

## ROCKS OF THE GRAND CANYON OVERVIEW FOR TEACHERS/PARENTS

<b>AGE/GRADE LEVEL</b>	This program is appropriate for grades 3–7. Rock types are introduced in grade 3. Classification of rocks and minerals and the rock cycle are introduced in grade 7.		
<b>DURATION</b>	1.5 hours (grades 3–4) – 2 hours (grades 5–7)		
<b>GROUP SIZE</b>	30 students plus one educator/chaperone for every six students		
<b>LOCATION</b>	Babbitt Reading Room and Geology Gallery		
<b>BACKGROUND</b>	This program should help students identify the three rock types the Earth is made of and to begin to understand that rocks are fascinating ways to discover information about their origin and that of the history of the Earth, as well. Most of the rock layers found at Grand Canyon are sedimentary, laid down over long periods of time by rivers and seas. A small amount of the sedimentary rock was deposited by desert winds. The oldest rock found at the bottom of the Canyon is metamorphic (rock formed by heat and pressure). Igneous rock, seen in the inner gorge and in the Western part of Grand Canyon, was formed by hot, molten rock called magma that cooled either below or on the Earth’s surface (then called lava). The marvel of Grand Canyon is that its rock layers are so beautifully exposed.		
<b>ESSENTIAL QUESTIONS</b>	<p>By the end of the end of the program, students should be able to answer the following question:</p> <ol style="list-style-type: none"> <li>1. Where do rocks come from? How do rocks differ from each other? Are all rocks formed the same way? What are the three types of rock?</li> <li>2. Which of the rock types would you expect to be most prevalent in the Grand Canyon? Why?</li> <li>3. Why would anyone want to study rocks? (grades 3, 4, and 5) Why is determining the age of rocks important to understanding the history of the earth? (grades 6 and 7)</li> </ol>		
<b>KEY WORDS USED IN THE PROGRAM</b>	Crust Mantle Core Igneous	Sedimentary Metamorphic Texture Fossil	Rock cycle (grade 7)
<b>ARIZONA ACADEMIC STANDARDS ADDRESSED BY THIS PROGRAM</b>	<p><b>SCIENCE</b>  <b>Strand 1: Inquiry process</b>  <b>Concept 1: Observations, Questions, and Hypotheses</b>  <i>Grades 3–4:</i> Observe, ask questions, and make predictions            PO 1. Formulate a relevant question through observations that can be tested by an investigation</p>		

#### Related Questions

1. How do you think a rock is made? Are all rocks made the same way?
2. What can we learn by studying rocks?

PO 4 (grade 4) Locate information related to an investigation.

*Grades 5–7:* Formulate predictions, questions, or hypotheses based on observation. Locate appropriate resources

PO 1. Formulate questions based on observations that lead to the development of a hypothesis

#### Related Question

In what type of rock (igneous, sedimentary or metamorphic) would you find fossils? Why?

### **Concept 2: Scientific testing (investigating and modeling)**

*Grades 3–4:* Participate in planning and conducting investigations, and recording data

PO 3. Conduct simple investigations (e.g. related to **properties of rocks**) in life, physical, and Earth and space sciences.

#### Related Questions

1. Are all rocks the same color? Same hardness? Have the same texture?
2. Which rock type (igneous, sedimentary or metamorphic) has only one sample in the Geology Gallery? Why?
3. Group specimen rocks into categories: sedimentary, igneous and metamorphic

### **Concept 3: Analysis and conclusion**

*Grade 6–7:* Analyze and interpret data to explain correlations and results; formulate new questions.

PO 5. Formulate a conclusion based on data analysis

#### Related Question

Predict from the rock cycle two different changes that a rock could undergo if left in its natural setting.

### **Concept 4: Communication**

*Grade 3:* Communicate results of investigations

PO 1. Communicate investigations and explanations using evidence and appropriate terminology

PO 3. Communicate with other groups to describe the results of an investigation.

## **Strand 6: Earth and Space Science**

### **Concept 1: Properties of Earth materials**

*Grade 3:* Identify the basic properties of Earth materials

PO 1. Identify the layers of the earth

- Crust
- Mantle
- Core (inner and outer)

PO 2. Describe the different types of rocks and how they are formed

- Metamorphic
- Igneous
- Sedimentary

PO 3. Classify rocks based on the following physical properties

- Color
- Texture

### **Concept 1: Structure of the Earth**

*Grade 5–7:* Describe composition and interactions between the structure of the Earth and its atmosphere.

PO 1 (grade 7): Classify rocks and minerals by the following observable properties:

- Grain
- Color
- Hardness
- Texture

PO 2 (grade 7): Describe the properties and the composition of the following major layers of the Earth:

- Crust
- Mantle
- Core

PO 4 (grade 7): Describe how the rock and fossil record show that environmental conditions have changed over geologic and recent time

### **Concept 2: Earth's Processes and Systems**

*Grade 7:* Understand the processes acting on the Earth and their interaction with the Earth systems

PO 1. Explain the rock cycle

PO 2. Distinguish the components and characteristics of the rock cycle for the following types of rocks

- Igneous
- Metamorphic
- Sedimentary