

WAYFINDER Understanding the Lithosphere

The following North Carolina State Science Standards are relevant to this Wayfinder:

Grade 6	3.01, 3.02, 3.04
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Introduction

The Earth is constantly changing and has been since it came to existence. One of the greatest observations that came out of the 19th century was that the same forces that can be observed today have always been and will still be shaping our world for billions of years. Observing and understanding earth-changing forces such as wind and water is a chance to look into the past and forward into the future.

There are many exhibits in the main Museum building that can illustrate how the lithosphere is shaped and formed. Explore the geology exhibits to discover the processes behind the formation of different rocks and to find rocks and minerals from North Carolina and the world. On the third floor, check out *Data Earth* to look at volcanic activity in the world and to interact with a database that offers information on many topics from tectonics to human impact on the pedosphere.

Before your visit

Review the following terms and concepts: lithosphere, crustal plate movement, the rock cycle, mineral.

Discuss the process of volcanic and earthquake activity and the impact each might have on the land.

During your visit

Head to the second floor and explore the *Data Earth* exhibits. Encourage students to use the Earth Update program to learn about topics involving the geosphere. As they navigate this database they can see a model of the Earth, a simulation of how the tectonic plates might move in the next 250 million years and other interesting images of our planet.

Find the Earthquakes and Eruptions screen (follow the sound of the drumbeats). It shows all volcanic and earthquake activity since the 1960s. Eruptions are indicated by red triangles and earthquakes by white dots. The size of the shape indicates the magnitude of the earthquake or eruption. Consider the following questions as you watch:

- 1) Do you notice a pattern or are these events occurring randomly over the surface of the Earth? *There should be distinct lines that you observe.*
- 2) Why do these events take place in only certain locations? What is distinct about these regions? *These lines are the boundaries of Earth's tectonic plates.*
- 3) Watch the lone triangle in the middle of the Pacific Ocean for awhile. What do you notice almost every time there is a volcanic eruption there? Why might this be happening? *Earthquakes tend to precede and follow volcanic eruptions. As magma pushes its way to the surface of the Earth, it forces rocks to move and an earthquake to occur.*

Find the World Seismic Map that is displayed on the side of the Earth Update computer kiosk and across from the fire engine exhibit. This is a composite of all of the earthquake activity that has occurred from 1960-1980. The red regions are where the most activity has occurred. The pattern you can see here should look familiar. Have students take note of the reddest regions and then find those same regions on the largest blue and tan globe near the stairs.

- 1) What land feature appears near the regions with the most volcanic and seismic activity?
Mountains
- 2) Why do these features appear here? What is happening in these regions that creates these landforms? *These are the boundaries of tectonic plates. At the boundary there is a great deal of activity and movement. As plates push against each other, mountains are formed.*

Visit the geology exhibits on the first floor. Find the seismometer that reports earthquake activity recorded by the Butner Seismic station. This is a working machine that warns us of any seismic activity that is taking place in the area. Off to your left check out the seismometer and seismograph. Try to get the needle to move by jumping on the location indicated. Consider these questions while you are here:

- 1) What causes an earthquake?
- 2) What are some ways that an earthquake can affect the lithosphere?
- 3) What is a fault? What is the relationship of a fault to an earthquake?
- 4) Why is it important to monitor seismic activity?
- 5) What events may occur after an earthquake that would affect humans?

Before handing out the Geology Scavenger Hunt, ask the following questions as a review:

- 1) How is an igneous rock formed? A metamorphic rock? A sedimentary rock?
- 2) How is a rock different from a mineral?
- 3) What are some different ways that people use rocks and minerals in their daily lives?

After your visit

Reflecting back on their Museum experience and their own past knowledge, challenge students with the following questions:

- 1) How is the Earth like an egg?
- 2) How is the lithosphere like a recycling plant?
- 3) How is the lithosphere like a swimming pool overcrowded by inflatable mattresses?
- 4) What other similes can you come up with?

Discuss the answers to the scavenger hunt. You could turn the hunt into a point-based competition, awarding one point for every item found or for every item answered correctly. The answers are given below.

Please see Geology Scavenger Hunt on next page...

Geology Scavenger Hunt

Use the Geology exhibit to help answer the following questions. Don't forget to look in the drawers underneath the rock displays!

FIND A MINERAL ...	WHAT MINERAL IS IT?
...that grows in long, thin sheets.	
...that is fluorescent and found in North Carolina.	
...from Brazil that is also a gemstone.	
...that might taste salty.	
...that grows with 8 triangular faces.	
...that might be mistaken for gold.	
...that grows with 4 sides.	
...that is North Carolina's State Gem	
...that is a solid yellow color.	

How many minerals can be found in North Carolina? _____

In which North Carolina county has gold been found? _____

Where was North America's largest emerald found? _____

FIND A ROCK...	WHAT IS IT CALLED?	SEDIMENTARY, METAMORPHIC OR IGNEOUS?
...that acts like a magnet.		
...made of sand and pebbles glued together with silt.		
...from NC formed 200 million years ago.		
...formed by piles of leaves, grasses and organic material.		
...formed by pressing and heating limestone.		
...that contains minerals like quartz and feldspar.		

Geology Scavenger Hunt ANSWERS

FIND A MINERAL ...	WHAT MINERAL IS IT?
...that grows in long, thin sheets.	<i>mica or muscovite</i>
...that is fluorescent and found in North Carolina.	<i>hyalite opal</i>
...from Brazil that is also a gemstone.	<i>amethyst (there may be others)</i>
...that might taste salty.	<i>halite</i>
...that grows with 8 triangular faces.	<i>fluorite</i>
...that might be mistaken for gold.	<i>pyrite</i>
...that grows with 4 sides.	<i>halite or calcite</i>
...that is North Carolina's State Gem	<i>emerald</i>
...that is a solid yellow color.	<i>sulfur(there may be others)</i>

How many minerals can be found in North Carolina? At least 250
 In which North Carolina county has gold been found? Mecklenburg
 Where was North America's largest emerald found? Hiddenite, NC

FIND A ROCK...	WHAT IS IT CALLED?	SEDIMENTARY, METAMORPHIC OR IGNEOUS?
...that acts like a magnet.	<i>magnetite</i>	<i>metamorphic</i>
...made of sand and pebbles glued together with silt.	<i>conglomerate or puddingstone</i>	<i>sedimentary</i>
...from NC formed 200 million years ago.	<i>diabase</i>	<i>igneous</i>
...formed by piles of leaves, grasses and organic material.	<i>oil shale</i>	<i>sedimentary</i>
...formed by pressing and heating limestone.	<i>marble</i>	<i>metamorphic</i>
...that contains minerals like quartz and feldspar.	<i>granite</i>	<i>igneous</i>