Space Place Education Team

Activity booklet Level 2

This booklet contains:

- **Teacher's notes for Level 2**
- **Level 2 assessment points**
- **Curriculum links**
- **Classroom worksheets**

Classroom worksheets:

Use these flexible worksheets to develop students awareness of abstract scientific concepts.

What is the Solar System?

Design a Space Suit

Create an alien landscape

Newspaper report mind-map

Animals in space!

These worksheets are available for editing and can be downloaded from our website.

museumswellington.org.nz

Curriculum Links:

Use these ideas to link this science topic with Literacy, Mathematics and Craft sessions.

Literacy

Mathematics

Arts

Notes for Teachers

Level 2 includes The World Around Us and Exploring the Solar System workshops. They cover how day and night happens and if this could happen on other objects in Space, how the Earth and other planets go around the Sun and the differences between a planet, a star and a moon. We explore all of our planets, what else is in our Solar System and how big it really is!

Day and night:

The Earth takes 365.25 days to travel once around the Sun. Every 4 years we add an extra day in February to make up for this- a leap year. At the same time, the Earth is spinning, taking 24 hours to complete 1 spin. The Sun appears to rise in the East and set in the West because of the spin of the Earth. The stars will also appear to move across the sky. We see different stars as the year goes on as we are going around the Sun and we are looking in a different direction at different times of the year. The stars are still there during the day but the Sun is so bright it hides them from view.

The side that faces the Sun gets the daylight, the side that points away from the Sun is in shadow and it doesn't get any light from the Sun so it is night time. At different places or positions on Earth get the day and night at different times, New Zealand has its daytime when Europe has its night and vice versa as they are on opposite sides of the globe. All planets will have day and night. Terrestrial (rocky) planets tend to spin slowly whilst gas planets will spin quickly. In our Solar System, Jupiter has the fastest rotation in 9.8 Earth hours, whilst Venus spins the slowest (244 Earth days).

At the same time, the Earth is spinning, taking 24 hours to complete 1 spin. The tilt (23.5 degrees) of the planet allows parts of the Earth to get different hours and strengths of sunlight during the seasons of the year. When the Earth is slightly tipped towards the Sun, that hemisphere will have more direct sun rays and longer sunlight hours and will be experiencing Summer, whilst the opposite it true when the Earth is tipped slightly away from the Sun.

Phases of the Moon:

At the same time as the Earth moving around the Sun, the Moon is also travelling around the Earth. It takes approximately 29.5 days, a lunar 'moonth' or 'month' to complete one cycle. We only ever see the side of the Moon that is lit up and *reflects the light* from the Sun. We will only see the same face of the Moon, as the Moon only spins once for each orbit of the Earth.

Some more challenging questions:

- **Could we live on the Moon?**
- **Why don't we call the Moon a planet?**

Notes for Teachers

The Moon

Early history

The Moon was formed about 4.5 billion years ago, soon after the Earth was formed. One theory is that a large object (about the size of Mars) collided with the early Earth and ripped off a large amount of crust and mantle. This material was pulled together by gravity to form the Moon.

Surface

The Moon is composed of an iron core surrounded by rock and is only 1.5% the mass of the Earth. Due to its weak gravity, the Moon lost its atmosphere a long time ago and so has no air. You cannot hear sounds on the Moon. The Moon was bombarded with asteroids and meteorites which left craters on the surface. The largest crater is called Copernicus. The larger craters have mountains in the centre with rays of debris surrounding them. The smooth parts of the Moon are called 'maria' and are plains of dried up lava.

Day and night on the Moon

The Moon used to be much closer to the Earth. The Moon is still moving away, up to 4cm a year. As the Earth and Moon have moved apart, the days on Earth and the Moon have also slowed down. The Moon's day is the same length as it takes to orbit the Earth. This is why we only see one side of the Moon. One day (one rotation) on the Moon is 28 days- 14 Earth days of daytime followed by 14 Earth days of night time. As there is no atmosphere on the Moon to keep in any heat from the Sun, temperatures range from 200°C in the day and –175 °C at night.

