MISSION TO THE MOON MODEL

Making an Earth-Moon Size and Distance Scale Model

Target Population:
Students, ages 7–10

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Mission to the Moon Model: Making an Earth-Moon Size and Distance Scale Model is part of the STEM²D Student Activity Series. The content and layout were both developed by the Smithsonian Science Education Center as part of Johnson & Johnson's WiSTEM²D initiative (Women in Science, Technology, Engineering, Mathematics, Manufacturing, and Design), using a template provided by FHI 360 and JA Worldwide. This series includes a suite of interactive and fun, hands-on activities for girls (and boys), ages 5-18, globally.

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Mission to the Moon Model:

MAKING AN EARTH-MOON SIZE AND DISTANCE SCALE MODEL

Challenge: **Make a scale model of the distance from the Earth to the Moon**

Target Population: **Students, ages 7–10**

ACTIVITY DESCRIPTION

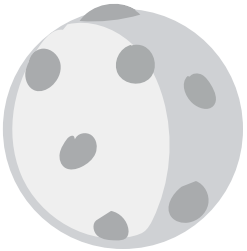
Students learn the importance of scale in model making. They use size relationships and distance relationships rather than large numbers to make an Earth to Moon distance model that is theirs as a takeaway. They become aware of misconceptions about distance in space.

Materials

For 100 students:

- 200 Strips blue construction paper, 18-x-1-inch
- 100 Strips white construction paper, 18-x-1-inch
- 4 Pairs safety scissors
- 2 Rolls clear tape
- 4 Balls kite string
- 2 Rings blue construction paper, 18-inch circumference (for facilitator)
- 1 Ring white construction paper in each of the following circumferences (for facilitator):
    - 12-x-½-inch
    - 9-x-½-inch
    - 6-x-½-inch
    - 4.5-x-½-inch
    - 3-x-½-inch

Instructions:



1. Probe the students' understanding of a model (model airplane, model train, doll house, etc.). Students are most familiar with models that represent something big that has been made smaller.

2. Ask the students, "How big do you think the Moon is compared to the Earth, if the Earth is this big?" Show them the 18-inch blue circumference ring, explaining that this ring is like a belt around the center of the Earth showing how big around it is.

3. Let the students select a Moon size from among the premade white circumference rings.

4. Using their selected Moon circumference, ask the students, "How far to do you think the Moon you selected is from the Earth?"

5. Let them show you a distance.

6. Respond, "Let's see how close you came?"

7. Hand them two blue strips and one white strip of 18-x-1-inch construction paper. Point out that they are all the same length.

8. Have them make an Earth circumference ring using one blue construction paper strip and tape. "This is your Earth."

9. Have them hold the white strip and tell them that the circumference (belt around) of the Moon is about ¼ that of the Earth. Ask them how they might find ¼ of that strip?

10. Guide them to folding the white strip in half and then in quarters, then cut off a quarter so that the white piece is ¼ the length of the blue strip. From this, they can make their Moon and tape it together. "This is your Moon."

11. Ask how close they came in selecting a Moon size in step 2.

12. Now ask, "How far apart do you think the Earth and the Moon are, using this scale?"

13. Tell them the Moon is a little less than 10 Earth circumferences (the blue strip) from the Earth. Using the second blue strip, which represents the Earth's circumference, for measuring, ask them to cut a piece of string 10 times the length of the blue strip. (Nine and a half times the blue strip is even closer to the correct distance.)

14. After measuring the string, have them tape the string length from their Earth to their Moon. This is their scale model to take with them.

Background Information/Resources

NGSS: Developing and Using Models. A practice of both science and engineering is to use and construct **models** as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.

The equatorial circumference of Earth is 24,874 miles.

(24,874 ÷ 4 = 6,219 miles) is the approximate circumference of the Moon.

(24,874 x 10 = 248,740 miles) is the approximate distance from Earth to the Moon.

The equatorial circumference of the Moon is 6,784 miles.

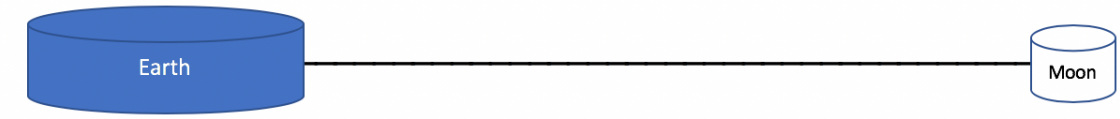
The distance from Earth to the Moon is on average 238,855 miles.

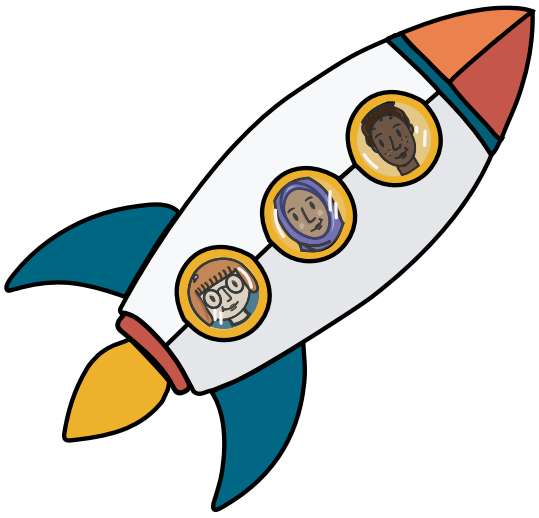
Questions/Assessment:

1. Were you surprised at the size of the Moon compared to the Earth?

2. Were you surprised at the distance the Moon is from the Earth?

3. What is important when making a scale model?





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