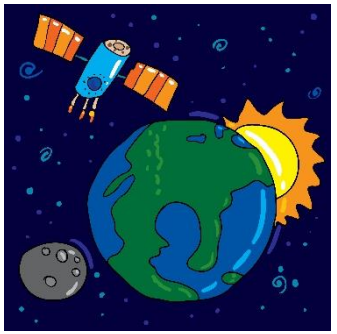
Progression in Earth and Space



National Curriculum statements in red are from other linked topics.

Early learning goal	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes
Year 1	• Observe changes across the four seasons. (Y1 - Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)
Year 2	
Year 3	
Year 4	•
Year 5	• 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 • Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky
Year 6	
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.

Year 5 – Earth and Space

National Curriculum 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
- Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky**.**

Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).
Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.
Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks

Prior Learning			Vocabulary
In Year 3: • Compare how things move on different surfaces. • Know how a simple pulley works and use making lifting an object simpler • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract and 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.	**Key Ideas**	**Suggested Activities**	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets
	What is the solar system like?	• Name any planets – Mnemonic. Observe pictures of planets. What do you see (spherical, colours, atmosphere, etc)? Make solar system biscuits (size); decorate. • Planets orbit sun. Moons orbit planets. Planets are big (gravity). Size of Earth, moon & sun. Earth/moon orbit. • Asteroid belt. Evidence that Pluto may not be a planet. Thinking skills mystery to explore evidence. • Fair test – asteroid impact! What effect does the weight of an asteroid (pebbles) have on its crater size (flour/sand)? (link gravity to mass) • Distances between Earth, moon & sun (how many 'Earths could fit between them). Model on playground. • Make model of solar system. Draw/make planets - annotate with research. Order and use proportion to give relative distances between planets.	
	Why does the sun move across the sky?	• Note position of the sun across classroom windows/sundial. Sun safety. Where does it go at night? • Sun as a star (luminous, large, heat, light). Link to light (energy transfer model) • Explore historical understanding of solar system (Egyptians, Aristotle, Ptolemy, Copernicus, and Kepler) and the Earth being a sphere (evidence). Research. • Take time-lapse sequence of sun across the sky using iPad. • Investigation – use shadows around a stick to explore the movement of sun across the sky. Model using torches. • Use data (shadow length, etc) to describe pattern. Compare to photos of same investigations done at different times of the year. Explain • Investigation: Does the amount of energy the sun transfers change during the day? Measure temperature of water bottle left in sun over time. Data logger (could include light intensity). Explain.	
	Why do we have day and night?	• Concept of elliptical orbit and Earth spinning on its axis. Complete cycle = 24hrs. Model day/night. Draw diagrams. • Rich questions: Is it correct to say 'sun rise/set'? What is the effect of summer/winter (day length, temperature)? • Make models to explain	

• Describe magnets as having two poles. • Predict whether two magnets with attract or repel each other, depending on which poles are facing	What are the phases of the moon?	• Moon as a non-luminous (reflective) object. Changes shape in the sky (phases). Obits Earth. Lunar month = 28 days. Effect on tides (relate tide tables to phases). • Phases from new moon to full moon (model using torch and balls). Draw diagrams to explain phases. • Rich questions: how would you see a crescent moon at the equator? How would Earth look to an astronaut on moon? • Explain a lunar eclipse using the model. Draw to explain. Model phases using black ball (mark 'X' – always faces you). Static torch (wide beam) shining on moon. Rotate whilst holding moon.	
	Exploring the solar system	• Research activities involving moon landings, space station, rockets, etc. Historical, current and future perspectives. • Create and plan lunar/mars base. Use all science. • Are we alone? Life on Mars mystery activity. • Make rockets (balloon along a string trajectory) • Make telescopes (rolled A3 card and magnifying lenses)	
In 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.			