Moons in the Solar System

Moons are objects that orbit a planet, sometimes they are known as 'natural satellites'. All the planets in our Solar System have moons except Mercury and Venus. Some dwarf planets also have moons!
Jupiter has the most known moons at 67 at last count, the largest four are called the Galilean moons after Galileo who discovered them. They are called Io, Europa, Ganymede and Callisto.

Pluto, the dwarf planet has at least 5 moons, and its largest Charon is the largest moon compared to its parent planet. It is so large that Pluto and Charon orbit around a point between them.

The Parkes telescope in Australia is one of several radio antenna used to receive live televised images of the first Moon landing on the 20th July 1969.

Assessment points for teachers

- **Can students understand and explain what a star, a planet and a moon are? What are the differences?**
- **Can children recognise the 8 planets and other Solar System bodies? Can they correctly name them and are they in the correct order?**

A star: is a ball of hot plasma. Some stars are different colours which indicate how hot they are. Blue and white stars are the hottest, yellow stars (like our sun) are average and red and orange stars are the coolest. The Sun is made up of gas, mainly hydrogen and helium.

A planet: needs to do 3 things to be classed as a planet.

1. **It must have enough gravity to pull itself into a ball and become spherical.**
2. **It needs to orbit a star**
3. **It needs to have cleared its orbit around the star of any other objects.**

A planet can be rock, gas or even ice! A dwarf planet has not cleared its orbit of objects but is spherical and orbits a star.

A moon: orbits a planet. A moon can be made of rock or ice.

Assessment points: The planets

Students should be able to draw and label the 8 planets and the Sun. They may not have drawn them to scale or size. The correct order is:

The Sun - Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune

Pluto is generally not included in this line up along with the other 4 recognised dwarf planets. These 5 classified dwarf planets are called Ceres, Eris, Pluto, Makemake and Haumea. There might be many more.

Your students may also have added in an asteroid belt between Mars and Jupiter. Moons can also be added, 1 for the Earth, 2 for Mars, 67 for Jupiter, 62 for Saturn, 27 for Uranus, 13 for Neptune. Pluto may also be added as a dwarf planet. Pluto has 5 moons, 1 of these moons called Charon is almost as big as Pluto!

Mercury, Venus, Earth and Mars are known as the inner or rocky planets, Jupiter, Saturn, Uranus and Neptune are known as the outer and gas planets.

Students may also add rings. Jupiter, Saturn, Uranus and Neptune all have rings but Saturn has the most obvious ones.

Literacy linked activities

- **Read stories from different cultures about the planets and the creation myths. What are the common themes? Make up a class creation story or a story about a certain Solar System object.**
- **Investigate the history of the Moon landings. Who was involved? Choose a character and create a diary entry or recount of this famous event. Read and write from different viewpoints, which character would you want to be?**
- **Read newspaper reports from the Moon landing, then have a go writing your own. This would be a nice shared writing task. Create a 'news desk' and video your report. You may like to interview characters or talk to other reporters.**
- **Investigate space related jobs. Create a questionnaire or interview a local or international person. What type of skills would you need to do this job? Role play the main aspects of the job. Can children guess the job?**
- **Create a factsheet about the Curiosity Rover. Find pictures and use IT tools to create an interesting page. Research information on the internet.**
- **Give your point of view about whether we should explore the Solar System. What arguments would be for it or against it?**
- **Read and collect a journal of simple space stories on different newspapers. Leave this in the library area for children to look through.**
- **How do you remember the planet names? Make up a silly sentence or acronym to remember the correct order. You could create rhymes or acrostics.**
- **Sequence pictures and create a simple storyboard. Use a story like the Moon landings as a base. Cut up and stick the pictures in the correct order. Add time connectives to the diagram like 'next', 'then', 'afterwards'. Add captions and labels.**
- **Design an alien landscape with descriptive words. Describe using the 5 senses.**
- **Link the classroom daily work and routines to the Space station daily routines. What are they doing day to day whilst we are doing Maths? You can find information on this on the internet. What are the main differences or the similarities?**
- **Read and share stories about the Moon. Tell traditional tales such as "Rona and the Calabash' and the Man in the Moon. What do they see in the Moon?**

