

Scaling the Solar System

Materials

3lbs of play-dough (minimum quantity required for this activity)

Student Sheet (Planet Boxes)

Pens

Rulers

Plastic Knife

Optional: Scale

1) Compare: Earth - Moon

1. Have students predict and make models of the **size** and **distance** of the MOON in relation to the EARTH.
2. Divide the dough into 50 equal sized balls (as equal as possible). Choose an average sized ball and set it aside. Squash the other 49 back together. You now have the EARTH and MOON. (This would be a good opportunity to expand measurement skills by weighing and dividing in half.)
3. Now comes the relative distance. The distance between the EARTH and the MOON should be equal to 30 EARTH diameters.

(NOTE: the misconception of the relative size and distance between the EARTH and the MOON is due to perspective which comes from the photographs we have all seen of both. In order to get both the EARTH and the MOON in the same photo, one has to take a photo of them one in front of the other and slightly off to one side.

2) Compare: Earth - Moon - Mars

1. Divide your dough in half. One half is the EARTH.
2. Make seven balls out of the other half. One ball is MARS.
3. Take another one of the seven balls and divide it into seven. One of those is the MOON.
4. You can also do a distance scale with this model...but MARS is far! If you used 3lbs of dough for this model, the distance between EARTH and MARS would be 7 city blocks!

3) Solar System Comparison

This activity demonstrates the different sizes of the nine planets in our solar system. Follow the steps outlined below to see the relative size (volume) of each planet. Start with a big 3-pound ball of play-dough, which represents the volume of all the planets combined.

1. Divide the Entire Ball of Play-Dough into 10 Equal Parts

You may find it easiest to start by rolling the ball into one big hot dog shape.

- Combine 6 parts together, roll them into a ball, and put ball into the Jupiter box.
- Similarly combine 3 parts and put them into the Saturn box.

2. Cut the Remaining Part into 10 Equal Parts

- Take 5 parts and combine them with the ball in the Saturn box.
- Combine 2 parts to put into the Neptune box.
- Put 2 parts into the Uranus box.

3. Cut the Remaining Part into 4 Equal Parts

- Take 3 parts and combine them with the ball in the Saturn box.

4. Cut the Remaining Part into 10 Equal Parts

- Put 2 parts into the Earth box.
- Put 2 parts into the Venus box.
- Take 4 parts and combine them with the ball in the Uranus box.

5. Combine the Remaining 2 Parts and Cut into 10 Equal Parts

- Put 1 part into the Mars box.
- Take 4 parts and combine them with the ball in the Neptune box.
- Take 4 parts and combine them with the ball in the Uranus box.

6. Cut the Remaining Part into 10 Equal Parts

- Put 7 parts into the Mercury box.
- Take 2 parts and combine them with the ball in the Uranus box.

7. Cut the Remaining Part into 10 Equal Parts

- Take 9 parts and combine them with the ball in the Uranus box.
- Put 1 part into the Pluto box.

And Now...

Now that you have divided the play-dough to represent the planets by volume, roll the pieces in each planet's box into balls to best represent the shapes of the planets.

Wrap-up

Start by asking the group about some of the discoveries they made regarding the sizes of the planets. Were there any surprises? Ultimately direct the discussion so that they realize the smaller planets (except Pluto) are the inner planets, while the larger planets are the outer planets. You may also want to note that more than 96% of the combined volume of the planets is in Jupiter and Saturn (approximately 60% in Jupiter and 36% in Saturn). Those giant planets really ARE giants.

NOTE: Why isn't the Sun included in this activity? The Sun is so much larger than all of the planets that if you use a 3 lb. tub of play-dough to make the 9 planets, it would take 980 tubs to make the Sun. That's a lot of play-dough!

Credits: Adapted from "A Scale Model of the Solar System using Play-doh!" activity from the STEREO (Solar TERrestrial RELations Observatory) website. See <http://stereo.gsfc.nasa.gov/> for more information.

Mercury

Venus

Earth

Mars

Jupiter

Saturn

Uranus

Neptune

Pluto