



Science Overview



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The Curriculum – our approach

Appleton Primary School strives to drive the curriculum through a love of reading. We are creating opportunities for our children to become aspirational in all areas of their lives through a structured build-up of knowledge and skills. We are committed to meeting the needs of all the children in our school. We offer a curriculum which remove barriers to learning by being broad and balanced and building on the knowledge, understanding and skills of the children, whatever their starting points, as they progress through our Foundation Unit and each Key Stage. Our aim is for children to be successful, resilient, independent and motivated learners in readiness for their next stage of education and beyond.

Using the children's interests through talking to pupils, their families and the local community we ensure we capture the enthusiasm of the children to take their development forward. We have a two-year programme of 6 themes across the year groups which captures the children's imagination and interests and ensures that there is a progressive sequence of skills and knowledge based on the National Curriculum. Each theme is supported by an appropriate text to nurture the children's love of reading and quest for knowledge. Our teaching sequences ensure that we teach skills and knowledge and provide sufficient opportunities for pupils to apply these independently. Through the consistent use of assessment, we can identify and address misconceptions to ensure learning is securely embedded and children can remember what they have learned.

At Appleton, we believe that all children are entitled to a broad, balanced and relevant curriculum through which we support children with additional needs. All children are encouraged to achieve their full potential and to be included in the social and academic life of the school. We aim to provide educational experiences that reflect the individual needs of children, appropriate to their level of ability. For some pupils with additional needs, there are times when the curriculum will need to be adapted to best meet their needs.

We will ensure our pupils have a wide range of cultural experiences and develop an understanding of opportunities available to them, so they leave us with high aspirations. We endeavour to introduce our whole community to the rich and diverse world in which we live in. To achieve this we promote tolerance and respect towards others in our both community and society as a whole using our PSHE programme, which runs throughout the school. Successes are celebrated and children are taught respect, empathy and fundamental British values and how they can contribute to our "Appleton family" and the wider world in which we live.

Our Curriculum Drivers

Reading is the key for learning

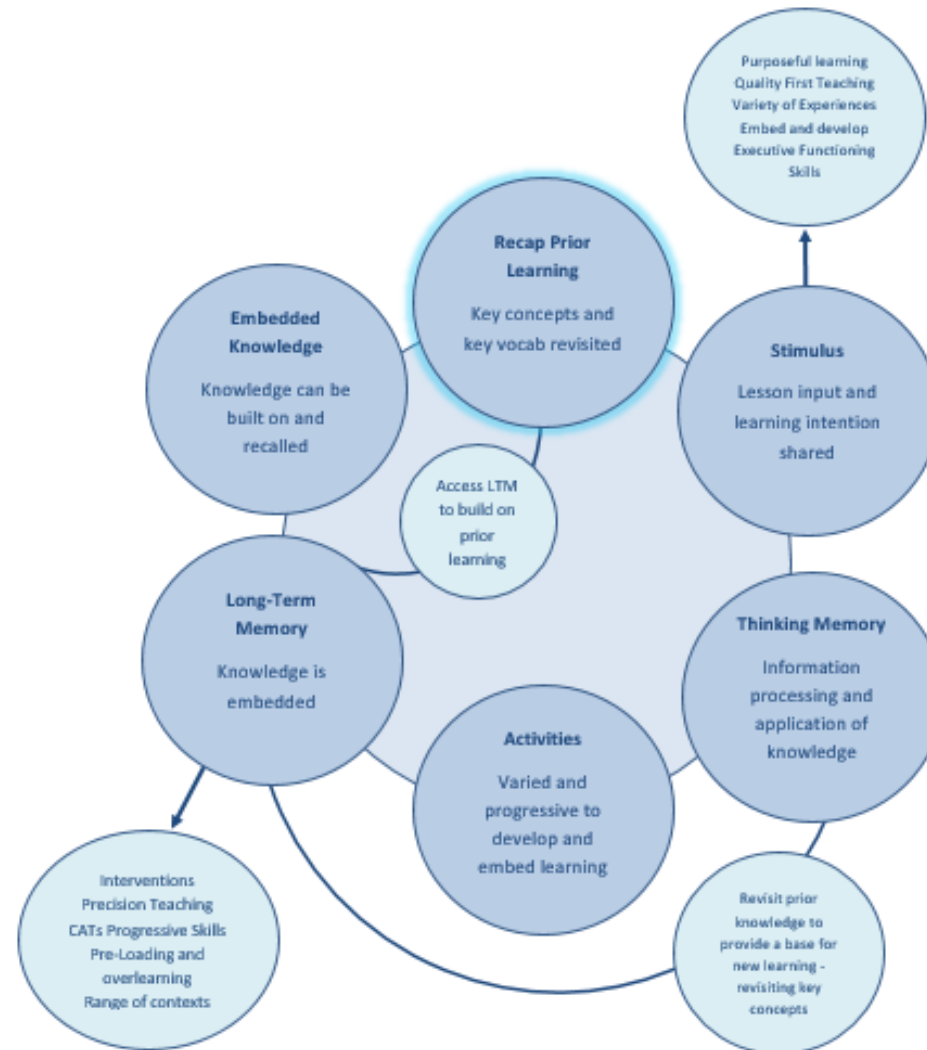
PSHE through developing resilience and promoting wellbeing our pupils can learn

