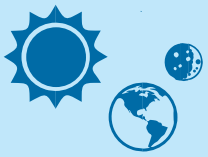
ACTIVITY 7

MEASURE THE SOLAR SYSTEM WITH TOILER PAPER



Level:	Preparation:	Number of students:	Length:	Place:	Type of activity:
Grades 1-6	**easy**	**groups of 10 students**	**15 min.**	**gymnasium or hallway**	**participation activity, discussion**

BRIEF DESCRIPTION

Students learn about the size of our Solar System and the distance between planets, using a toilet paper roll as a measuring instrument.

MATERIALS

- 1 roll of toilet paper per team (at least 250 sheets per roll)
- 1 set of planet cards per team

PREAMBLE

It is very difficult to visualize the size of the Solar System, since no single image can be made to-scale. If the *distances* are to-scale, the planets will be too small to see. If the *sizes* of the planets are to-scale, the distances between them will be far too great to fit into the image. This problem causes misrepresentations of the size of the Solar System. This activity helps you explore the enormous distances between the planets.

PREPARATION

Print and cut out the planet cards before starting the activity. Ideally, this activity should be done in groups of no more than 10 students; with larger groups, the students may get bored without a role to play.

This activity is based on a roll of toilet paper with 250 sheets, each 10.1 cm thick. This information is found on the packaging. **Make sure your roll has 250 sheets or more.**

STEPS

Place the Sun at a starting point. Unroll the toilet paper roll and count the number of squares as you go. At square number 3, place the Mercury card. At square number 5, place the Venus card. Continue unrolling the toilet paper and placing the planet cards on the squares indicated in the following chart. Each child should have their own planet card and keep count of the squares as the paper unrolls, making sure to place it at the right distance.

Table of values calculated for a roll of 250 sheets, approx. 10 cm wide.

Object	Distance (number of squares)
Mercury	3
Venus	5
Earth	7
Mars	10
Ceres (in the Asteroid Belt)	18
Jupiter	33
Saturn	61
Uranus	122
Neptune	191
Pluto (in the Kuiper Belt)	250

Possible discussions with the students:

- Are you surprised by our model? What surprised you most?
- How big do you think the objects would be if they were placed to scale in the model? See the Information section for the answer!

Eco-friendly tip: After the activity, roll up the paper as best you can and use it to repeat the activity with another group, for cleanup duty around the classroom.

DID YOU KNOW...?

Did you know that sunlight takes 8 minutes to reach Earth, 43 minutes to reach Jupiter, but about 5 hours to reach Pluto?

INFORMATION

This model shows the size of the Solar System and placement of the planets. In particular, it's striking how close together the objects of the inner Solar System (Mercury, Venus, Earth, Mars, and Ceres) are, while the objects of the outer Solar System (Jupiter, Saturn, Uranus, Neptune, and Pluto) are farther apart.

After the Sun, planets are the largest objects in a solar system. In this activity, we've also included two dwarf planets: Ceres and Pluto. Ceres lies within the asteroid belt and was long considered its largest asteroid before being reclassified as a dwarf planet in 2006. That same year, the International Astronomical Union updated the definitions of planets and dwarf planets, which led to Pluto being reclassified as well. Pluto is the largest known object in the Kuiper Belt —a distant region beyond Neptune that can be thought of as a second, far-flung asteroid belt.

This activity only models the distances between celestial objects, not the size of the objects themselves. The photos on the maps are not to scale. If we wanted to scale the objects, the Sun would be a sphere 6 mm in diameter, Jupiter, the largest planet, would be 0.6 mm and the Earth would be practically invisible!

SOURCE

This activity is inspired by *Toilet paper planets*, an activity in Jim Wiese's book *Cosmic Science*.

TO LEARN MORE

- *Solar System*, *Wikipedia* page.

SUN

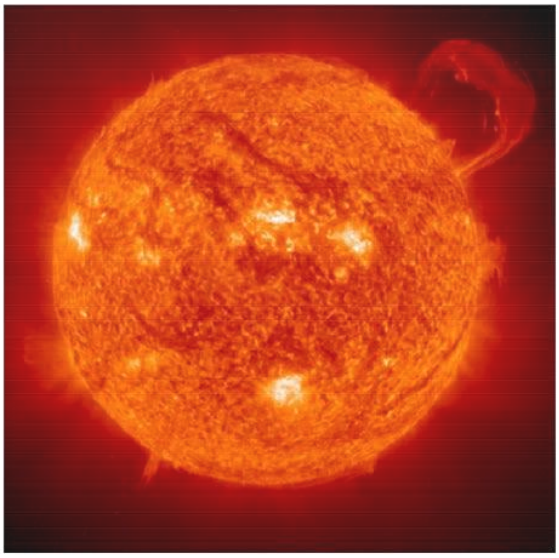


Image: *SOHO, NASA / ESA*

MERCURY

Image: *MESSENGER, NASA* / Johns Hopkins

VENUS

Image: *Mariner 10, NASA*

EARTH

Image: *NASA*

MARS

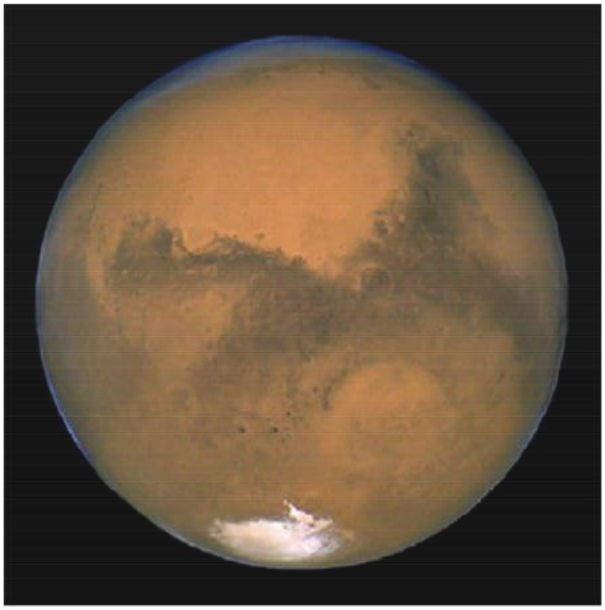


Image: *Hubble, NASA / ESA*

CERES (ASTEROID BELT)

