

Title: Layers of the Moon

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Subject(s): Science

Topic: Moon, Geology, Space Science

Grade/Level: 5-8

Objective:

By the end of this lesson, students will be able to:

- construct a scale model of the lunar layers.
- identify the lunar layers.

Summary of Lesson:

Students will learn the current theory of the geology of the moon's layers. Using this information, students will construct a scale model of the moon's layers and cut a cross section to identify the layers.

Time Allotment: 30-40 minutes

Procedures/Instructions:

Background Information:

Knowledge of the Moon's interior is limited; however, scientists have developed a model based on available data. The current model suggests that the Moon has a partially molten iron-rich core. Seismic equipment left by Apollo astronauts indicates that inner parts may be partially molten. It is estimated that this core is 200 km in diameter. Over the core is a 500 km thick inner mantle (asthenosphere) that has properties similar to the Earth's asthenosphere. This asthenosphere is semi-solid and non-rigid. Over this layer is the outer mantle that is similar to the Earth's lithosphere.

Unlike the Earth's rocky lithosphere, the Moon's is very thick, composed of solid rock and about 1000 km thick. Over this is the crust. The crust of the Moon is richer in titanium and aluminum than Earth crustal rocks. The crust varies in its



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depth and is 60 km on the side of the Moon facing the Earth and 150 km on the back side of the Moon. The reason for this is probably related to the Earth's gravitational pull. Dense lunar material was attracted by the Earth's gravitational pull and pulled it closer to the side of the Moon facing the Earth. This made the mantle (lithospheric and asthenospheric mantle) a little off center while the crust moved slightly away leaving the crust thicker on the side of the Moon facing away from the Earth.

A layer of shattered rock due to meteor impacts called regolith covers the surface of the Moon. This depth varies and can be up to 100 meters thick.

Procedures:

1. Discuss the layers of the Moon and their relationship to the layers of the Earth.
2. Have students complete the student worksheet.
3. Divide the students into groups of four and give each group a 4 pack of Play Doh.
4. When students make the initial ball of clay it is only .2" to represent the core.
5. For the remaining layers have the students press the clay into their hands to the proper depth and then wrap the clay around the previous layer.
6. Students will use the plastic knife to cut a triangle into the clay to remove a 1/8 section of the Moon to see the layers.
7. Reinforce the Moon's interior geology (theory) by comparing the worksheet to the Play Doh model.

Transfer/Extension:

- With the remaining Play Doh make a model of the Moon's interior.
- Contact your local NASA Educator Resource Center http://www.nasa.gov/audience/foreducators/informal/contacts/ERCN_State_Listing.html to have real moon rock samples loaned to your school.

Instructional Materials:

- Crayons (Red, Green, Yellow, Blue)
- Eight 4 packs of Play Doh in Red, Green, Yellow, and Blue
- Plastic knives
- Ruler
- Silver glitter
- Student worksheet

Additional Resources:

Layers of the Moon

http://www.knet.co.za/moon/peeling_back_the_layers.htm

Top Ten Scientific Discoveries Made During Apollo Exploration of the Moon

<http://www.lpi.usra.edu/expmoon/science/lunar10.html>

86 facts about the Moon from Astronomy Cafe

<http://www.astronomycafe.net/qadir/amoonm.html>

NASAexplores moon and Earth rocks activity

http://media.nasaexplores.com/lessons/05-005/5-8_2.pdf

National Science or Mathematics Standards:

Science

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
 - Use appropriate tools and techniques to gather, analyze and interpret data.
 - Develop descriptions, explanations, predictions and models using evidence.
- Understandings about scientific inquiry

Earth and Space Science

CONTENT STANDARD D:

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

- Structure of the earth system
- Earth in the solar system

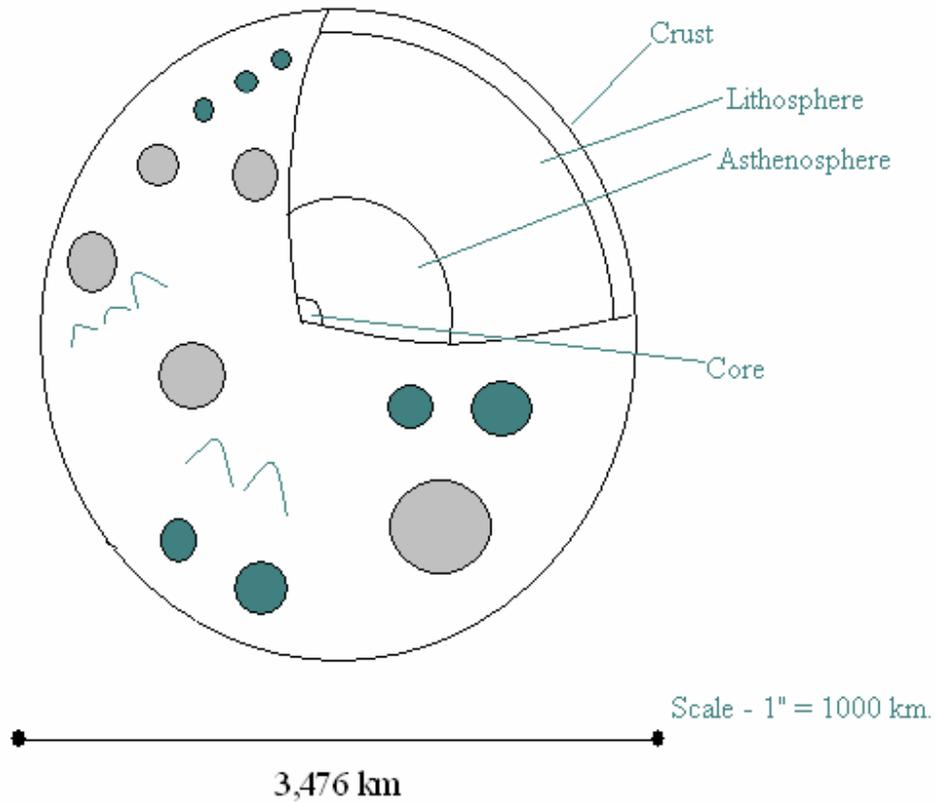
Assessment Plan:

- Discuss with students that the Moon's crust differs in depth on the side facing the Earth and the side away from the Earth. Have them come up with possible reasons and confirm them with current scientists theories.
- Compare and contrast the chemical composition of Moon rocks to Earth rocks. Check out the NASAexplores moon and Earth rocks activity at http://media.nasaexplores.com/lessons/05-005/5-8_2.pdf

NAME _____

DATE _____

LAYERS OF THE MOON



DIRECTIONS:

1. Color the crust yellow.
2. Color the lithosphere red.
3. Color the asthenosphere blue.
4. Color the core green.
5. Make a .2" ball of green clay. This represents the core.
6. Flatten a piece of blue clay .5" thick. This represents the asthenosphere.
7. Surround the green clay with the .5" thickness of blue clay.
8. Flatten a piece of red clay 1" thick. This represents the lithosphere.
9. Surround the blue clay with the 1" thickness of red clay.
10. Flatten a piece of yellow clay .1" thick. This represents the crust.
11. Add some silver glitter to represent the regolith. (Not too thick as it is only 100 meters thick which would be .01")
12. Create some lowlands (maria) and highlands and craters.
13. Using a plastic knife, cut 1/8 of the moon away as shown in the illustration.