Mathematics linked activities

- **Read numbers to 2013, create a timeline and order them. Use significant events, like the Moon landings or the Curiosity rover landing on Mars to create a space timeline. Add in dates and events as you learn about them. You could either create a timeline around the room or on a washing line and peg on new events and dates.**
- **Link astronauts in with arrays and times tables. Ask real life questions about equipment needed or astronaut food supplies to create problems. For example: There are 5 astronauts on the Space station. Each astronaut needs to eat 6 times a day. How many meals need to be eaten in one day? How many meals are eaten in a week?**
- **Sequencing phases of the Moon. Use the cardinal points, positional and directional vocabulary to describe the sequence. Sequence pictures of the Earth and label times of the day. Add clocks to discuss what happens at certain times of the day and night.**
- **Create a Moon treasure hunt. Give children clues or directions to follow to find the treasure! You could use simple co-ordinates and maps.**
- **Make a scaled model of the Solar System. Measure out distances accurately. Talk about the distances and units used. Make scale models of the planets and use them in the demonstration. Talk about bigger, smaller, larger etc.**
- **Create a favourite planet graph or table. Play with different types of graphs, pictographs, bar charts and pie charts. Why would a line graph not work? Ask questions about which planet is the most/ least popular, the differences in popularity between planets and totals.**
- **Make water rockets. Measure out water capacities accurately and experiment with which rocket is the best. How much water is needed for a long distance? How far will a rocket go? How can you make them more aerodynamic? This would link well to a science experiment.**
- **Look at a variety of calendars from around the world. How do we get a year? Match up seasons and months of the year. What happens in each season?**

Arts linked activities

- **Listen to different types of space music, classical themes like Star Wars or the Planets Suite from Holst. Listen to each piece and describe what you hear. Is it loud or soft? Fast or slow? How do you feel? Create movements to match the music. Link these movements together to create a short dance. Show the rest of your class and evaluate. What did they like about it or what could be done better?**
- **Using drama and hot seating, re-enact famous space moments in history, like the Space landings. Give everyone a role, including the astronauts, the scientists at NASA and the Parkes Telescope team in Australia. You could include how people felt when they first saw the Moon on TV. Freeze frame and take a photo. Label and caption the photo with speech bubbles. Imagine you are Buzz Aldrin or Neil Armstrong. Allow the class to ask questions to these famous people about the training involved, or the journey or how they were feeling.**
- **Make a planet landscape. Investigate a planet's surface like Mars. What does it look like? Try and recreate the surface of Mars using different materials. What could you use?**
- **Compose a piece of music about a planet or an object in the Solar System. Would instruments would you use to recreate the Earth? Compose your music and perform it to a small group.**
- **Look and observe the Moon. When the Moon is up in the daytime, use binoculars or a telescope to observe it. <u>Be careful not to look at the Sun!</u> Use a variety of sources to create a picture of the Moon. Ask children to use different media like chalk, collage, paint or wax crayons. Which looks the best and why?**
- **Design an alien! What would it look like? Look at different features of animals, like claws, tails, eyes or feet and decide what your alien might need. Where would your alien live? You could link this in with a literacy session and create a character for your alien and maybe write a story about it.**
- **Imagine meeting an alien! What would you do or say to it? You could use drama here or freeze frames to capture this historic moment. Will the alien be friendly or unfriendly? How would the alien move or speak?**
- **Dress up Saturn. Explore different themes to create a decorated Saturn. Think about a theme and using different media. You may want to create a 3D or 2D picture. Use recycled materials or paper mache. Hang these around your class.**