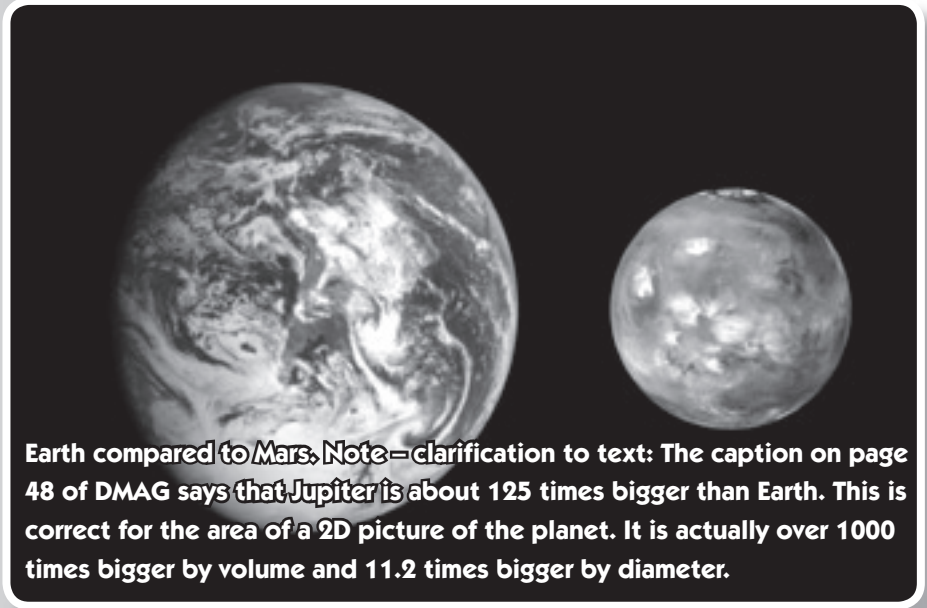


Outer Space

Blast off into the great beyond!

This teachers' supplement should be used in conjunction with Project Pull-out #16: Outer Space, which is found in DMAG's issue 68, November 2007. The pull-out will inspire students to learn about the Universe and environments beyond the Earth.



Earth compared to Mars. Note – clarification to text: The caption on page 48 of DMAG says that Jupiter is about 125 times bigger than Earth. This is correct for the area of a 2D picture of the planet. It is actually over 1000 times bigger by volume and 11.2 times bigger by diameter.

IMAGE COURTESY NASA

These activities encourage students to:

- Explore and discover our Universe
- Understand how Earth's environment differs to other planets
- Use observational skills and form theories
- Understand how vast space is and how small / large Earth is compared to the other planets
- Appreciate that science is a constant quest for understanding – there is so much still to learn about the Universe – maybe they can discover something exciting themselves one day!

Science and Technology: Out in space

Solar System

Read as a class pages 48-49. Look at the picture of the eight planets and the Moon on page 48.

Discuss what the photos of the

planets tell us – e.g. Why is the Earth shown as mainly blue? Why is Mars shown as reddish-brown?

Break the class into eight groups, with four of the groups bigger than the others, and assign each group a planet. The bigger groups should get the planets Jupiter, Saturn, Uranus and Neptune. Each group needs to carry out research on the Internet or in books to find out the following about their planet:

- 1) Diameter
- 2) What it's covered in (e.g. red soil, gas etc.)
- 3) If it has any special features (e.g. Saturn has rings)
- 4) How far the planet is from the Sun

Planet table

Draw the table to the right on the board using the students' answers to fill in the second column (provided here fyi). Leave the third column blank.

| Planet | Diameter in kilometres | Diameter when drawn to scale 1:100,000 |
|---------|------------------------|--|
| Mercury | 4,879 | 4.9cm |
| Venus | 12,104 | 12.1cm |
| Earth | 12,756 | etc |
| Mars | 6,794 | |
| Jupiter | 142,984 | 143cm = 1.43 metres |
| Saturn | 120,536 | |
| Uranus | 51,118 | |
| Neptune | 49,528 | |

Discuss as a class the scale of the planets and think about what the numbers mean. How far is it across Australia from Sydney to Perth? (About 3,500km). How does this distance compare to the diameter of Mercury?

Each group is to draw a 2D picture of their planet. All planets must be drawn to the same scale. The scale

Outer Space

Blast off into the great beyond!

will be 1cm = 1,000 kilometres (this is 1: 100,000). So if Mercury's diameter is really 4,879 kilometres, the scaled version is 4.89cm (ie knock off the last three digits to divide by 1000).

Complete the table on the board and then ask each group to draw their planet to scale on a piece of paper and colour it using the information learned from their research.

Sun fun

The groups that were assigned the smaller planets may finish first. Tell them that the diameter of the Sun is 1,392,000 kilometres. If they were to draw that to the same scale as the planets, how big would they have to make the Sun? (Ans. the diameter would be 1392cm = 13.92 metres).

Using a ball of string, ask these groups to measure $13.92 / 2 = 6.96$ metres. Ask one person to hold the string and another to extend the string and start walking around in a circle so that the rest of the class can see how big the Sun is compared to the rest of the planets. On a large piece of paper, draw a section of the Sun – ie just a portion of the arc – and colour it realistically by looking at the picture of the Sun on page 52 of DMAG.

Planet mural

Stick the portion of the Sun and the rest of the planets in order on a classroom wall and label the planets. If your class feels up to it, paint a background with stars, moons and comets!

Life on Mars

Ask the group that researched Mars



to tell the class what they found out about it. Then ask the entire class to read pages 50-51.

Draw a table on the board with three columns: Characteristics; Earth and Mars. As a class group, fill in the table to compare the two planets' characteristics:

- What is the temperature range?
- Is there free water?
- Is there an atmosphere?
- Are there plants and animals?
- Could you grow plants?

English: Mars mission

Ask the class to write a 500 word story set in the future. Imagine they've been sent on a mission to explore parts of Mars – what will their mission involve? What are they looking for? Why is their mission important?

Experiment: The Red Planet

Divide the class into pairs. Each pair will need:

- A small non-metallic dish
- Some sand
- Small pieces of wire wool (cut up before-hand with scissors)
- Some water

Instructions:

- 1) Tip onto the dish the sand and wire and carefully mix together
- 2) Pour some water into the dish to just cover the mixture
- 3) Leave to rest in a safe place
- 4) What colour is the mixture now? Write the date next to your answer. Also write down what you think might happen to the colour of the mixture over time.
- 5) Over the next few days, continue adding water to keep your mixture moist. Each day, write the date and the colour of your mixture.

What happens?

After about three days, the mixture should become quite red. The iron rusts and stains the sand. This is similar to the surface of Mars and it's why the soils on Mars are so red – they're coloured by iron oxide or rust.

Grammar note:

The names of all the planets and the Sun and the Moon, should start with a capital letter, as they are all PROPER NOUNS. E.g. *The Earth is the third planet from the Sun.*

Earth is not capitalised when you are talking about earth as in dirt e.g. *The red earth is very dry.*

Note: There are many other moons, and they are not capitalised unless you are calling them by their name – e.g. *Io is one of Jupiter's moons.* The same applies to the Sun. e.g. *The Sun is one of billions of suns in the Universe. The nearest sun to ours is Proxima Centauri.*