

Year 5 Science Curriculum

Earth and Space

Prior learning:

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)

Common misconceptions

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.

Reading Opportunities

The Skies Above My Eyes - Charlotte Guillain & Yuval Zommer




George's Secret Key to the Universe - Lucy and Stephen Hawking with Christophe Galfard

The Way Back Home - Oliver Jeffers

Vocabulary

Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit

Space

<u>National curriculum principles</u>	<u>Knowledge and key vocabulary</u>	<u>Activities and working scientifically</u>
Describe the movement of the Earth, and other planets, relative to the Sun, in the solar system	The Sun is a star. It is at the centre of our solar system. There are 8 planets. These travel around the Sun in fixed orbits. Earth takes 365 1/4 days to complete its orbit around the Sun.	Research the solar system. Name and explain the relative size and spacing of the planets 
		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 the model to explain how the Earth moves in relation to the Sun and the Moon moves in relation to the Earth
Describe the movement of the moon relative to the earth	The Moon orbits the Earth. It takes about 28 days to complete its orbit.	Learn about the phases of the moon Focus: asking questions
Describe the sun, earth, moon as approximately spherical bodies	The Sun, Earth and Moon are approximately spherical.	Keep a moon observation diary 
Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	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.	Understand the evidence used in the past to refute the idea that the earth is flat. Evaluate how scientific ideas have changed. Focus: evaluation
		Use secondary sources to help make a model to show why day and night occur. Research time zones. Focus: Communicating results 

Living things and their habitats

Prior learning:

Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, humans)

Know the life cycle of humans, chickens, butterflies and frogs

Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)

Common misconceptions

Some children may think:





- all plants start out as seeds
- all plants have flowers
- plants that grow from bulbs do not have seeds
- only birds lay eggs.

Reading Opportunities

Vocabulary

life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, bulbs, cuttings

Living things

National curriculum principles	Knowledge and key vocabulary	Activities and working scientifically
<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p>	<p>As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.</p>	<p>Research and present the life cycles of different animals (add detail to that covered in year 2) </p>
		<p>Compare and contrast the life cycles of different animals which lay eggs e.g. snake, penguin, turtle Focus: ask questions</p>
		<p>Compare and contrast the life cycles of two other animals Focus: communicate results</p>
		<p>Look for patterns between the size of an animal and its expected life span  Focus: evaluate and explain anomalous results</p>
<p>Describe the life process of reproduction in some plants and animals</p>	<p>Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.</p>	<p>Dissect a flower and explain how plants reproduce sexually (recap from year 3) </p>
		<p>Explain how plants can reproduce asexually</p>
		<p>Grow plants e.g. mint from cuttings</p>
		<p>Observe how a potato plant can grow from a tuber </p>

Forces

Prior learning:

Compare how things move on different surfaces. (Y3 - Forces and magnets)

Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)

Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)

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. (Y3 - Forces and magnets)

Describe magnets as having two poles. (Y3 - Forces and magnets)

Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)

Common misconceptions

Some children may think:

- the heavier the object the faster it falls, because it has more gravity acting on it
- forces always act in pairs which are equal and opposite
- smooth surfaces have no friction
- objects always travel better on smooth surfaces
- a moving object has a force which is pushing it forwards and it stops when the pushing force wears out
- a non-moving object has no forces acting on it
- heavy objects sink and light objects float.

Reading Opportunities

The Enormous Turnip - Katie Daynes






Leonardo's Dream - Hans de Beer

The Aerodynamics of Biscuits - Clare Helen Welsh

Vocabulary

Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

Forces

<u>National curriculum principles</u>	<u>Knowledge and key vocabulary</u>	<u>Activities and working scientifically</u>
Children can explain that unsupported objects fall towards the earth because of the force of gravity acting between the earth and the falling object	A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.	<p style="text-align: center;">Research Sir Isaac Newton Focus: Communicate results</p> 
To identify the effects of air resistance, water resistance and friction, that act between moving surfaces	<p>Air resistance is a type of friction caused by air pushing against a moving object. Water resistance is a type of friction caused by water pushing against a moving object. Friction is a force that acts between 2 sources or objects that are moving across each other. Friction can be helpful and unhelpful.</p> <p>Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.</p>	<p>Investigate the effects of friction e.g. how quickly a marble rolls down a ramp with different surfaces Focus: setting up tests</p> 
		<p>Investigate the effects of air resistance e.g. changing size of wings on paper spinners Focus: Asking questions</p> 
		<p>Investigate the effects of water resistance e.g. dropping different shaped clay through water. Focus: Observing and measuring</p> 
		<p>Using one of the above investigations, reflect on the success of an enquiry and identify further questions for enquiry. Focus: Evaluation</p>
To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.	<p>Explore how levers, pulleys and gears work Focus: Recording</p> 

Animals inc humans

Prior learning:

Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)

Common misconceptions

Some children may think:

- a baby grows in a mother's tummy
- a baby is "made".

