Pocket solar system

ACTIVITY

Make a scaled-down version of the Solar System to get a picture of how big and far apart Earth's near (and far) neighbours are from each other.

BACKGROUND INFORMATION

Our Solar System is where we live. It contains the Sun, planets, moons and other objects such as asteroids and comets.

We can think of our Solar System's edge as something called the Kuiper belt. It's a ring of about 100,000 small objects that are mostly made of rock and ice.

The Sun is in the middle of our solar system, with eight planets travelling around it in giant circles. We used to say that there were nine planets, but in 2006 the International Astronomical Union created an official definition for the word 'planet'. This definition meant that Pluto could no longer be called a planet.

The definition of a planet states that:

- the object must be in orbit around the Sun,
- the object must be round because its gravity pulled it into that shape, and
- it must have cleared the path of its own orbit around the Sun.

Pluto hasn't cleared its path, so it is now called a dwarf planet.

We'll include Pluto for this activity because it is part of our Solar System (even if it's not officially a planet and sits within the Kuiper belt).

BACKGROUND INFORMATION cont'd

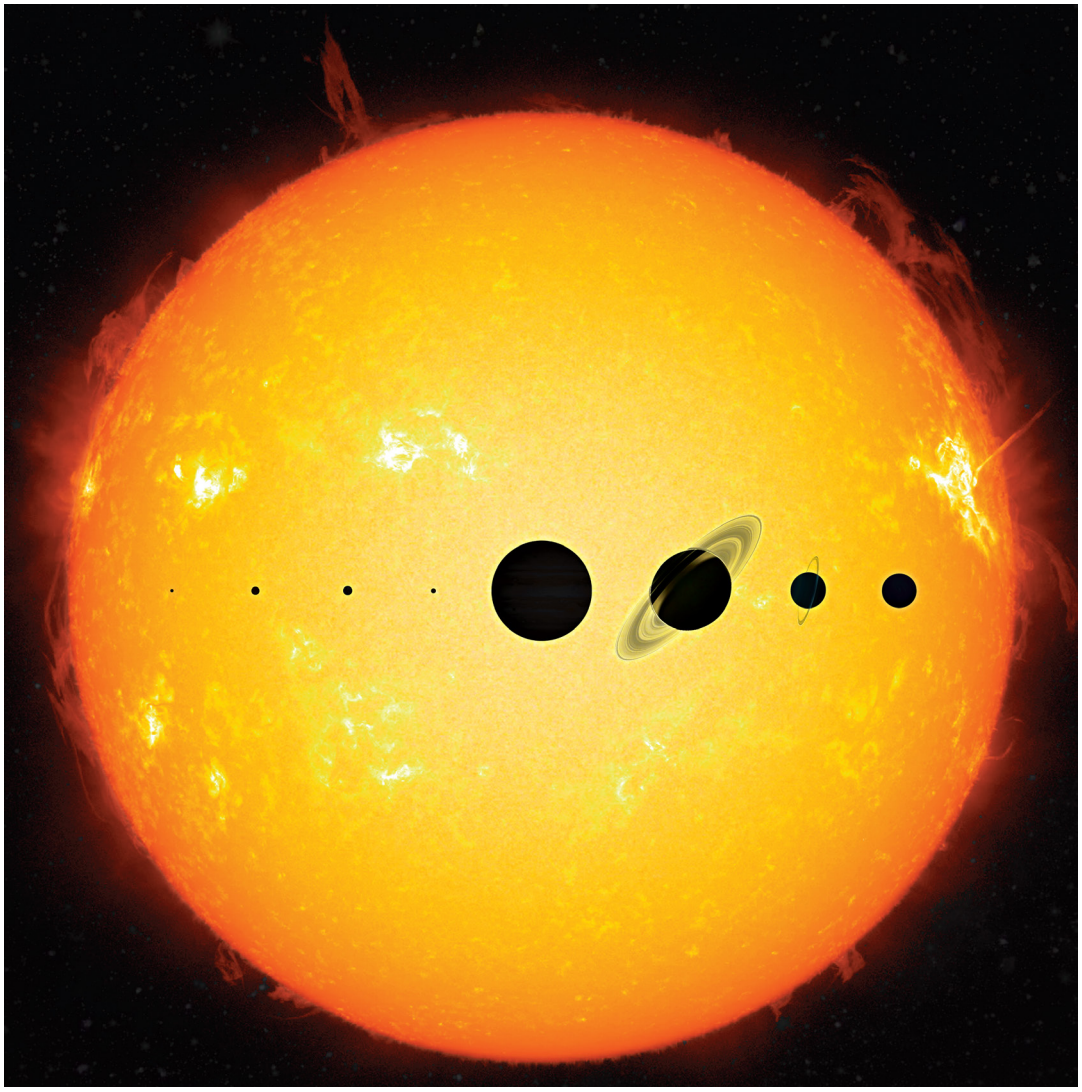
Planets are big, and yet tiny compared to the size of the Sun.

