Science Autumn 1 Year 5 **Long Ago and Faraway**

Domains
Earth and Space

Earth and Space	
Prior Learning	**Future Learning** Children do not need to be taught this year
Year 3 • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing. Year 1 • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies	KS3 • Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only) • Our Sun as a star, other stars in our galaxy, other galaxies • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance • The light year as a unit of astronomical distance.
In Year 5 NC Objectives	
• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth. • Describe the Sun, Earth and Moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.	
Key Learning	**Possible Evidence of Secure**

	(Shows understanding of a concept using scientific vocabulary correctly)
• The Sun is a star. It is at the centre of our solar system. • There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. • The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. • The Moon orbits the Earth. It takes about 28 days to complete its orbit. • The Sun, Earth and Moon are approximately spherical	• Can create a voice over for a video clip or animation • Can show, using diagrams, the movement of the Earth and Moon • Can explain the movement of the Earth and Moon • Can show using diagrams the rotation of the Earth and how this causes day and night • Can explain what causes day and night

Common Misconceptions	**Vocabulary**
Some children may think: • the Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.	**Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets, axis, day, night, phases of the moon, constellation, waxing, waning, crescent, gibbous, spherical, geocentric, heliocentric.**

Sticky Knowledge	**Key Questions**
• Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance. • Objects with larger masses exert bigger gravitational forces. • Objects like planets, moons and stars spin. • Smaller mass objects like planets orbit large mass objects like stars. • Stars produce vast amounts of heat and light. • All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.	- How does temperature/size/day length/year length change as you get closer/further to the sun? - How does distance from a light source affect how much light hits an object? - Does having more moons result in more light hitting a planet? How could you test this? - How does speed/size of a meteorite affect the size of the moon crater formed? - If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth?

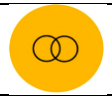
	- If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon? - Why do we have day/night/months/years/seasons? - Why does day length change? - Why does shadow size change over the course of a day?

Pre-Topic Assessment Resources

Explorify – Maps of the solar system, The great red spot, What if the Earth wasn't on an axis?
Explore, Engage, Extend (EEE) by PSTT -

Working Scientifically (Apply knowledge in familiar related contexts, including a range of enquiries)	**Possible Evidence of Secure**
1. Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary 2. Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate 3. Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs 4. Using test results to make predictions to set up further comparative and fair tests 5. Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations 6. Identifying scientific evidence that has been used to support or refute ideas or arguments. Highlighted yellow = main focus during this topic	• Can use the model to explain how the Earth moves in relation to the Sun and the Moon moves in relation to the Earth • Can demonstrate and explain verbally how day and night occur • Can explain evidence gathered about the position of shadows in term of the movement of the Earth and show this using a model • Can explain how a sundial works • Can explain verbally, using a model, why we have time zones • Can describe the arguments and evidence used by scientists in the past
Pupils could work scientifically by: • Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth. • Use secondary sources to help make a model to show why day and night occur. • Make first-hand observations of how shadows caused by the Sun change through the day. • Make a sundial. • Research time zones. • Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel.	

Fair/Comparative testing-	**Identify & Classify**	**Observation over time**	**Pattern Seeking**	**Research**

				
How does the length of daylight hours change in each season? (comparative testing)	How could you organise all the objects in the solar system into groups? Can you observe and identify all the phases in the cycle of the Moon?	Can you observe and identify all the phases in the cycle of the Moon?	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	How have our ideas about the solar system changed over time? What unusual objects did Jocelyn Bell Burnell discover (linked to radio pulsars and 'rapidly spinning neutron stars)? How do astronomers know what stars are made of?

How Science Ideas Have Changed Over Time:

- How have our ideas about the solar system changed over time?
- How is astronomer and planetary scientist Sara Seager changing our ideas about the universe?

SOTSOG

Assessments	**Key Scientists**
<u>TAPS</u> - Crater results tables - Orbit explanation **<u>Concept Cartoons</u>** - Daytime moon - Moon shape - Dark side of the moon - Movement of the sun	Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe) Neil Armstrong (First man on the Moon) Helen Sharman (First British astronaut) Tim Peake (First British ESA astronaut) Galileo (Model of the solar system)

Linked Texts	**Science Capital**	**Maths**
The Skies Above My Eyes - Charlotte Guillain & Yuval Zommer George's Secret Key to the Universe - Lucy and Stephen Hawking with Christophe Galfard	To be completed by teachers	Shape – spheres Angles – earth tilt Tables Bar charts

The Way Back Home - Oliver Jeffers		
Planning Resources		
PSTT ASE Standing on The shoulders of Giants SOTSOG (PSTT) Hamilton Trust Ogden Trust Explorify		

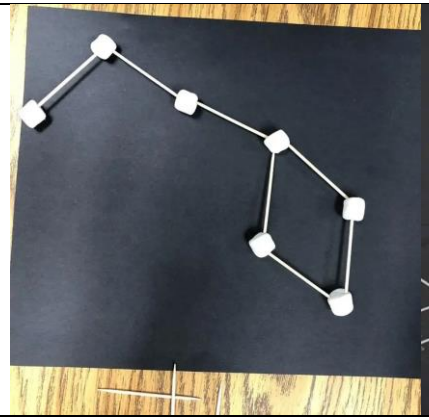
Session 1 WALT- understand that the Sun, Earth and Moon are spherical	
Retrieval activity	1) Electricity Quiz 2) Sound quiz
Lesson	In pairs- give children true or fact cards. Ask them to sort these cards into all the statements which are true and all the statements which are false. Use this as an opportunity to assess the children. Go through answers PP. Ask the children to write what they would like to learn about space and the questions they have, write on a post-it note and stick on working wall. Go through PP on spherical bodies with children, ask if anyone knows what a sphere is. Sort evidence cards into 2 piles- believing the earth Is flat and believing the Earth is round. Watch linked video about Aristotle. Task- in books children to write the evidence that the Earth is round. Hand out moon observation journal and ask children to shade the part of the moon they can see every night for the next month.
Key vocabulary	Spherical, planets, Space, Moon, Solar System, Aristotle, Evidence,
Differentiation	Paired with HA for sorting tasks. SEN sheet for final writing task.
Assessment	AFL during true or false cards. Assessing at the end whether the children can give reasons for the Earth being spherical

