AUDIENCE WITH AN ASTRONAUT
SPACE FOUNDATION

STEM ACTIVITY LESSON

MOON GEOLOGY

Explore the fascinating world of geology by classifying real rocks based on their visual characteristics and investigating their densities, all while drawing parallels to the classification and density of moon rocks.

Grade Level

3rd - 12th

Focus

Geology, Mathematics, Critical Thinking

Standards

ESS2.A, **ESS1.C,**

BACKGROUND
INFORMATION

Understanding the geological history of celestial bodies involves classifying rocks by their visual and compositional characteristics and evaluating properties like density. Earth's rocks are categorized into three main types: igneous, sedimentary, and metamorphic, based on factors such as mineral composition and texture. Density, which measures mass per unit volume, varies with factors like composition and porosity, playing a crucial role in decoding the history and formation processes of Earth and other celestial objects.

STUDENT REAL-LIFE
CONNECTIONS

- Have you ever wondered why some mountains are jagged and rocky while others appear smooth and round? How could the history of moon rock formations give us clues about the Moon's past volcanic activity and impacts from space objects?
- Have you ever seen a meteor shower or watched shooting stars at night? How do these cosmic events relate to the idea that the Moon's surface is constantly bombarded by space rocks and debris, potentially shaping its geology?

LESSON
OBJECTIVES

- Classify different rocks based on visual characteristics, and accurately identify them as igneous, sedimentary, or metamorphic rock types.
- Calculate the density of rocks by measuring their mass and volume, and understand how differences in composition and porosity affect rock density.
- Develop critical thinking skills by comparing and contrasting the classifications and densities of Earth rocks with the potential classifications and densities of moon rocks, thereby gaining insights into the scientific methods used to explore lunar geology.

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MATERIALS

LIST

- Various rock samples (igneous, sedimentary, and metamorphic)
- Triple-beam balance or digital scale
- Graduated cylinders
- Water
- Calculator
- Worksheets for data recording
- Safety goggles

ACTIVITY

DIRECTIONS

Engage

- Begin the lesson by showing students images of moon rocks and briefly discussing the concept of lunar geology.
- Ask questions to pique their curiosity, such as "What do you think moon rocks are made of?" and "How are they different from Earth rocks?"

Explore

- Provide students with various real rocks (igneous, sedimentary, metamorphic) collected from Earth. These should be marked with numbers or symbols to differentiate them.
- In small groups, students will first observe and classify the rocks based on their visual characteristics (color, texture, shape, etc.). They can use moon rock reference images as a guide.
- Next, introduce the concept of density and explain that they will determine the density of these rocks. Provide students with digital scales, graduated cylinders or beakers, and water.
- Instruct students to measure the mass of each rock on the digital scale and record the values on their worksheets.
- Have students fill a graduated cylinder or beaker with a specific amount of water (e.g., 100 ml) and record this initial volume.
- Submerge each rock in water and measure the volume displaced by the rock, recording these values.
- Guide students through the calculations to find the density of each rock (Density = Mass / Volume).

Explain

- Gather the class and discuss their findings. Compare and contrast the classification of the rocks based on visual characteristics with their densities.
- Emphasize that moon rock classification is based on both visual and compositional criteria, while density is a physical property that can provide additional information about a rock's composition and origin.

ACTIVITY

DIRECTIONS (CONT.)

Elaborate

- Challenge students to explain why certain rocks have higher or lower densities than others based on their knowledge of rock types.
- Ask them to speculate about how moon rocks might differ from Earth rocks in terms of density and why that might be the case. Discuss the unique conditions on the Moon that could affect rock density.
- Provide moon rock samples (even if they are just pictures or descriptions) and ask students to predict how they might classify and estimate the density of these moon rocks.

Evaluate

- Distribute an evaluation worksheet that includes questions about rock classification, density calculations, and moon rock predictions.
- Encourage students to write a short paragraph explaining how the classification and density of moon rocks can help scientists understand the history of the Moon.
- Review the completed worksheets to assess their understanding of the concepts.