Vocabulary we aim to extend pupils' language to enable them to learn from a wide range of experiences in our language rich curriculum

Fundamental Values promoting empathy and British values are at the core of our "Appleton family" approach.

Working Memory Model

With the collation of all this extensive research, we have generated a 'Working Memory Model' which enables teachers to ensure that learning is robust and that all pupils are using their interconnected schema to their full potential. Fundamental to our model is "grow what you know" and retrieval of prior learning.









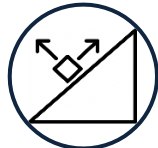


A Broad and Balanced Curriculum at Key Stage 2

We ensure that we celebrate the talents of all pupils and provide everyone with opportunities to shine.

Reading, Writing and Maths are taught daily. Pupils who need phonic support continue on the Read Write Inc. and Fresh Start programmes. Science and PE are taught for 2 hours each week. RE and PSHE are taught for 1 hour each week. Foundation subjects are blocked over half term units. Y4 and 5 have Wider Opportunities for Music taught by a brass specialist. PE specialists and sport organisations regularly visit the school to teach pupils in lessons.

Key Concepts (Big Ideas)

Through collaboration with subject leaders and subject specialists across our secondary schools, each subject has identified key concepts (big ideas) for their subject. These key concepts are the skills and knowledge essential to pupils achieving and exceeding expected standards in that specific subject. Key concepts are subject specific and build progressively as pupils move through the school. When pupils encounter a key concept, they will revisit other topics where they learnt about the same concept to enable them to make connections between different learning and build the schema they need. Thus they will have opportunities to link new learning to prior knowledge within a key concept to build a rich and deep knowledge of the big ideas in each subject. Knowledge is empowering and provides a foundation for success. We accept that the more children know, the more they can learn.

Science								
								
Working Scientifically	Animals including humans	Plants	Living things and their habitats	Materials	States of matter	Forces	Energy	Earth Science
	Biology			Chemistry		Physics		

Key concepts (Big Ideas) in Science

Pupils build substantive knowledge of the main **concepts, models, laws and theories** across the three disciplines of science: biology, chemistry and physics. They will also learn about significant scientists and discoveries and the impact of these on our lives. Through each unit, pupils will develop their disciplinary knowledge as they learn how to work scientifically.

