



National Curriculum Progression

Y1	Y2	Y3	Y4	Y5	Y6
<p>Seasonal Change i. observe changes across the four seasons ii. observe and describe weather associated with the seasons and how day length varies.</p>		<p>Light i. recognise that they need light in order to see things and that dark is the absence of light ii. notice that light is reflected from surfaces iii. recognise that light from the sun can be dangerous and that there are ways to protect their eyes iv. recognise that shadows are formed when the light from a light source is blocked by an opaque object v. find patterns in the way that the size of shadows change.</p> <p>Forces and Magnets i. compare how things move on different surfaces ii. notice that some forces need contact between two objects, but magnetic forces can act at a distance iii. 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 iv. describe magnets as having two poles v. predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>Sound i. identify how sounds are made, associating some of them with something vibrating ii. recognise that vibrations from sounds travel through a medium to the ear iii. find patterns between the pitch of a sound and features of the object that produced it iv. find patterns between the volume of a sound and the strength of the vibrations that produced it v. recognise that sounds get fainter as the distance from the sound source increases.</p> <p>Electricity i. identify common appliances that run on electricity ii. construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers iii. identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery iv. recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit v. recognise some common conductors and insulators, and associate metals with being good conductors.</p>	<p>Earth and Space i. describe the movement of the Earth, and other planets, relative to the Sun in the solar system ii. describe the movement of the Moon relative to the Earth iii. describe the Sun, Earth and Moon as approximately spherical bodies iv. use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>Forces i. explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ii. identify the effects of air resistance, water resistance and friction, that act between moving surfaces iii. recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	<p>Light i. recognise that light appears to travel in straight lines ii. use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye iii. explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes iv. use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p> <p>Electricity i. associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ii. compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches iii. use recognised symbols when representing a simple circuit in a diagram.</p>

Scientific Enquiry Skills

Asking Questions	Investigating	Gathering and Recording Data	Presenting and Analysing Findings
<p>♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p>	<p>♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</p>	<p>♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</p>	<p>♣ using test results to make predictions to set up further comparative and fair tests ♣ 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 ♣ identifying scientific evidence that has been used to support or refute ideas or arguments.</p>

