Graphic Transition – Summing Up**
135. During the past few minutes we have taken a look at the general characteristics of the three main rock groups including igneous rocks,...
136. . . . metamorphic rocks, . . .
137. . . . and sedimentary rocks.
138. We have also explored what makes a rock a rock.
139. We took a look at the process of weathering and erosion.
140. Finally we investigated the various relationships in the rock cycle, and the amazing
141. . . . ways rocks continually change form.
142. So the next time you look at some rocks, think about the different ways they may have changed.
143. You might just look at rocks a little differently.

Fill in the correct word when you hear this tone. Good luck and let's get started.

1. The Grand Canyon was formed primarily via _____.
2. A rock contains one or more _____.
3. The main types of rocks are sedimentary, metamorphic, and _____ rocks.
4. Sedimentary rocks may be formed from solidified layers of _____.
5. Metamorphic rocks are created from other rocks undergoing _____ and pressure.
6. Slate is a _____ rock used for buildings and roofing.
7. Sand originally comes from _____.
8. _____ rock is formed when rock becomes liquid.
9. The rock _____ illustrates that rocks are continually changing form.
10. _____ involves the wearing down of rocks over time.

Answers to Student Assessments



Preliminary Test

1. rocks
2. metamorphic
3. sediments
4. weathering
5. molten
6. erosion
7. cycle
8. sedimentary
9. magma
10. pressure
11. False
12. False
13. False
14. True
15. True
16. False
17. True
18. False
19. True
20. True

Video Review

You Decide:

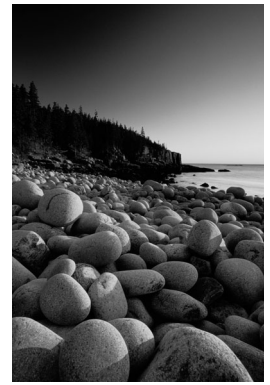
1. Elk are living organisms, while rocks are not.
2. Powerful forces, including heat and pressure, are responsible for twisting the rock.
3. The wave action of water and the rubbing against other stones wore down the pebbles, making them smooth and rounded.
4. The sand originated from rocks.

Video Quiz

1. erosion
2. minerals
3. igneous
4. sediments
5. heat
6. metamorphic
7. rock
8. molten
9. cycle
10. weathering

Post Test

1. True
2. False
3. True
4. False
5. True
6. False
7. True
8. True
9. False
10. False
11. pressure
12. molten
13. sediments
14. weathering
15. metamorphic
16. erosion
17. magma
18. rocks
19. cycle
20. sedimentary



Answers to Student Activities

Take a Closer Look: Sand

To make this activity interesting for students, provide students with a wide variety of sand.

1. Answers will vary.
2. Answers will vary. The longer the quartz grains have been weathered, the smaller they will be.

Rock Cycle Field Trip

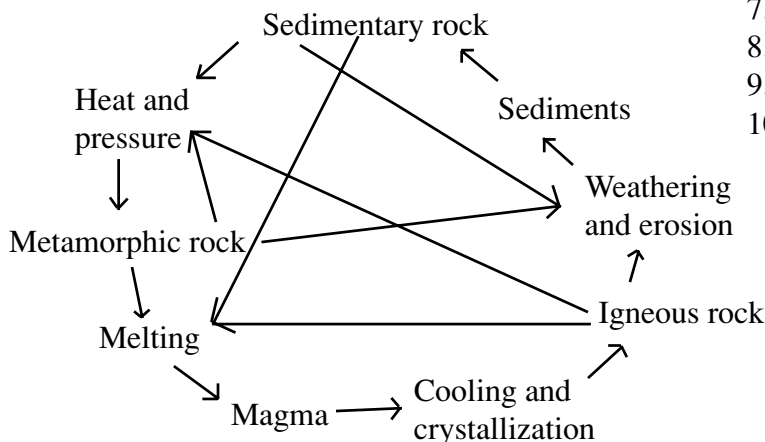
Answers will vary.