Object	Diameter (km)
Mercury	4,897
Venus	49,244
Earth	12,742
Mars	6,779
Asteroid belt	-
Jupiter	139,820
Saturn	116,460
Uranus	50,724
Neptune	49,244
Pluto	2,376

Also, the distances between the planets are huge.

Object	Distance from the Sun (km)
Mercury	60,000,000
Venus	105,000,000
Earth	150,000,000
Mars	225,000,000
Asteroid belt	420,000,000
Jupiter	780,000,000
Saturn	1,440,000,000
Uranus	2,880,000,000
Neptune	4,500,000,000
Pluto	5,925,000,000

BACKGROUND INFORMATION cont'd



This image compares the size of the Sun with each of the planets. Earth is the third one from the left.

Pocket solar system

EQUIPMENT

You will need the following to complete this activity.

- A coloured print out of the Solar System and instructions
- A long strip of paper, as long as you can stretch your arms apart and about 5cm wide (cash register rolls work well).
- Scissors
- Glue stick or sticky tape

ACTIVITY

1. Use the scissors to cut out the planets and other objects.

2. At the every end of one end of the strip of paper attach the Sun using tape or glue. At the opposite, end attach Pluto.

3. Fold the paper in half (so the Sun and Pluto touch each other) and make a crease in the middle of the paper. Unfold the paper and stick Uranus on the crease.

4. Fold the paper back in half, then fold it in half again. Unfold the paper completely - there should be two new creases.

