

ACTIVITY 9

MAKE PLANETS WITH MODELLING DOUGH



Level:
Grades 3-6

Preparation:
intermediate

Number of students:
groups of 2 to 4

Length:
20 min.

Place:
classroom

Type of activity:
**participation activity,
do-it-yourself**

BRIEF DESCRIPTION

Students discover the sizes of the planets by making a scale model using modelling dough.

MATERIALS

- 3 pounds (1.4 kg) of modelling dough per group (*see recipe on page 54*)
- plastic knives
- 1 instruction sheet per group
- placemats or wax paper to cover tables (if necessary)
- paper and pencil to identify planets

PREAMBLE

It is very rare to see images showing the sizes of planets to scale, and even if they are accurate, an image on paper does not give a good idea of three-dimensional sizes. This activity helps you understand the relative sizes of the planets by creating spheres for each of them.

PREPARATION

This activity requires 3lbs (1.4 kg) of dough per group. Using this full amount is important; otherwise, it won't be possible to create the smallest objects in the Solar System by the end of the activity.

If you are working with multiple groups, the cost can add up quickly. As an alternative, you can use the modelling dough recipe provided with this activity. Making the dough can even serve as a fun preliminary activity for students.

It's also a good idea to try the activity yourself beforehand. The results may surprise you!



STEPS

Begin the activity with a discussion on the size of the objects in our Solar System. Which is the largest planet? The smallest? Is the largest planet much larger than Earth? You can use the image of the not-to-scale planets so that students can see them, but without giving them the answers.

Give 3lbs of modelling dough to each group of 2–4 students, and explain that they are going to investigate the sizes of the planets using a scale model. To help them understand the principle of scale models, you can use children's toys, such as small cars or animals. For example, you can show them a toy car and a toy plane and discuss the fact that they are scale models, but (probably) not to the same scale. You can then find two objects of the same scale and explain the difference.

Ask the children to make paper labels for the 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. These labels can be used to identify the dough balls.

This activity can be done in two stages. First, ask students to create dough spheres representing the sizes of the planets based on their existing knowledge. Once they're finished, compare the models between groups and discuss the differences.

Then, have students reshape their dough into a single large ball. If you have enough dough, you may choose to keep their original models so they can compare their estimates with the actual sizes later on.

Hand out the instruction sheet so that students can complete the activity at their own pace. If you prefer, **you can also guide the group** by reading the instructions yourself.

At the end, come together as a class to discuss the results. Here are some questions you might ask:

- Are you surprised by the sizes of the planets? Why or why not?
- Do you think there are even smaller space objects? (*Yes, there are hundreds of objects even smaller than Mercury. These include dwarf planets such as Pluto, Eris, and Ceres, as well as moons, asteroids, and comets. For our scale model, the Moon would be practically invisible!*)

Did you know that it would take 1750 pounds (794 kg) of modelling dough to create the Sun for our model? It would be a huge ball, 1 metre in diameter.

**DID YOU
KNOW...?**



RECIPE FOR MODELLING DOUGH

This recipe makes 3 pounds of colourful modelling dough.

- 4 cups white flour
- 1 cup salt
- 2 cups boiling coloured water (food colouring can be added for colour)
- 4 tablespoons of vegetable oil
- 4 tablespoons of cream of tartar

In a large bowl, combine all dry ingredients (flour, salt, and cream of tartar). In a separate bowl, combine the liquid ingredients (water and oil) then pour over the dry ingredients. Mix well until a ball forms. If the mixture is too sticky, add a little flour. Remove from bowl and knead until smooth. Store in a plastic bag in the fridge until ready to use.

Over time, this modelling dough can become mouldy. If you plan to do this activity regularly, it may be easier to buy a good quantity of commercial modelling dough and store it.

INFORMATION

This activity compares the volumes of the planets. It's striking to see just how tiny the terrestrial planets are next to the giant planets.

The terrestrial planets are Mercury, Venus, Earth, and Mars. They are called terrestrial because they share Earth-like characteristics: they are relatively small, rocky, and have solid surfaces. These planets are also the closest to the Sun.

The giant planets—Jupiter, Saturn, Uranus, and Neptune—are much larger and are composed mostly of gas. They do not have solid surfaces like the terrestrial planets. All of them have ring systems (although only Saturn's rings are easily visible from Earth) and many moons. These planets are located much farther from the Sun, in the outer regions of the Solar System.