Parts of the Rock Cycle

1. Weathering is responsible for breaking down rocks into sediments. Erosion is responsible for moving sediments from one place to another.
2. Heat and pressure are forces which may change sedimentary rock into metamorphic rock.
3. When magma or lava cools, the molten rock crystallizes into igneous rocks.
4. Sand may form from any of the 3 major rock types.

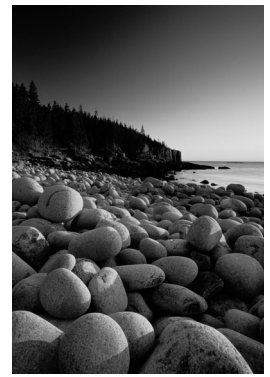
Vocabulary

1. sediment, j
2. melting, g
3. igneous rocks, d
4. metamorphic rocks, f
5. rock cycle, a
6. weathering, b
7. lithification, h
8. erosion, c
9. magma, i
10. sedimentary rocks, e



Assessment and Student Activity Masters



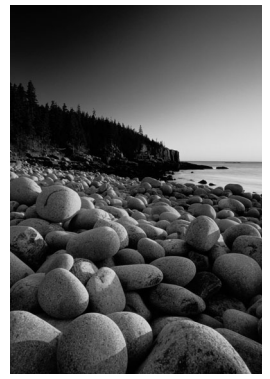


Preliminary Test

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. _____ are made of one or more minerals.
2. The three main groups of rocks are sedimentary, _____, and igneous rocks.
3. Sedimentary rocks are commonly made of _____ that are compacted and cemented together.
4. _____ involves the breaking down of rocks on the earth's surface.
5. _____ rock solidifies to form igneous rocks.
6. _____ involves the transporting of sediment from one place to another.
7. The rock _____ illustrates how rocks change from one type of rock to another.
8. The particles resulting from weathering of rocks may lead to the formation of _____ rock.
9. Molten rock inside the earth is called _____.
10. Heat and _____ are key factors in the formation of metamorphic rocks.

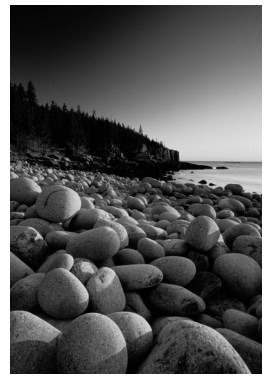
- | | |
|-------------|-------------|
| metamorphic | rocks |
| cycle | sedimentary |
| molten | weathering |
| erosion | lava |
| igneous | magma |
| pressure | sediments |



Preliminary Test

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|---|---|---|
| 11. Igneous rocks are only found within the earth. | T | F |
| 12. Molten rock found on the surface of the earth is called coral. | T | F |
| 13. Molten rock is only found close to the surface. | T | F |
| 14. Compaction and cementation of sediments are key processes involved in the formation of sedimentary rocks. | T | F |
| 15. The process of rain wearing down rocks is an example of weathering. | T | F |
| 16. Moving water is a minor force in transporting sediment. | T | F |
| 17. Sand once existed as rock. | T | F |
| 18. The rock cycle only flows in one direction. | T | F |
| 19. Magma is the result of rocks being heated into liquid rock. | T | F |
| 20. Erosion is responsible for transporting sediment. | T | F |



Video Review

Directions: During the course of the program, answer the “You Decide” questions as they are presented in the video. Answer the Video Quiz questions at the end of the video.

You Decide:

1. What makes rocks different from elk? Answer _____

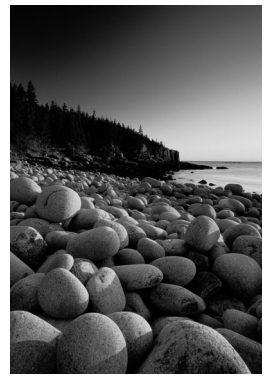
2. What twisted this rock? Answer _____

3. How did these pebbles get so smooth? Answer _____

4. Where did all this sand come from? Answer _____

Video Quiz:

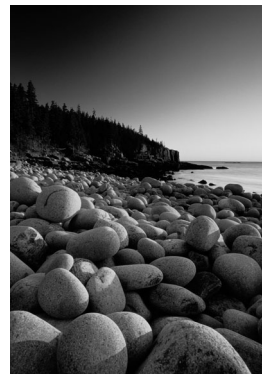
1. The Grand Canyon was formed primarily via _____.
2. A rock contains one or more _____.
3. The main types of rocks are sedimentary, metamorphic, and _____ rocks.
4. Sedimentary rocks may be formed from solidified layers of _____.
5. Metamorphic rocks are created from other rocks undergoing _____ and pressure.
6. Slate is a _____ rock used for buildings and roofing.
7. Sand originally comes from _____.
8. _____ rock is formed when rock becomes liquid.
9. The rock _____ illustrates that rocks are continually changing form.
10. _____ involves the wearing down of rocks over time.



Post Test

Directions: Decide whether the answer is True (T) or False (F).

- | | | |
|--|---|---|
| 1. Compaction and cementation of sediments are key processes involved in the formation of sedimentary rocks. | T | F |
| 2. Molten rock is only found close to the surface. | T | F |
| 3. Sand once existed as rock. | T | F |
| 4. Igneous rocks are only found within the earth. | T | F |
| 5. The process of rain wearing down rocks is an example of weathering. | T | F |
| 6. Moving water is a minor force in transporting sediment. | T | F |
| 7. Magma is the result of rocks being heated into liquid rock. | T | F |
| 8. Erosion is responsible for transporting sediment. | T | F |
| 9. Molten rock found on the surface of the earth is called coral. | T | F |
| 10. The rock cycle only flows in one direction. | T | F |



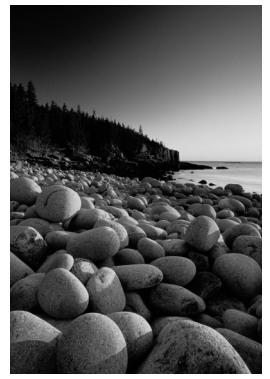
Post Test

Directions: Fill in the blank with the correct word. Choose from the list of possible answers at the bottom of the page.

11. Heat and _____ are key factors in the formation of metamorphic rocks.
12. _____ rock solidifies to form igneous rocks.
13. Sedimentary rocks are commonly made of _____ that are compacted and cemented together.
14. _____ involves the breaking down of rocks on the earth's surface.
15. The three main groups of rocks are sedimentary, _____, and igneous rocks
16. _____ involves the transporting of sediment from one place to another.
17. Molten rock inside the earth is called _____.
18. _____ are made of one or more minerals.
19. The rock _____ illustrates how rocks change from one type of rock to another.
20. The particles resulting from weathering of rocks may lead to the formation of _____ rock.

metamorphic
cycle
molten
erosion
igneous
pressure

rocks
sedimentary
weathering
lava
magma
sediments



Take a Closer Look: Sand

Objective: In this activity you will explore the process of weathering and erosion in the rock cycle by observing and measuring the composition of sand.

Background:

Sand is a term used to describe particles that range in size from very coarse (2 mm) to very fine (0.125 mm). Sand is found in a variety of environments. Sand deposits can accumulate along the curves of a river, are found abundantly along coastlines, and can form dunes and beaches. Some sand is mined from terrestrial deposits left behind by glaciers. Enormous sand deposits form as wind blown deposits in dry, arid areas or deserts. All sand is not the same. Through studying a sand sample, conclusions can be made about the composition of the parent rock, the types of weathering, the length of transportation, and the site of deposition.

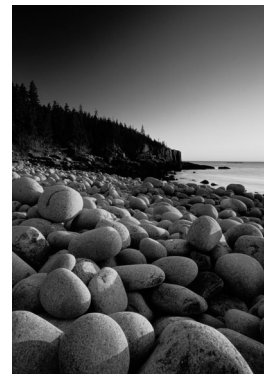
Materials:

4 different kinds of sand	Centimeter grid paper
Sheet of plain white paper	Ruler
Microscope and/or hand lens	Toothpick

Procedure:

Each working group will work with one sand sample as assigned by your teacher.