5. Stick Neptune on the crease between Uranus and Pluto.

6. Stick Saturn on the crease between the Sun and Uranus.

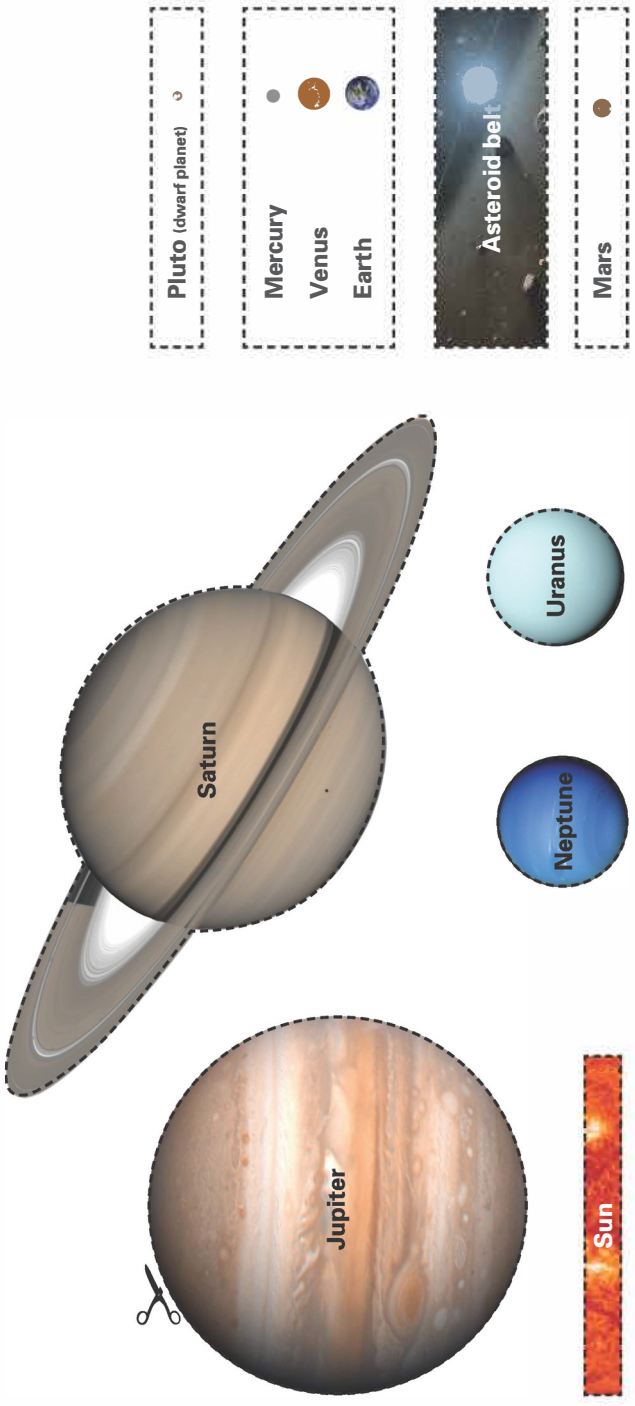
7. Fold the Sun end of the paper to Saturn, unfold and stick Jupiter on the crease.

8. Fold the Sun to Jupiter, unfold and stick the Asteroid Belt on the crease.

9. Fold the Sun to the Asteroid Belt, unfold and stick Mars on the crease.

10. Between the Sun and Mars, place the last cut-out, with Mercury closest to the Sun and the Earth next to Mars.

ACTIVITY cont'd



FOLLOW-UP QUESTIONS

1. Sketch your solar system on another piece of paper, with the Sun on the left hand side and Pluto on the right hand side of the page. Uranus is in the middle, so it's at the half way point. Write the number for 'half' in the middle, and work out what fractions are needed for the other planet positions.

2. Is there gravity in space? Why do you think there is, or isn't?

3. What holds the planets in the solar system?

4. Why don't the planets fly off?

5. What star is in the middle of our Solar System?

6. Which planets can be seen without a telescope?

FOLLOW-UP QUESTIONS cont'd

7. Why can't all of the planets be seen without a telescope?

8. How many Earths do you think could fit inside the Sun?

FOLLOW-UP QUESTIONS cont'd

EXTENSION QUESTIONS

1. In reality, the distance between Pluto and the Sun is about 5.9 billion kilometres. The real diameter of Jupiter is about 140,000 km.

a) Write down the distance between Pluto and the Sun with all of its zeros.

b) Using a calculator, work out how many Jupiters you would need to line up, side by side, to make a continuous line from the Sun to Pluto.

c) If you made Jupiter the correct size for your pocket solar system, how **big** would you make it?

FOLLOW-UP QUESTIONS cont'd

2. To make numbers a bit smaller and easier to manage, astronomers have invented a unit of length called an 'astronomical unit' (au). It's the distance between the Sun and the Earth. So Earth is 1 au away from the Sun.

Using a spreadsheet, calculate the distances of each of the planets from the Sun using astronomical units (au).

Hint: *If Earth's distance is equal to 1 au, then it was calculated like this:*

$$\frac{150{,}000{,}000\ km}{150{,}000{,}000\ km} = 1$$

Object	Distance from the Sun (km)	Distance from the Sun (au)
Mercury	60,000,000	
Venus	105,000,000	
Earth	150,000,000	*1*
Mars	225,000,000	
Asteroid belt	420,000,000	
Jupiter	780,000,000	
Saturn	1,440,000,000	
Uranus	2,880,000,000	
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