

**Hands-On Aviation and Space Activities for Secondary Educators
and Civil Air Patrol Aerospace Education Officers**

AEX II

Volume I

Great Hands-On Aerospace Activities



The Civil Air Patrol Aerospace Education Excellence Award Program

activity thirteen

Moon Shot! —

A game to determine the relative size and distances between earth and moon

OBJECTIVE – The student/cadet will explore the relationships between the Earth and our moon by comparing their relative sizes and by determining the distances between them.



NATIONAL STANDARDS

Science Standards:

- Standard A: Science as Inquiry
- Standard D: Earth and Space Science
 - Structure of the earth system
- Unifying Concepts and Processes
 - Constancy, change, and measurement

BACKGROUND

1. The Earth is about 4 times larger than its moon.
2. The diameter of the Earth is about 8,000 miles.
3. The diameter of the moon is about 2,000 miles.
4. The circumference of the Earth is about 25,000 miles.
5. The distance from the Earth to the moon is about 240,000 miles.
6. The circumference of the moon is about 7,000 miles.

MATERIALS

1. You will need two spheres, like a basketball and a tennis ball. The basketball is 10" and the tennis ball is about 2.5" in diameter.
2. You'll also need a length of string, like kite string, at least 25 feet long.
3. Masking tape is the final requirement.

DISCUSSION

1. The instructor should ask, "How far away is the moon?" *answer 240,000 miles*
2. Then ask, "What is the circumference of the Earth?" *answer 25,000 miles*
3. Next is, "What is the approximate diameter of the Earth?" *answer 4,000 miles*
4. Finally, "What is the diameter of the moon?" *answer about 2,000 miles or 1/4 the size of the Earth.*

From these answers, the instructor will ask, "Based on the correct answers to the above questions, how many times will the string go around the earth to equal the distance to the moon?" Solution, divide 240,000 by 25,000 *answer is 9.5!*

PROCEDURE

1. The demo area should be at least 30 feet long if you plan to use the basketball and the tennis ball.
2. Have one student/cadet hold the basketball and another hold the tennis ball.
3. The instructor should state, "How far away would the tennis ball be if both were in scale? I'm holding a piece of string with the exact 'distance' in scale terms. (hidden) I want you to tell the person with the tennis ball when to stop once you think he (or she) has reached the exact relative distance." Have the student/cadet holding the tennis ball start by putting the "moon" up next to the basketball. The "moon" student/cadet then slowly starts walking away from the "Earth" student/cadet holding the basketball. The instructor tells the "audience" to call out "stop!" when they think the correct distance has been obtained.
4. Each time the "moon" student is told to stop, the person issuing the command gets up and puts a piece of masking tape on the floor where the "stop" was called. Once the tape is placed, the initials of the student/cadet calling the "stop" should be written on the tape.
5. Once all of the audience has made their mark, the instructor takes the correct length of string, previously marked with a pen or marker, to the basketball.
6. The unmarked end of the string is carefully taped to the basketball.
7. To increase the suspense, the instructor should drop all but the marked end of the string to the floor. Then slowly proceed toward the "guess marks" on the floor.
8. As the instructor passes the first mark, naturally the student/cadet who made it will let out some kind of expression like, "oh, man....!" The AEO/teacher should continue slowly while taking up the slack in the string.
9. Once the AEO/teacher reaches the point where the string is taut, the "moon" student is called to the scene. The excitement will reach a fever pitch when the instructor reads out the initials of the cadet/student who was closest to the correct distance.
10. The instructor tells the audience/students, "If the Earth were the size of this basketball, the tennis ball would be this far away."
11. Going back to the basketball, the instructor should wrap the string around its "equator" once and then mark it. The AEO/teacher should then say, "...that's 25,000 miles, right?" The instructor should do this nine times and then state, "...that's 225,000 miles." The string should go around one-half of the basketball one more time and then the statement made, "...and that's 240,000 miles!"
12. Some kind of reward should be given like a gift certificate to a local fast food place to the winning student/cadet.