- 1.) Place a teaspoon of sand on the center of the white paper. Using a hand lens or microscope, take a minute to carefully observe the sample. Record this information in the first table provided. Write down your first impressions of the sand (i.e. “dark,” “light,” “looks like playground sand,” etc.). Record information about relative size of the grains (coarse, fine, very fine), the colors of grains (are all the same, varied, 50/50 dark and light, etc.), the edges of grains (worn, jagged, rounded), and other important features (such as materials included in the sand—shells, pine needles, leaves, clay, dirt, etc.).
- 2.) Next take a piece of centimeter grid paper and carefully pour the sand from the white paper onto the grid paper.
- 3.) Using the edge of the ruler, carefully remove all sand from the paper except from a single one-centimeter grid. Return all excess sand to the original container.
- 4.) Focusing on the sand in the one-centimeter grid, use toothpicks to separate grains of sand into separate piles according to color. In the second table, record the number of grains for each color that represents different minerals. Estimate percentages.
- 5.) Construct a pie graph illustrating the percentage of different minerals in your sand sample. Your teacher may need to assist you in identifying specific minerals.



Take a Closer Look: Sand (cont.)

Table One Sample # _____

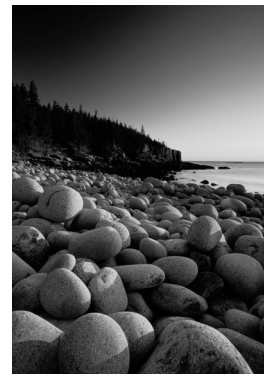
First Impressions	
Size of Grains	
Color of Grains	
Edges of Grains	
Other Features	

Table Two Sample # _____

Color/Mineral	Number of Grains	Percentage

Questions:

1. Theorize as to what the composition of the parent rock may have been. Referring to your pie graph, what is the percentage of the mineral quartz in your sand? Which types of rocks contain abundant amounts of quartz? What conclusions can you draw?
2. Think about the types of weathering that your sand has endured. What is the average size of the individual quartz grains? Have they been weathered for a short or long period of time? How can you tell?
3. Think about the length of time the sand has been transported. What is the shape of the sand grains? As they erode out and move away from the parent rock, have they been moving and rounding for a longer or shorter period of time?
4. What is the site of deposition? Is this a beach or ocean sand, river sand, glacial sand or a desert sand? Why do you think so?



Parts of the Rock Cycle

Background:

Slowly, but surely, rocks in the earth's crust change. The rock cycle illustrates some ways rock changes from one form to another, recycling rock over time. The rock cycle is a means of illustrating the interrelationships of rocks. It is not as complicated as it may appear at first. Complete the rock cycle diagram by placing the given information in the correct location on the diagram. Answer the questions that follow.

There are three types of rock:

- A. Igneous
- B. Metamorphic
- C. Sedimentary

There are many processes in the rock cycle which are continually at work, changing and recreating rocks. These processes include:

- D. melting
- E. cooling and crystallization of magma to form igneous rocks
- F. weathering and erosion
- G. sediments form sedimentary rock
- H. heat and pressure to form metamorphic rock.

Each type of rock can go through any of these processes.

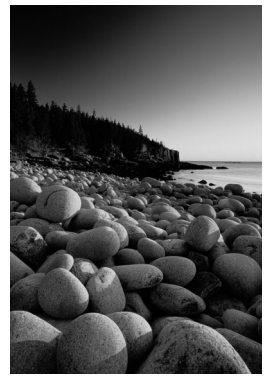
Activity:

- 1.) Obtain a copy of Parts of the Rock Cycle - Student Activity.
- 2.) The steps of the rock cycle are listed on the following page. Use the information provided in the Background and in your text book to create your own diagram of the rock cycle. Use arrows to show the relationships between the different rock types, as well as the different processes that link them.
- 3.) Answer the following questions.

Questions:

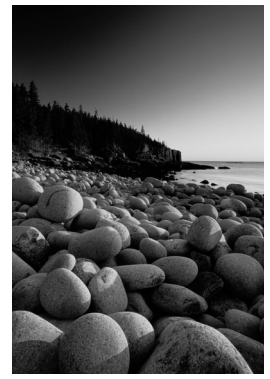
- 1) What two processes result in the formation and movement of sediments?
- 2) What forces change sedimentary rock into metamorphic rock?
- 3) Describe how magma or lava may form igneous rocks.
- 4) List some of the possible parent rocks for beach sand, a sediment.

