



## Curriculum Planning

### Intent

- Our Science curriculum has been carefully planned and designed to encompass the content of the National Curriculum and the North Yorkshire Scheme of Learning (NySoL).
- Pupils' science education begins in the early years and builds year on year, developing pupils' expertise.
- Curriculum plans have been constructed effectively in line with the NySoL Scheme to ensure that pupils know more, remember more and are able to do more.
- Key knowledge has been mapped out from the early years to the end of KS2 to ensure that the curriculum is coherently sequenced and there is clear progression.
- The organisation of the curriculum builds both knowledge and skills of enquiry so that pupils can draw on it in future learning.
- Each of the 5 types of enquiry (Research, Comparative and Fair Tests, Pattern Seeking, Grouping and Classifying, Observing Over Time) is taught at least once every term.
- Working scientifically skills are embedded into every lesson to ensure these skills are being developed throughout the curriculum.
- Vocabulary has been identified and outlined clearly so that this can be taught explicitly within lessons.
- Clearly defined end points have been identified to ensure that pupils build upon prior learning and develop their knowledge of key concepts.
- Pupils commit knowledge to their long-term memory through recalling and repeated practice outlined in plans.

### Implementation

Within and beyond our classrooms we provide a range of opportunities and implement a range of teaching methods to ensure that over the course of study, teaching is designed to help learners to remember in the long term the content they have been taught and to integrate new knowledge into larger concepts.

- Knowledge organisers which outline knowledge (including vocabulary) all children must master and apply in lessons are introduced at the start and referred to throughout a unit of study.
- A well sequenced cycle of lessons carefully plans for progression and depth concentrating on the scientific knowledge and skills suited to the age group.
- Lessons follow a consistent structure of retrieval, explanation, application and assessment which may include such features as questioning, modelling, individual, partner, group or whole class activities.
- Regular practical experiments are carried out focusing on scientific enquiry
- Enrichment activities, including visits and visitors to school
- Working walls reflect what is being taught, vocabulary, relevant diagrams, photos and display the 5 types of science enquiry characters
- Our inclusive approach is demonstrated through the way in which tasks and activities are adapted to ensure that all pupils are able to access the curriculum.
- Through retrieval, teachers make sure that pupils can draw on what they already know so that they can remember more.
- Key vocabulary is explicitly taught to enable pupils to develop their range of geographical vocabulary and understanding.
- Assessment for learning strategies are used at the start, during and at the end of lessons to assess pupils' learning and identify any gaps or misconceptions.

### Impact

- Our Science Curriculum is high quality, well thought out and is planned to demonstrate progression. If children are keeping up with the curriculum, they are deemed to be making good or better progress. In addition, we measure the impact of our curriculum through the following methods:
  - Pre and post unit assessments
  - Assessment against end of year expectations detailed on Pupil Progress Records with clearly identified end points. These are then passed to the receiving teacher to ensure any gaps can be addressed when a key concept is revisited.



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Progression of Working Scientifically vocabulary					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
What...? How ....? Why ...? Similar different best and worst Change Plan look biggest and smallest compare sort group	observe change slowly quickly Describe name identify label record measure bigger and smaller pattern notice cycle predict	gradually identify observe Recognise investigate record units table fair evidence research Length observations prediction	similarities differences research and source scientists discovery process cycle Measurements conclude evaluate rank plan vary keep the same/constant bar graph table tally	classify interpret pattern relationship prediction analyse interpret conclude evaluate rank variable constants control repeat key relationship line graph	hypothesis variable constants evaluate plan conclude interpret classify categorise database enquiry control repeat support refute degree of trust scatter graph



