



## EARTH/MOON COMPARISONS

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**Background:** Children and adults alike have difficulty comprehending the scale of the Earth-Moon system. This includes the relative diameters of the Earth and the Moon, their relative volumes, as well as the distance from the Earth to the Moon. We have created several activities that help children and adults get a better understanding of the scale of Earth-Moon system. In all of these activities, we simply compare relative sizes and distances. We avoid using actual diameters and distances in miles or kilometers as such large numbers can be difficult to comprehend.

For background information, here are a few numbers and ratios:

*Important numbers (ratios) for the activities:*

1. Ratio Moon diameter to Earth diameter: 3.67 (about 4)
2. Ratio Earth diameter (at equator) to Earth/Moon distance: 30.1
3. Ratio Earth volume to Moon volume: 49.5 (about 50 times)

*Background numbers for the above ratios:*

- Diameter of the Earth (at equator): 12,756 km (7,935 miles)
- Diameter of the Moon: 3,474 km (2,159 miles)
- Mean Distance, Earth to Moon: 384,400 km (239,000 miles)

**Objectives:** Participants will understand: the use of models to understand relationships; comparative sizes and distances of the Earth and the Moon; the concepts of diameter, distance, and volume. They will be able to: 1) arrive at a prediction and 2) explain the relative sizes (volumes) of the Earth and the Moon and the relative distance between the Earth and Moon.

**Bead Bracelet Activity:** This activity simply models the distance from the Earth to the Moon. From *important numbers* above (2), the distance from the Earth to the Moon is very close to 30 times the diameter (distance across) of the Earth. Therefore the thirty beads on a string represent the 30 “Earths” it takes to fit between the Earth and the Moon.

Below on the left is a picture of the bead bracelet activity. On the right we show part of the *Earth/Moon Comparisons* activity that uses 30 Styrofoam® balls to represent the Earth-Moon distance.



**Earth/Moon Comparisons:** Since this is an activity that will normally be done at a Family Science Night, the only part of this that will be done will probably be the Earth and Moon clay model comparison, as pictured on the right at the bottom of the previous page. In this activity, the participants will be modeling the relative volumes of the Earth and the Moon. You could also show the cutouts of the Earth and the Moon to show the relative diameters of the Earth and the Moon.

1. Review the concept of volume.
2. Give each participant a quantity of Play-Doh® and have them form 50 spheres of equal size, using all of their clay.
3. Ask participants to decide how to model the volumes of the Earth and the Moon; how many spheres of the 50 would represent the Earth and how many the Moon? They must use all 50 spheres.
4. Have the participants loosely clump together the spheres of their models.
5. Have each group display their models on one table.
6. Observe and discuss the models.
7. Show the correct relationship; one sphere of clay represents the Moon’s volume and the other 49 represent the Earth’s.
8. Finally, you can show them the 30 Styrofoam® balls for a distance comparison.
9. **Note:** in large venues, pre-make the spheres, divide the spheres into separate piles of 25/25, 35/15, 40/10, 45/5, 49/1, etc. and have the participants guess which one is correct (a container is helpful to keep the spheres together).



Girl Scout counting out clay balls



Two students with their “final answer”



Girl Scout leaders estimating Earth-Moon distance



Example of the counted-out clay balls