Reading Opportunities

The Land of Neverbelieve - Norman Messenger

Mummy Laid an Egg - Babette Cole

Hair in Funny Places - Babette Cole


Giant - Kate Scott

You're Only Old Once! - Dr. Seuss

Vocabulary

Puberty - the vocabulary to describe sexual characteristics

Animals inc humans

<u>National curriculum principles</u>	<u>Knowledge and key vocabulary</u>	<u>Activities and working scientifically</u>
<p>Describe the changes as humans develop to old age</p>	<p>When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.</p>	<p>Explain six stages of human life cycle foetus, baby, childhood, adolescence, adulthood, old age.</p>
	<p>This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below:</p>	<p>Pattern seeking - Is there a relationship between a mammal's size and its gestation period? Focus - explain any anomalous results </p>
	<p>https://www.gov.uk/government/publications/relationships-education-relationships-and-sex-education-rse-and-health-education/physical-health-and-mental-wellbeing-primary-and-secondary</p> <p>https://www.pshe-association.org.uk/news/joint-briefing-teaching-about-puberty-key-stage-2</p> <p>https://www.pshe-association.org.uk/curriculum-and-resources/resources/briefing-human-development-and-reproduction</p>	<p>Discuss and evaluate stereotypes of old age.</p>

Properties and changes of materials

Prior learning

Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)

Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

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. (Y3 - Forces and magnets)

Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)

Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter)

Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)

Common misconceptions

Many misconceptions exist around reversible and irreversible changes, inc. around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible/irreversible changes. They do not correlate simply. Chemical changes lead to new material being formed and are mostly irreversible. Physical changes are often reversible but may not be and do not result in new materials e.g. cutting bread. It is still bread, but it is no longer a loaf. The shape, not the material, has changed.

Some children may think:

- thermal insulators keep cold in or out
- thermal insulators warm things up
- solids dissolved in liquids have vanished and so you cannot get them back
- lit candles only melt, which is a reversible change.

Reading Opportunities








Kensuke's Kingdom - Michael Morpurgo

The BFG - Roald Dahl

Vocabulary

Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

Properties and changes of materials

<u>National curriculum principles</u>	<u>Knowledge and key vocabulary</u>	Activities and working scientifically
Compare and group together everyday materials on the basis of their properties including their hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets	Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.	Compare and group materials based on hardness, solubility, transparency, electrical and thermal conductivity and magnetism. Focus: observation and measurement 
Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution	Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.	Dissolve salt in water and explore what happens. Focus: Children to ask questions and predict 
		Test whether different substances dissolve in water. Focus: planning how to set up investigation 
		Investigate how water temp affects rate of dissolving. Focus: Draw bar graph to show results. 
Use knowledge of solids, liquids and gases to decide how mixtures might be separated including through filtering, sieving and evaporating	Mixtures can be separated by filtering, sieving and evaporation.	Investigate how to separate a range of mixtures using simple equipment: sand and water (filter); salt and water (evaporation); rice and paperclips (magnet); flour and raisins (sieve). Focus: explain results. 
Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials including metals, wood and plastics	Materials have different uses depending on their properties and state (liquid, solid, gas).	Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat. Focus: planning how to set up investigation 
Demonstrate that dissolving, mixing and changes of state are reversible changes	Some changes to materials such as dissolving, mixing and changes of state are reversible.	Focus: explain results
Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, e.g. burning or vinegar and bicarb of soda	Some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.	Comparative tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? Focus: evaluating results 

Working Scientifically in Year 5 and 6

Asking Questions

Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work

Observation and Measurement

The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

Setting up and carrying out practical work

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long.

Recording

The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. Children present the same data in different ways in order to help with answering the question.

Interpreting

Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. They talk about how their scientific ideas change due to new evidence that they have gathered. They talk about how new discoveries change scientific understanding.

Evaluating

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. They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. They identify any limitations that reduce the trust they have in their data. Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests

Working Scientifically Skills



Science Enquiry Types

Comparative and fair testing	
Research	
Observation over time	
Pattern seeking	
Identifying and classifying	
Problem solving	