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KS1 Medium Term Plans	Autumn Term		Spring Term	Summer Term	
Prior Knowledge (Retrieval)	<b>Year 3:</b> Recognise that they need light to see things and that dark is the absence of light	<b>Year 4</b> Identify common appliances that run on electricity	<b>New topic but some knowledge from Y3</b> Describe in simple terms how fossils are formed when things that have lived are trapped within rock  Recognise that environments can change and that this can sometimes pose dangers to living thing	<b>Year 5</b> Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird	<b>Year 4</b> Describe the simple functions of the basic parts of the digestive system in humans
	Notice that light is reflected from surfaces *Recognise that light from the sun can be dangerous and that there are ways to protect their eyes	Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers		Describe the life process of reproduction in some plants and animals.	Identify the different types of teeth in humans and their simple functions
	Recognise that shadows are formed when the light from a light source is blocked by a solid object	Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery			
	Find patterns in the way that the size of shadows change.	Recognise that a switch opens and closes a circuit and associate this with whether a lamp lights in a simple series circuit  Recognise some common conductors and insulators, and associate metals with being good conductors			



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Working Scientifically (Skills to be taught throughout the year)	PLAN		DO			REVIEW		
	Ask relevant questions (containing scientific knowledge and understanding).  Recognise which type of enquiry is best to answer a question	Plan different types of science enquiries to answer questions. Recognise and control variables where necessary.  Decide what observations and measurements to make and what equipment to use (giving reasons) to make measurements and observations.	Take measurements, using a range of scientific equipment with increasing accuracy and precision.  Take repeat readings when appropriate  Use relevant information sources to find things out  Identify possible risks to themselves and others	Record data and results of increasing complexity using e.g., scientific diagrams, labels and tables  Choose a method to suit the results, e.g., a two-column table	Present data and results in suitable formats using e.g. line graphs, bar graphs, scatter graphs and classification keys	From data and observations draw valid conclusions (i.e., consistent with the evidence) including causal relationships  Identify scientific evidence to support or refute the ideas or arguments for my conclusion	Look at results and decide if any observations or measurements are unsuitable and need to be carried out again.  Offer simple explanations for differences in results	Use test results to make predictions to set up further enquiries e.g., comparative and fair tests and suggest how working methods could be improved, with reasons
Y6	Knowledge and Skills to be developed:		Knowledge and Skills to be developed:			Knowledge and Skills to be developed:		
	<u>Light:</u> L1 – pre-assessment: To explain my understanding of Light  L2 – Explain how light travels, explain how we see things because light travels from source to our eyes or from source to object to our eye.  L3 – <u>Research</u> To explain that objects are seen because they give out or reflect light into the eye	<u>Electricity</u> L1 – pre-assessment: to explain my understanding of electricity.  L2 – <u>Classifying and grouping</u> to represent a circuit and its components as a diagram, using electrical symbols  L3 – <u>Pattern seeking</u> Observe and explain the effects of differing voltage in a circuit – associate the brightness of a lamp	<u>Evolution and inheritance</u> <u>L1 – Research</u> Pre-assessment Research characteristics that make a plant suited to its environment in different ways and that adaptation may lead to evolution.  L2 – <u>Research</u> Research characteristics that make an animal suited to its environment in different ways and that adaptation may lead to evolution  L4- <u>Comparative and Fair Testing</u> Blubber Experiment  L3- <u>Research</u> Evolution/natural selection of The Peppered Moth			<u>Living things and their habitats</u> Pre-assessment L1 – <u>Classifying and grouping</u> Describe how living things are classified into broad groups according to characteristics, similarities, differences, including micro-organisms, plants and animals  L2 - <u>Classifying and grouping</u> Learn about Carl Linnaeus and how he grouped plants and animals.		<u>Animals, including humans</u> Pre-assessment L1- <u>Identifying, classifying and grouping</u> Name the main parts of the human circulatory system  L2 – <u>Research</u> Describe the ways in which nutrients and water are transported within animals, including humans  L3 – <u>Comparative and Fair testing</u> Which type of exercise has the greatest effect on our heart rate?