Working scientifically*



This is embedded through all units. Pupils will learn how scientific enquiry is used to grow and develop knowledge in science. They will learn how scientists use a variety of enquiry strategies to answer scientific questions. Different questions lead to different types of enquiry and are not limited to fair testing. Pupils will learn to use these enquiry strategies confidently and know that different strategies may be needed at different times. Through different units of science, pupils will learn the following:

- **Observing over time:** (observing or measuring how one variable changes over time)
- **Identifying and classifying:** (identifying and naming materials/living things and making observations or carrying out tests to organise them into groups.)
- **Looking for patterns:** (making observations or carrying out surveys of variables that cannot be easily controlled and looking for relationships between two sets of data)
- **Comparative and fair testing:** (observing or measuring the effect of changing one variable when controlling others)
- **Answering questions using secondary sources of evidence:** (answering questions using data or information that they have not collected first hand)
- **Using models:** (Developing or evaluating a model or analogy that represents a scientific idea, phenomenon or process)

Biology:

Animals including humans



Plants



Living things and their habitats



Pupils will develop an understanding of **living things and their environments** through the study of animals, humans, plants and habitats. They will learn about reproductions, inheritance and evolution through the study of life processes and life cycles.

Chemistry:

Materials



States of matter



Pupils will learn about states of matter through the study of solids, liquids and gases. They will look at the properties of materials including rocks and fossils and will study reversible and irreversible changes in materials.

Physics:

Energy



Forces

















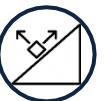


















Earth Sciences



Pupils will develop an understanding of the concepts and laws that apply to physics. They will study the concept of **energy** by learning about light, sound and electricity. They will develop an understanding of **forces** by studying and investigating friction, air resistance, gravity and magnets. They will learn about **Earth and space**, studying seasons, day and night, the solar system and beyond.



*These concepts are studied in all units of science


KEY CONCEPTS YEAR GROUP MAPPING



KEY CONCEPTS YEAR GROUP MAPPING							
	Autumn	Spring	Summer				
EYFS	In EYFS pupils are taught science through the world – Understanding the world. throughout the year pupils will be taught: Animals including humans, Living things and their habitats, Forces and Earth Sciences,						
Year 1	 Weather	 Animals	 Senses	 Weather	 Materials	 Weather	 Plants
Year 2	 Materials			 Habitats	 Plants	 Human body	
Year 3	 Human Body	 Rocks and Minerals	 Plants			 Forces	 Light and shadows
Year 4	 environment	 States of matter	 Light	 Human body	 Human Body	 Sound	
Y56 cycle 1	 Classification	 Body Health	 Forces	 Earth Science	 Electricity	 Light	
Y56 cycle 2	 States of matter			 Circulation	 Environment	 Life cycles	 Reproduction


Knowledge and skills sequencing		SCIENCE						
		EYFS	Y1	Y2	Y3	Y4	Y5	Y6
WORKING SCIENTIFICALLY	Observing over time Using observations and data to draw conclusions	I can make observations and explain what I can see	I can use observations and ideas to suggest answers to questions	I can observe changes over time I can ask questions about what I notice	I make careful and systematic observations and take accurate measurements using standard units I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions I can record findings using bar charts keys, tables and labelled diagrams		I can take measurements, using a wider range of scientific equipment, with increasing accuracy and precision and taking repeat reading when appropriate I can report and present findings from enquiries including conclusions, explanations, data and diagrams including scatter graphs and line graphs.	I use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including observing changes over different periods of time I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways I am evaluate my results
	Identifying /classifying	I can sort objects into groups	I can identify and classify according to simple criteria	I can group and classify things	I can gather, record, classify and present information in a variety of different ways to help me answer questions		I can classify materials and identify why they are / are not fit for purpose	I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and grouping and classifying things
	Looking for patterns		I can perform simple tests, involving observations and the gathering and recording of data	I can use different types of Scientific enquiry to gather and record data, using simple equipment	I can identify differences, similarities or changes related to simple scientific ideas and processes		I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables and noticing patterns	