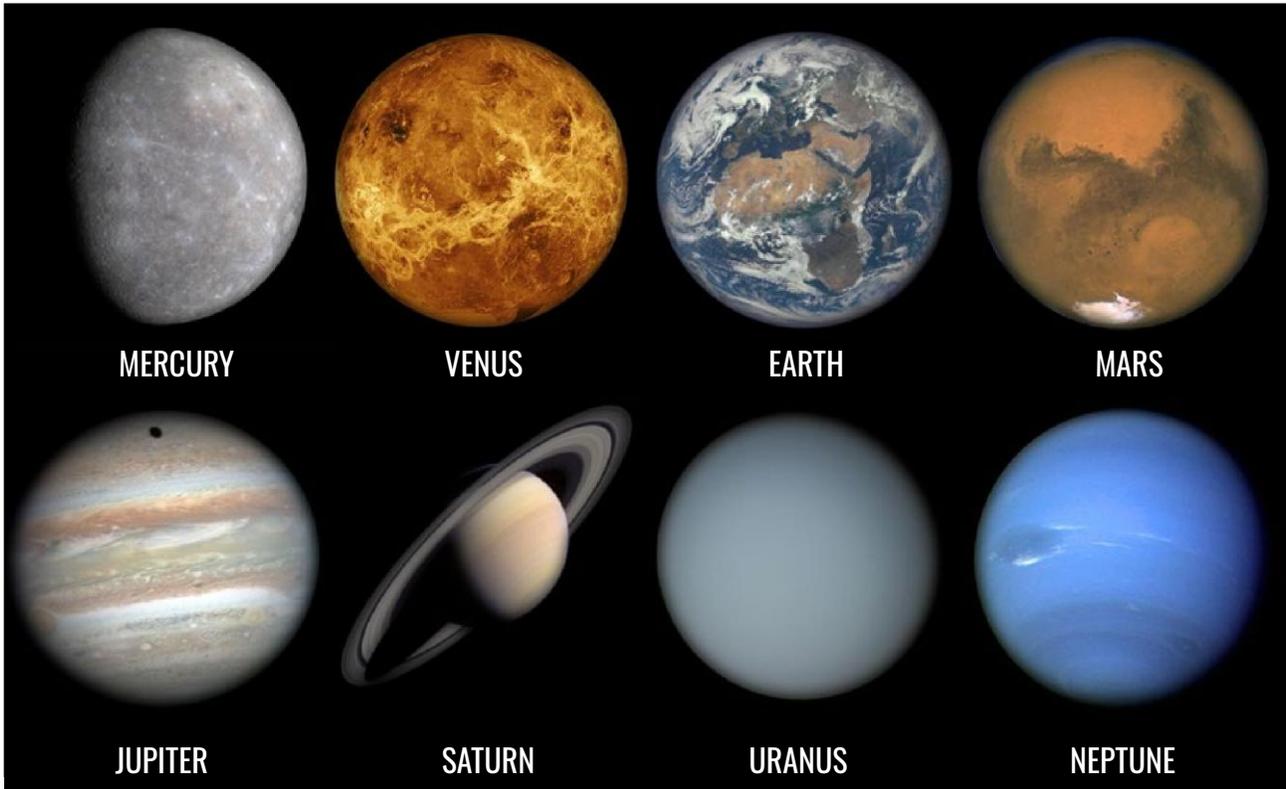
SOURCE

This activity is adapted from a *NASA* activity and the *Astronomical Society of the Pacific's* activity *Worlds in comparison*.