Parts of the Rock Cycle- Student Activity



Directions: Use these steps to create a diagram of the rock cycle.

- A. Igneous rock
- B. Metamorphic rock
- C. Sedimentary rock
- D. melting to form magma
- E. cooling and crystallization from magma to form igneous rocks
- F. weathering and erosion
- G. sediments
- H. heat and pressure to form metamorphic rock.



Rock Cycle Field Trip

Objective: In this activity students will go on a field trip to observe and identify the rock cycle in action.

Background: The rock cycle is a way to interpret and explain dynamic earth processes that produce and recreate rocks. In this activity we will explore our surroundings by analyzing and recording the rock cycle as it functions around us, much like a physical scientist does.

Materials:

1. A geologic map - It can be a small or large scale map. The map should give some indication, either regionally or locally, as to what the bedrock is in your field trip locale.
2. A Field Trip Map - This is your plan for study. This should be a schematic map (not necessarily to scale) that will show the planned route for your class field trip. There should be locations indicated that will be your study areas. These will likely be in your neighborhood or areas surrounding your school. At each stop, you will record the name of each locality on the map.
3. Rock Cycle Field Trip Data Form - Each locality will be recorded on the Data Form. For example, if you see an igneous rock at Stop #2: Stout Mountain, you would record "Stout Mountain" under igneous in your rock cycle diagram.
4. Field Notebook - This will be used to record observations, conclusions, and answer the questions asked by your teacher.

Procedure:

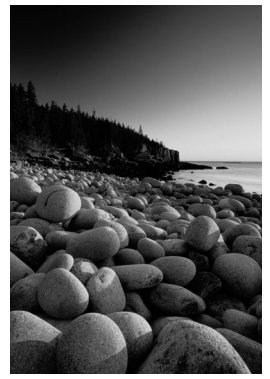
You will travel to several field localities determined by your teacher. Each stop will represent at least one aspect of the rock cycle. Pay careful attention to the instructions of your teacher at each site.

At each stop, determine the following with your class:

1. A made-up name for this locality
2. The rock types that are present
3. The process(es) that is/are occurring
4. Determine the processes that have occurred in the past

At each stop, record your conclusions on the rock cycle diagram and in your notebook.

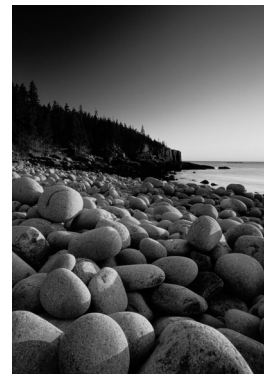
After you have completed your field trip, create a diagram of the rock cycle with specific reference to site observations you noted in the field.



Rock Cycle Field Trip Student Data Form

	Site #1	Site #2	Site #3	Site #4	Site #5
Sedimentary Rock					
Metamorphic Rock					
Igneous Rock					
Heat and Pressure					
Weathering					
Erosion					
Sediments					
Melting					
Magma/Lava					

Rock Cycle Diagram:



Vocabulary of Rocks and the Rock Cycle

- | | |
|---------------------------|--|
| ___ 1) ndtieesm | a. continuous changing of rocks from one type to another |
| ___ 2) telmngi | b. breaking down of rocks and other materials |
| ___ 3) noeisgu osrck | c. the process of wearing down the earth's surface and moving materials from one place to another |
| ___ 4) mmortaipceh csokr | d. rocks that form from magma cooling within the earth or from lava cooling on the earth's surface |
| ___ 5) krok ccyel | e. rocks that form from compaction and cementation |
| ___ 6) rgineatwhe | f. rocks that have been changed from other rocks as a result of heat and pressure |
| ___ 7) iiiilfnoachtt | g. changing of solid rock to molten rock |
| ___ 8) ooisren | h. cooling and solidification |
| ___ 9) amgam | i. liquid rock within the earth |
| ___ 10) imensearydt ocskr | j. particles and dissolved substances |