			I notice patterns in my observations or data			
Comparative and fair testing			I can carry out simple comparative tests	<p>I can ask relevant questions and use different types of scientific enquiry to answer them, including comparative and fair tests</p> <p>I can record findings and present data using simple scientific language, explanations, diagrams, pictures, keys, bar charts and tables.</p>	<p>I can plan and carry out scientific enquiry using a range of scientific equipment and variables in order to answer questions</p> <p>I can use test results to make predictions to set up further comparative and fair tests</p>	<p>I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary and carrying out comparative and fair tests</p> <p>I draw conclusions, explain and evaluate my methods and findings, communicating these in a variety of ways</p>
Using secondary sources of evidence			I can find things out using secondary sources of information	I can identify scientific evidence that has been used to support or refute ideas or arguments	<p>I describe and evaluate my 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</p> <p>I ask my own questions about the scientific phenomena that I am studying, and select the most appropriate ways to answer these questions including finding things out using a wide range of secondary sources</p>	
Using models				<p>Understand how models can explain progresses that can't be fully observed eg: how light/sound travel, magnetism, the water cycle</p> <p>Understand how models explain how molecules behave when substances change shape.</p>	Understand how models about space and the solar system explain processes that can't be observed.	


		EYFS	Y1	Y2	Y3	Y4	Y5	Y6
BIOLOGY	Living things and their habitats 	<p>To understand the difference between plants and animals through observation (similarity and difference)</p> <p>To understand the need to respect and care for the natural environment and all living things (responsibility)</p>		<p>To identify whether things are alive, dead or have never lived</p> <p>To name different plants and animals and describe how they are suited to different habitats</p> <p>To describe how animals get their food from plants and other animals, using the idea of a simple food chain to describe this relationship</p>	<p>To describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p>	<p>To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</p> <p>To recognise that living things can be grouped in a variety of ways</p> <p>To recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<p>To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</p> <p>To describe the life process of reproduction in some plants and animals.</p>	<p>To group, classify and identify plants, animals and micro-organisms using keys or other methods based on their observable features</p> <p>To describe how living things have changed over time and evolved using the basic ideas of inheritance, variation and adaptation</p> <p>To give evidence for evolution</p> <p>To recognise that living things produce offspring of the same kind but that offspring normally vary and are not identical to their parents.</p>
	Animals including humans 	<p>To talk about lifecycles (continuity and change)</p> <p>To use my senses in hands on explanations (similarity and difference)</p>	<p>To describe and compare the features of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</p> <p>To identify, name, draw and label the</p>	<p>To describe the basic needs of animals for survival and the main changes as young animals (including humans) grow into adults</p> <p>To notice that animals, including humans, have</p>	<p>To identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.</p>	<p>To describe the simple functions of the basic parts of the digestive system in humans.</p> <p>To identify the different types of teeth in humans and their simple functions.</p>	<p>To describe the changes as humans develop to old age.</p>	<p>To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>To describe the effects of diet, exercise, drugs and</p>

		<p>To name my 5 senses (similarity and difference)</p> <p>To explain what my 5 senses are (similarity and difference)</p>	<p>basic parts of the human body. To say which part of the body is associated with each sense.</p> <p>To group animals according to what they eat</p>	<p>offspring that grow into adults.</p> <p>To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>To identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	<p>To construct and interpret a variety of food chains, identifying producers, predators and prey.</p>		<p>lifestyle on how the body functions</p>
Plants		<p>To plant seeds and care for growing plant with support (responsibility)</p> <p>To say what a plant needs to survive (cause and consequence)</p> <p>To talk about lifecycles (continuity and change)</p>	<p>To name, identify and describe the basic structure of a variety of common flowering plants including trees.</p>	<p>To describe the basic needs of plants for survival and the impact of changing these</p> <p>To observe and describe the main changes as seeds and bulbs grow into mature plants.</p>	<p>To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>To explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</p> <p>To understand the way in which water is transported within plants.</p> <p>To explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>		<p>To name, locate and describe the functions of the main parts of plants, including those involved in reproduction</p>	