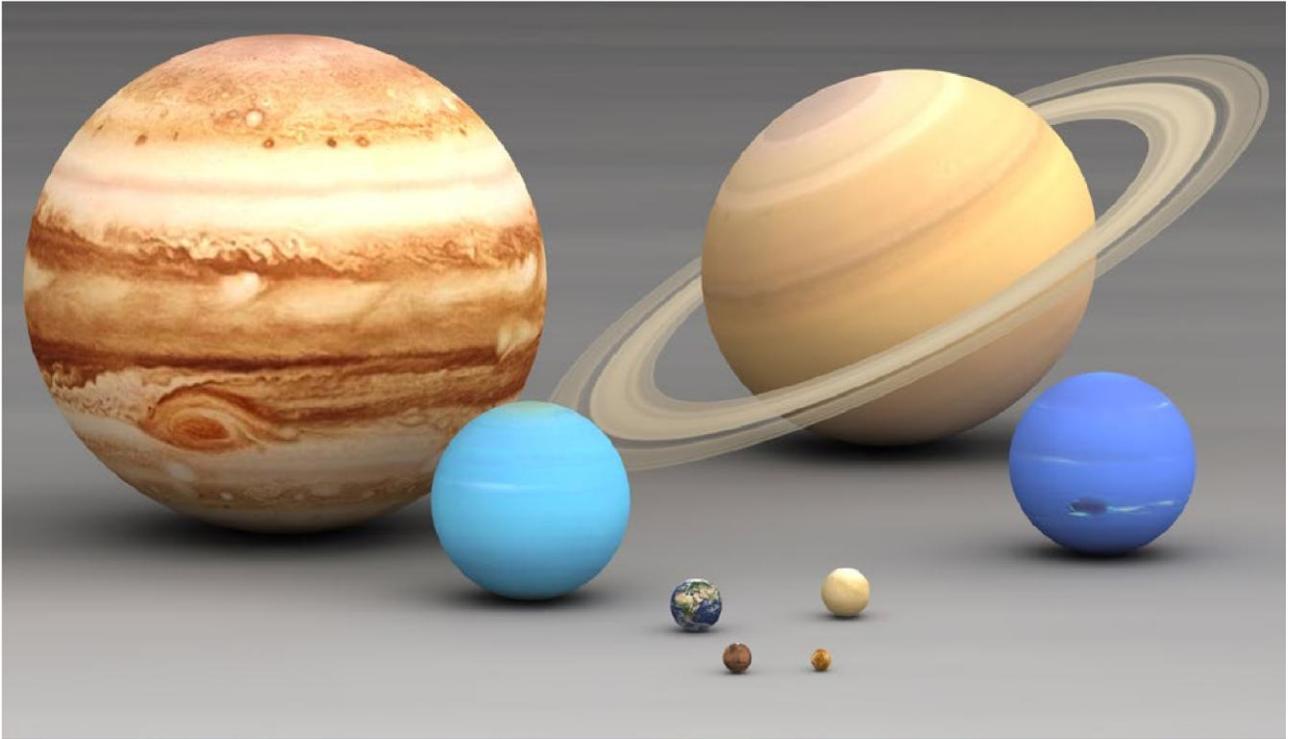


PLANETS OF THE SOLAR SYSTEM

TO LEARN MORE: [Solar System](#), *Wikipedia* page.



The planets of the Solar System. *Images not to scale.* Photo credit: NASA.



Planets to scale. Photo credit: Lsmpascal / *Wikimedia Commons*.

INSTRUCTIONS FOR CREATING DOUGH PLANETS



Start with a 3-pound ball of modelling dough. This volume represents all the planets combined.

To help you divide the dough, make a roll and cut it with a plastic knife.

1. Divide the 3lbs ball into 10 equal parts, and then:

- Combine 6 of these parts together to make a new ball. This is the beginning of **Jupiter**.
- Combine 3 other parts together and place this new ball on the **Saturn** label. More will be added later.

2. Divide the remainder into 8 equal parts, and then:

- Combine 3 parts and add them to **Saturn**.
- Combine 2 parts and form a ball. This is **Neptune**.
- Combine 2 parts and form another ball. This is **Uranus**.

3. Divide the remainder into 8 equal parts, and then:

- Combine 4 add them to **Saturn**.
- Combine 2 and add them to **Uranus**.
- Add one part to **Jupiter**.

4. Divide the remainder into 10... Yes, it becomes a bit challenging!

- Combine 3 parts and form a ball to create the **Earth**.
- Combine 2 parts and form a ball to create **Venus**.
- Combine 4 parts and add them to **Neptune**.

5. Divide the remainder into 5, and then:

- Combine 2 parts and add them to **Venus**.
- Combine 2 parts to create **Mars**.
- The remainder is **Mercury**.

Now that all the planet amounts have been distributed, form them into beautiful spheres and admire your Solar System!