Key Vocabulary – Unit Specific		Key Vocabulary – Scientific Enquiry
<p>gravity – force, force of attraction, unsupported objects, Earth, force of gravity, falling object - explain</p> <p>types of forces – gravity, friction, air resistance, water resistance, change the direction of moving objects, slow down moving objects, everyday life – compare and describe</p> <p>Mechanisms - levers, pulleys, gears, smaller force, greater effect, mechanical advantage, assist, movement of objects – describe, demonstrate</p>		<p>questions, explain, scientific enquiry</p> <p>equipment - measuring tape, hand lens, trundle wheel, ruler, data loggers plus sensors, such as light (lux), sound (dB) and temperature (°C); timers (seconds, minutes and hours); thermometers (°C), and measuring tapes (millimetres, centimetres, metres). A force meter can be used to measure an object's mass in grams (g) or kilograms (kg) and its weight in newtons (N), accurate measurements</p> <p>observe, accurate observations, compare, group, classify, feature, similarities, differences, make simple connections, measure, systematic, regular intervals</p> <p>tests, instructions, method, prediction, investigation, comparative test, fair test, variable, constant results, information, investigate, investigation, noticing patterns and relationships, conclusion, evidence record, data, table, charts, Venn diagram, labelled diagrams, bar and line graphs, timeline, key, models, explain</p>
	Conceptual Learning Goals - Core Knowledge	Procedural Learning Goals - Skills
Substantive Knowledge	<p>a. Know that gravity is a force of attraction and that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>b. Know that friction, air resistance and water resistance are forces that change the direction and slow down moving objects. Know that these forces can be useful in everyday life.</p> <p>c. Know that mechanisms, such as levers, pulleys and gears, allow a smaller force to have a greater effect; therefore giving a mechanical advantage.</p>	<p>a. Know how to explain that objects fall to Earth due to the force of gravity.</p> <p>b. Know how to compare and describe, using a range of toys, models and natural objects, the effects of water resistance, air resistance and friction.</p> <p>c. Know how to describe and demonstrate how simple levers, gears and pulleys assist the movement of objects.</p>
Disciplinary Knowledge	<p>d. Know that questions can help us find out about the world and can be answered using a range of scientific enquiries.</p> <p>e. Know that specialised equipment is used to take measurements in standard units. Examples include data loggers plus sensors, such as light (lux), sound (dB) and temperature (°C); timers (seconds, minutes and hours); thermometers (°C), and measuring tapes (millimetres, centimetres, metres). A force meter can be used to measure an object's mass in grams (g) or kilograms (kg) and its weight in newtons (N).</p> <p>f. Know that a method is a set of clear instructions for how to carry out a scientific investigation. A prediction is a statement about what might happen in an investigation based on some prior knowledge or understanding.</p> <p>g. Know that an observation involves looking closely at objects, materials and living things. Accurate observations can be made repeatedly or at regular intervals to identify changes over time.</p> <p>h. Know that the results are information, such as measurements or observations, that have been collected during an investigation. A conclusion is an explanation of what has been discovered using evidence collected.</p> <p>i. Know that data can be recorded and displayed in different ways, including tables, bar and line graphs, classification keys and labelled diagrams.</p>	<p>d. Know how to ask a wide range of relevant scientific questions that broaden their understanding of the world around them and identify how they can answer them.</p> <p>e. Know how to take increasingly accurate measurements in standard units, using a range of chosen equipment.</p> <p>f. Know how to plan and carry out a range of enquiries, including writing methods, identifying variables and making predictions based on prior knowledge and understanding.</p> <p>g. Within a group, know how to decide which observations to make, when and for how long, and make systematic and careful observations, using them to make comparisons, identify changes, classify and make links between cause and effect.</p> <p>h. Know how to use relevant scientific vocabulary to report on their findings, answer questions and justify their conclusions based on evidence collected, identify improvements, further questions and predictions</p> <p>i. Know how to gather and record data and results of increasing complexity, selecting from a range of methods (scientific diagrams, labels, classification keys, tables, graphs and models).</p>

Scientific Enquiries:				
Observing changes Over a Period of Time	Noticing Patterns	Grouping and Classifying Things	Carrying out comparative and fair tests	Finding things out using a wide range of secondary sources of information.
Assessment Criteria	What is the relationship between weight and mass? Investigating air resistance How does the position of the fulcrum affect the effort needed to lift a weight? How does the amount of pulleys affect the effort needed to lift a weight?		What effect does gravitational force have on everyday objects and everyday life? Plan and carry out a fair, comparative test to investigate friction on different surfaces. Water resistance investigation Which gear wheel combinations give a mechanical advantage? Bike investigation	'What is a force?' and 'What forces do you know?' Which scientists helped to build our understanding of gravity and what did they discover? Own research on forces and mechanisms? Bike investigation

Assessment Criteria:

Disciplinary Knowledge and Skills

The pupil can, using appropriate scientific language from the national curriculum:

- describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources
- ask their own questions about the scientific phenomena that they are studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests, and finding things out using a wide range of secondary sources)
- use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate
- record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways
- raise further questions that could be investigated, based on their data and observations.

Substantive Knowledge and Skills

The pupil can:

- describe the effects of simple forces that involve contact (air and water resistance, friction) and gravity
- identify simple mechanisms, including levers, gears and pulleys, that increase the effect of a force (year 5)

Resources

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| <ul style="list-style-type: none"> • Beanbags • Identical plastic bottles • Force meters with a range of scales • Information books about gravity and famous scientists • Toy cars • Ramps • Measuring tape • Range of thin, flexible sheet materials including plastic, fabric and different paper types, such as printer paper, tissue paper and card • Plasticine • 2 litre plastic bottles or other tall, wide, transparent vessels | <ul style="list-style-type: none"> • Weights • Broom handles • Thin rope • 2-litre milk containers • Large carabiners • Information books about forces and mechanisms • Children's or adult's own bicycles with gears • Cycle helmets • Information books about air resistance and cycling • Three bicycles with different tyres • Various art materials, such as paper, felt tip pens, markers and crayons |
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