

GRAND CANYON GEOLOGY CURRICULUM GUIDE

AGE/GRADE LEVEL

This program is appropriate for Grades 4–8

DURATION

The program is approximately 1.5 hours long.

GROUP SIZE

Up to 30

LOCATION

Geology Gallery, Courtyard, Nature Trail

BACKGROUND

This program helps students identify the three rock types within the Earth and to begin to understand that rocks offer fascinating ways to discover information about the origin and the history of the Earth. 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. Although much is known about the age of the rock layers exposed at Grand Canyon and the environment at the time they were formed, scientists are still debating how Grand Canyon itself was formed. The Colorado River carved it, but how the river got there and began the process remains a mystery.

ESSENTIAL QUESTIONS

- 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 rocks?
- What was the Earth like when the rock layers of Grand Canyon were deposited? How do we know?
- What do geologists learn from the study of rocks? Why is determining the age of rocks important to understanding the history of the earth? of Grand Canyon?
- The layers of rock were in place long before the Grand Canyon formed. What would be strong enough to cut through all that rock to make a canyon? Is Grand Canyon finished growing and changing?

KEY WORDS USED IN THE PROGRAM

Geology	Crust	Mantle
Core	Colorado Plateau	Plate Tectonics
Igneous	Metamorphic	Sedimentary

SET UP

Get box of Geology rock samples from docent closet, stage scavenger hunt materials in Geology Gallery



SUPPLIES NEEDED

- Rock samples
- Folders with Grand Canyon cross-section and environment descriptions
- Geology scavenger hunt
- Pencils
- Clipboards

PROGRAM INSTRUCTIONS

- Introduction to rocks and basic geology in Geology Gallery
- Give kids scavenger hunt (or break into groups if large group)
- Rock activity in Geology or Branigar depending size of group
- Can take group on nature hike in canyon outside museum if you are comfortable talking about how it was formed



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History and Social Science Standards

GEOGRAPHY

The use of geographic representations and tools helps individuals understand their world.

- 3.G1.1 Use and construct maps and graphs to represent changes in Arizona over time.
 - Key concepts include but are not limited to locating physical features including the Grand Canyon, Mogollon Rim, Colorado River, Salt River, Gila River
 - Key concepts include but are not limited to locating human features including major cities, counties, Hoover Dam, Roosevelt Dam, and state capital
 - Key concepts include but are not limited to distinct physical and cultural characteristics of Arizona including landforms, the 5C's, climate zones, elevations, plants, animals, Arizona's 22 Indian Nations, diverse ethnic, racial, and religious cultures

Arizona Science Standards

EARTH AND SPACE SCIENCES

- 4.E1U1.6 Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.
- 4.E1U1.7 Develop and/or revise a model using various rock types, fossil location, and landforms to show evidence that Earth's surface has changed over time.
 - **Crosscutting Concepts:**
Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models;**
Energy and Matter; Structure and Function; **Stability and Change**
- 7.E1U1.5 Construct a model that shows the cycling of matter and flow of energy in the atmosphere, hydrosphere, and geosphere.
- 7.E1U1.6 Construct a model to explain how the distribution of fossils and rocks, continental shapes, and seafloor structures provides evidence of the past plate motions.
 - **Crosscutting Concepts:**
Patterns; Cause and Effect; Scale, Proportion and Quantity; **Systems and System Models;**
Energy and Matter; **Structure and Function;** Stability and Change
- 8.E1U1.6 Analyze and interpret data about the Earth's geological column to communicate relative ages of rock layers and fossils.
 - **Crosscutting Concepts:**
Patterns; **Cause and Effect;** Scale, Proportion and Quantity; **Systems and System Models;** **Energy and Matter;** Structure and Function; **Stability and Change**

PHYSICAL SCIENCES

- 6.P1U1.2 Plan and carry out an investigation to demonstrate that variations in temperature and/or pressure affect changes in state of matter.
 - **Crosscutting Concepts:**
Patterns; Cause and Effect; **Scale, Proportion and Quantity;** **Systems and System Models;**
Energy and Matter; Structure and Function; Stability and Change
- 8.P1U1.2 Obtain and evaluate information regarding how scientists identify substances based on unique physical and chemical properties.



- **Crosscutting Concepts:**
Patterns; **Cause and Effect**; Scale, Proportion and Quantity; Systems and System Models; **Energy and Matter**; Structure and Function; **Stability and Change**



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