Session 2 WALT- identify the planets in our solar system and research key facts about them	
Retrieval activity	1) Animal habitat 2) Name the type of teeth
Lesson	Introduce the learning objective today. And show chn video about the planets in our solar system, explain that there are 8 but they are all very different and we are going to find out more about them Chn to then use books, iPads and planet fact sheets to research about the planets. Students to produce a double page spread about the planets in their books. Including carefully drawn planets and facts.

Key vocabulary	Solar system, Uranus, Neptune, Saturn, Earth, Mars, Venus, Jupiter, Mercury, gas planets
Differentiation	SEN Sheet
Assessment	By the end of the lesson children can recall the order of the planets and key information about them

Session 3 WALT- To describe the movement of the planets in relation to the Sun	
Retrieval activity	1) Solids, liquids and gases 2) Science, what I have learnt
Lesson	Have children in hall or outside. Set up at rings, getting larger as the rings go on. Hold up the Sun and Earth card, explain that the Earth goes around the sun. How long do you think this takes? Ask 2 children to come up to the front, one to stand in the middle as the sun and other to walk around the sun in an anti-clockwise direction on the 3rd circle. Ask the Earth to also slowly turn as she goes around the sun. Why is this? How long does it take? Repeat this for the remaining planets, the planets further away moving slower around the sun. Video this for evidence. When back in class ask children to write a brief explanation about how the planets move around the sun and which is the slowest and which is the fastest.
Key vocabulary	Planets, sun, orbiting, rotating, axis, anti-clockwise,
Differentiation	SEN/ EAL- to verbally explain how the planets move around the sun and written on a whiteboard by an adult.
Assessment	Are they able to explain in their books how the planets move around the sun?

Session 4 WALT- understand what a constellation is	
Retrieval activity	1) How do you know the Earth is round, what is the order of the planets, what are the gas planets, how do the planets move around the sun? 2) Classify animals
Lesson	Explain to children that a constellation is a group of stars joined together to form a pattern. You cannot see all the constellations at once. Explain that the Greeks came up with stories for these constellations based on myths and legends. Go through each constellation linked to birthdays. Task- create a constellation with dried spaghetti and play-doh or tin foil or stickers with lines Task- chn to create their own constellation and a story to go with it.

	 
Key vocabulary	Constellations, Greek, Mythology, Star Sign, Zodiac
Differentiation	Story template for SEN
Assessment	Do children understand what a constellation is and why we have them?

Session 5 WALT- Understand the movement of the moon in relation to the Earth	
Retrieval activity	1) Forces and magnets 2) Parts of a flower
Lesson	Lets look at your moon observation journals. What did you notice? Was the moon the same every night? Why do you think that is? Show this animation to show the position of the Earth, Sun and the moon. Explain that as the moon moves around the Earth the sun will be lighting up different parts. Show this using a ball and a torch. https://en.tutiempo.net/astronomy/sun-earth-moon-3d.html#UTC20210722T0142 Ask the children what an eclipse is? Explain that an eclipse is when the moon is fully or partially covering the sun. Task- children to make a model showing the moon orbiting and rotating around the Earth. In their books to write what is happening.
Key vocabulary	Orbit, moon, Earth, axis, rotating, eclipse,
Differentiation	SEN/EAL help with putting explanation onto paper
Assessment	Can the children explain how the moon moves?

Session 6 WALT- Explain why night and day is not the same time everywhere	
Retrieval activity	1) What is a fossil? How is it formed? 2) Why is day and night not the same everywhere, what is this moon phase called, How does the moon move around the Earth, How long does it take for the moon to go around the Earth?
Lesson	Use a globe, a Lego man and a torch. Roate the earth and show how the shadow of the man changes. Explain that where the torch is not shining it would be night.  Children to work in pairs and go outside during the morning, lunch and afternoon and draw around their shadow. In their books children to explain why their shadows have changed.
Key vocabulary	Day night, rotation, earth, shadow,
Differentiation	Sentence starters for SEN
Assessment	Can children explain why it is day and night at different times in the world?

Session 7 WALT- plan and carry out an investigation	
Retrieval activity	1) What are independent, dependent and controlled variables, how do I make something a fair test, what is a average, what is a prediction? 2) Space definitions
Lesson	What is a crater? Ask chn and show pictures of different craters. Explain that we are going to carry out an investigation to see how different variables affect the size of a crater. Explain the use of sand, balls and rulers to do this. Ask chn what an independent, dependent and controlled variable is. Gather all the possible variables for these. Then explain we will be looking at either the height the ball was dropped or the type of ball.

	In their tables- approximately 5 or 6 children will choose which one they will be looking at. All chn to write their independent, dependent and controlled variables in books and write a prediction. Chn to carry out the investigation in groups and record their data in the table. Explain the use of an average and support how to calculate this. Chn to then put their data in a bar chart and explain whether their prediction was correct and why they think this is. How could they make the experiment more accurate?
Key vocabulary	Crater, meteorite, explosion, independent, controlled, dependent variable, investigation
Differentiation	Mixed ability groups, support to draw graph and write up conclusions
Assessment	Can children identify the variables in the experiment and record their findings?