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	<p>L4- <b><u>Pattern Seeking</u></b> Investigate and explain refracted light</p> <p>L5 – <b><u>Research</u></b> The colour of light and the visible spectrum</p> <p>L6 – <b><u>Comparative and Fair Test</u></b> To use the idea that light travels in straight lines to explain why shadows have the same shape as the object that cast them.</p> <p>L7 – Post-assessment</p>	<p>with the number and voltage of cells used.</p> <p>L4 – <b><u>Fair Testing/Pattern Seeking</u></b> Compare and give reasons for variations in how components function, including the brightness of bulbs, loudness of buzzers and the on/off positions of switches</p> <p>L5 – <b><u>Observing over time.</u></b> How would you group electrical components and appliances based on what electricity makes them do?</p> <p>L6 – Post-Assessment</p>	<p>L4 – <b><u>Pattern Seeking</u></b> Bird Beak investigation</p> <p>L5- To understand inherited characteristics</p> <p>L6 - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago – understand how fossils show changes over time.</p> <p>L7 – <b><u>Classifying and grouping</u></b> Can you classify these observations into evidence for the ideas of evolution and evidence against?</p> <p>L8 – Post-Assessment</p>	<p>L3 – <b><u>Classifying</u></b> Classify living things into Domain, Kingdom, Phylum and Class</p> <p>L4 – <b><u>Pattern Seeking</u></b> Do all plants have similar observable characteristics?</p> <p>L5 – <b><u>Research</u></b> Understand how micro-organisms are classified into broad groups</p> <p>L6 – Post-Assessment</p>	<p>L4 – <b><u>Research</u></b> Research drugs and alcohol and how it affects the body</p> <p>L5 – <b><u>Observing overtime</u></b> How does my heart rate change over a day?</p> <p>L6 - Post - assessment</p>
<b>Future Learning</b>	<p><b>Key Stage 3</b> Similarities and differences between light waves and waves in matter</p> <p>Light waves travelling through a vacuum; speed of light</p> <p>Transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</p> <p>Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</p>	<p><b>Key Stage 3</b> Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <p>Differences in resistance between conducting and insulating components (quantitative).</p>	<p><b>Key Stage 3</b> Heredity as the process by which genetic information is transmitted from one generation to the next</p> <p>A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model</p> <p>Variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection</p> <p>Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction</p>	<p><b>Key Stage 3</b> Differences between species</p>	<p><b>Key Stage 3</b> *Consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</p> <p>Effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</p> <p>Structure and functions of the gas exchange system in humans, including adaptations to function the mechanism of breathing to move air in and out of the lungs.</p> <p>Impact of exercise, asthma and smoking on the human gas exchange system</p>



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		Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras  Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.	Static electricity			
Vocabulary	All	Straight lines, Light rays. Transparent, Shiny, Matt, Surface, Shadow, Reflect, Mirror, Sunlight, Dangerous	function switches, circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor	Offspring, vary, characteristics, suited, environment, fossils	fish, reptiles, birds, mammals, insects, flowering and non-flowering,	Heart, pulse, rate, pumps, blood, lungs, water, muscles, lifecycle, diet, exercise, drugs and lifestyle
	Most	refraction, angle of reflection, Translucent, Opaque absence of light,	voltage, variations, components,	sexual reproduction, inherited, species, adapted	Vertebrates, invertebrates, amphibians, Classification; Micro-organisms;	circulatory system, blood vessels, transported, nutrients, oxygen, carbon dioxide,
	Some	angle of incidence	Series and parallel circuits LEDs and Resistors	Hereditary	Taxonomists Linnaeus;	Pulmonary, chambers
Quality Texts		Light and Colour		All About Evolution (Big Questions)  The Moth: A story of evolution	Linnaeus Organising Nature	Your Hardworking Heart and Spectacular Circulatory System (Your Brilliant Body!)
Enrichment Activities (e.g. visitors/visits)		Science and Engineering week		Evolution workshop (in school) from North York Moors Zoo Lab – Animal Encounter	Crucial Crew Transition workshops with Graham School	
National Curriculum		Recognise that light appears to travel in straight lines  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	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit  Compare and give reasons for variations in how components function, including the brightness of bulbs,	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago  Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents  Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals  Give reasons for classifying plants and animals based on specific characteristics	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood  Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function



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	<p>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</p> <p>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>the loudness of buzzers and the on/off position of switches</p> <p>Use recognised symbols when representing a simple circuit in a diagram</p>			<p>Describe the ways in which nutrients and water are transported within animals, including humans</p>
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