

The Earth in Space

Our solar system is comprised of planets, dwarf planets, moons, asteroids, meteors and comets, all of which revolve around the Sun. All of this lies on one of the many spiralling arms of the Milky Way galaxy.

There are eight planets in our solar system, believed to have been formed about 4.6 billion years ago.

The Growing Universe

Our universe is getting bigger all the time, expanding like a balloon. The following activity will show students how.

What you need

- A balloon
- Felt-tip pens
- A ruler

What to do

1. Draw dots or stars all over the flat balloon.
2. Blow up the balloon—just a little bit.
3. Stop and look at the distance between the stars. Measure the distances with a ruler.
4. Now, blow up the balloon some more, then measure the distances between some of the stars.
5. Have the distances grown? What is happening to the distances between the stars as the universe grows?

The Sun

The Sun is a medium-sized star and is the closest star to Earth. It gives off heat and light energy, making it possible for life to exist on Earth. As it orbits the Sun, the Earth's 24-hour rotation on its axis gives the effect of day and night. Early clocks, called sundials, measured shadows to tell the time.

Activity—Download the *Sunny Sundial* blackline master and have students create their own sundials.

Planets

The word 'planet' comes from the Greek word for 'wandering star'. According to the International Astronomical Union (IAU), in order to be defined as a planet, a celestial body must:

1. Orbit the Sun.
2. Have sufficient mass to assume a nearly round shape.
3. Have 'cleared the neighbourhood' around its orbit.

Planets are divided into two main types. There are large, low-density gas giants, such as Jupiter, Saturn, Uranus and Neptune, which have a thick atmosphere of hydrogen and helium. They lack a solid surface and landing a space vehicle on any of them would be impossible!

Each of the smaller, rocky terrestrials—Mercury, Venus, Earth and Mars—has a central metallic core with a surrounding rocky mantle (which in Earth's case is called the 'crust'). They have canyons, craters, mountains and volcanoes.

The Relative Size of Planets

The planets in our solar system vary in size. Try the following activity to see how they compare.

What you need

- 2 peppercorns
- 2 peas
- 2 plums
- 1 grapefruit
- 1 large orange
- 1 basketball

What to do

Put the items in this order: basketball (Sun), peppercorn (Mercury), pea (Venus), pea (Earth), peppercorn (Mars), grapefruit (Jupiter), orange (Saturn), plum (Uranus), plum (Neptune).

While the sizes aren't exact, this should give the idea of the planets' relative sizes. How many peas fit inside a grapefruit? This shows approximately how many Earths would fit inside Jupiter. How many grapefruits will fit inside a basketball? This shows approximately how many Jupiters would fit inside the Sun.

Scale the Solar System Down to Your Schoolyard!

Use the *Far Out Solar System Mapping Tool* (available on page 175 of your 2012 *School Essentials* catalogue) to scale the solar system down to your schoolyard! It offers a fun, physical way to teach the solar system and the relative distances of the planets to the Sun. This reel houses tape with planets marked according to their relative proximity to the Sun. Students choose a planet, find it on the tape, and stand next to it, creating a scale model of the solar system. Students instantly see and understand that some planets are closer to the Sun, while others are much farther away. It also includes downloadable planet posters with actual NASA images, and a teacher's guide with lesson plans.

Dwarf Planets

The IAU defines a dwarf planet as:

1. A celestial body that orbits the sun.
2. Having sufficient mass to assume a nearly round shape.
3. Not clearing the neighbourhood around its orbit.
4. Not a satellite.

There are currently four dwarf planets in our solar system—twin planets Pluto and Charon, and Eris and Ceres—and there are many more celestial bodies that may reach dwarf planet status in the future.

Natural Satellites

A natural satellite is a celestial body that orbits a planet. Some planets, such as Mercury and Venus, have no natural satellites, while others have at least two. Earth is the only planet in our solar system with one—the Moon. Not all natural satellites are the size and shape of our Moon; some are as small as a kilometre in diameter and others resemble lumpy potatoes!

Your Weight on the Moon

Ask students to calculate how much they would weigh on the Moon by using the following formula:

$$\text{Your mass (weight on Earth)} \times 0.17 = \text{Your weight on the Moon}$$

Asteroids, Meteors and Comets

Asteroids are irregularly shaped objects floating around in what is known as the Asteroid Belt, which lies between the orbits of Mars and Jupiter. They are composed of rocks or metals, or a combination of the two. The word 'asteroid' comes from the Greek word meaning 'starlike'.

Meteors are pieces of rock or iron that are considerably smaller than asteroids. When a meteor enters the Earth's atmosphere, it heats up and looks like a streak of light in the sky. For this reason, meteors are sometimes known as shooting stars.

Comets are dirty, mountain-sized snowballs mainly found in the far depths of space. They don't survive for long in the inner solar system—they melt like a snowman on a hot day! The ancient Greeks thought comets were stars with long flowing hair, and the word 'comet' comes from the Greek word meaning 'hair'.

Another Earth

With its atmosphere containing free oxygen and oceans of liquid water that can sustain life, Earth has been the only habitable planet known to scientists—until recently!

In 2011, the Kepler space mission discovered a new terrestrial planet, which has been named Kepler-22b, and which may be in just the right spot for supporting life. The planet orbits a sun-like star 600 light-years away in what is known as the Goldilocks zone—the region around a star where a planet's surface is not too hot and not too cold for liquid water, but just right to support life.

While more information will need to be obtained from Kepler-22b, scientists are getting closer and closer to what may be another Earth.

Resources available in the 2012 School Essentials catalogue

- *The Earth's Place in Space*, page 163
- *Earth and Space Science Variety Pack*, page 172
- *Our Solar System Bulletin Board*, page 172
- *Planet Quest Game*, page 172
- *Earth & Space Voyage Complete Set*, page 173
- *Mission to the Moon*, page 173
- *Stars & Planets*, page 173
- *Inflatable Solar System Set*, page 173
- *Glow-in-the-Dark Solar System*, page 174
- *Voyage to the Planets 2-DVD Set*, page 174
- *Weigh Out! Talking Planetary Mat*, page 174
- *Giant Magnetic Solar System*, page 175
- *What's That Planet?*, page 175
- *Far Out Solar System Mapping Tool*, page 175

FREE Teacher Toolkit Resources available at www.scholastic.co.nz/schools/bookclub

- *Plotting a Space Flight Path* blackline master
- *Australians in Space* blackline master
- *Holidays in Space* blackline master
- *Phases of the Moon in Southern Skies* blackline master
- *Shooting Stars—Comprehension* blackline master
- *Design a New Star Constellation* blackline master
- *Space Timeline Worksheet* blackline master
- *Rocket Fuel* blackline master
- *Sunny Sundial* blackline master



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