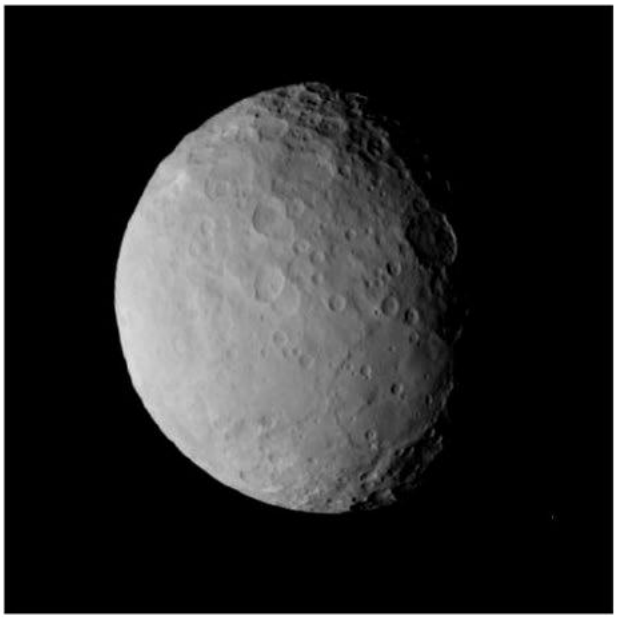


Image: *Dawn, NASA*, JPL-Caltech

JUPITER

Image: *Cassini, NASA / CICLOPS*

SATURN

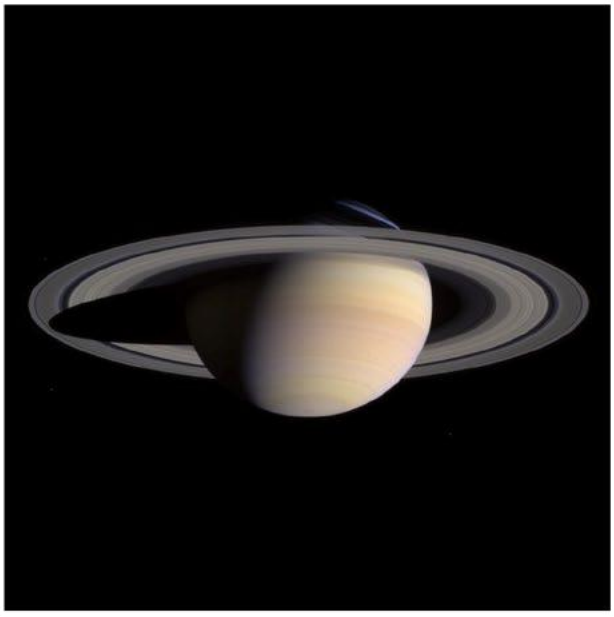


Image: Cassini, *NASA / JPL / Space Science Institute*

URANUS

Image: *NASA / JPL*

NEPTUNE

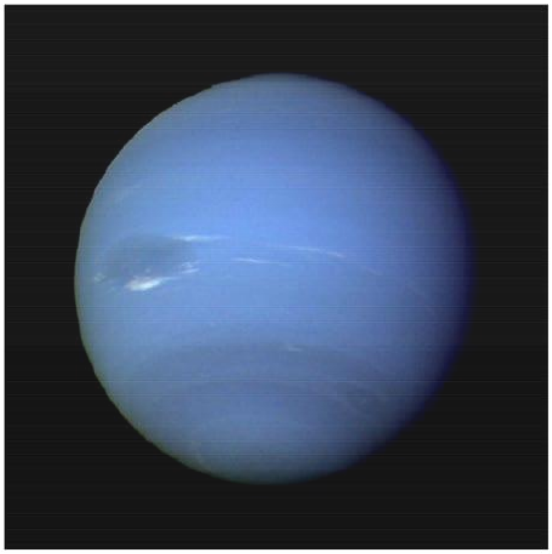


Image: *Voyager, NASA / JPL*

PLUTO (KUIPER BELT)

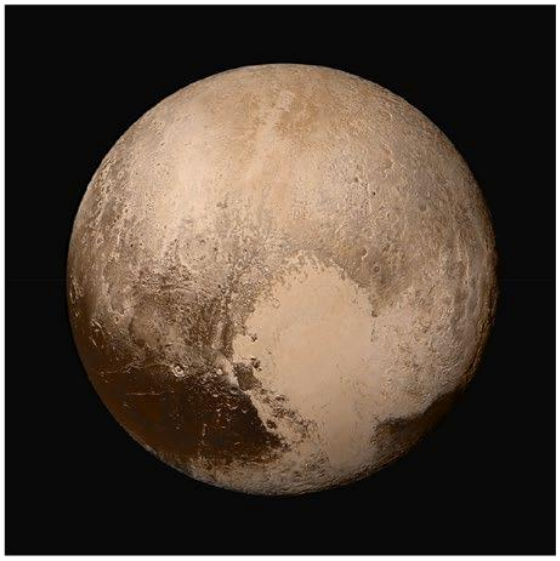


Image: *New Horizons, NASA / JHUAPL / SwRI*