		EYFS	Y1	Y2	Y3	Y4	Y5	Y6
CHEMISTRY	Materials 	<p>To explore collections of materials and talk about similarities and differences</p> <p>To talk about the differences between materials and talk about the changes I see (cause and consequence)</p>	<p>To name, compare and group a variety of everyday materials and describe their simple, physical properties.</p> <p>To distinguish between an object and the materials from which it is made</p>	<p>To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p>	<p>To compare and group together different kinds of rocks and soil on the basis of their appearance and simple physical properties.</p>		<p>To compare and group together everyday materials on the basis of their properties</p> <p>To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p>	
	States of matter 						<p>To describe the characteristics of different states of matter and group materials on this basis</p> <p>To describe how materials change state at different temperatures</p> <p>To 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.</p> <p>To identify the part played by evaporation and</p>	<p>To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.</p> <p>To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>To identify, with reasons, whether changes in materials are reversible or not</p> <p>To explain that some changes of</p>

						condensation in the water cycle and associate the rate of evaporation with temperature.	state result in the formation of new material and that this kind of change is not usually reversible.	
PHYSICS	<p>Forces</p> 	<p>To explore how things work e.g. toys</p> <p>To explore pushes and pulls</p> <p>To talk about forces and concepts such as floating and sinking, magnetism and light.</p>				<p>To notice contact and non-contact forces and observe similarities and differences.</p> <p>To describe how magnetic forces act at a distance</p> <p>To describe magnets as having two poles.</p> <p>To compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet</p> <p>To predict and explain whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<p>To explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>To identify the effects of air resistance, water resistance and friction that act between moving surfaces.</p> <p>To recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	

	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
<p>Energy</p> <ul style="list-style-type: none"> • Light • Sound • Electricity 				<p>Light To recognise and understand the properties of light.</p> <p>To recognise that shadows are formed when the light from a light source is blocked by a solid object.</p> <p>To find patterns in the way that the size of shadows changes.</p>	<p>Sound To identify how sounds are made, associating some of them with something vibrating.</p> <p>To recognise that vibrations from sounds travel through a medium to the ear.</p> <p>To recognise that sounds get fainter as the distance from the sound source increases</p> <p>To describe the relationship between the pitch of a sound and the features of its source</p> <p>To describe the relationship between the volume of a sound, the strength of the vibrations and the distance from its source</p> <p>Electricity To construct and name the basic parts of a simple series circuit,</p>		<p>Light To use the idea that light travels in straight lines and enters our eyes to explain how we see things</p> <p>To 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>To 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>Electricity To use simple apparatus to construct & control a series circuit, and</p>

						<p>including cells, wires, bulbs, switches and buzzers.</p> <p>To identify whether or not a lamp will light in a simple series circuit</p> <p>To recognise that a switch opens and closes a circuit</p> <p>To recognise and explain why materials are good conductors and insulators.</p>		<p>describe how the circuit may be affected when changes are made to it</p> <p>To use recognised symbols when representing a simple circuit in a diagram.</p>
<p>Earth science</p> 	<p>To name and identify some different types of weather</p>	<p>To explain how the weather changes throughout the year and name the seasons (link to geography)</p> <p>To use a globe to identify the equator and north and south poles (Link to geography)</p>					<p>To describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</p> <p>To describe the movement of the Moon relative to the Earth.</p> <p>To use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	

Second Order Concepts

Second order concepts are fundamental knowledge and skills which are transferable across a range of curriculum subjects. For example, we introduce pupils to the concept of ‘similarity and difference’ early in their education, developing the observational skills and language needed to make comparisons. This is developed and applied as pupils move through the school so they can confidently apply this in all areas of the curriculum by upper Key Stage Two. A summary of second order concepts and how these apply to Science is provided below.

Curriculum subject	Significance	Similarity and difference	Cause and consequence	Continuity and change	Responsibility	Written and oral expression	Enquiry
Science	Significant scientists, discoveries, laws, models and theories	Making comparisons, finding patterns, noting differences, drawing conclusions	Models and laws, reactions between materials, observing processes	Observing what changes and what stays the same	Working safely, climate change and sustainability, how science solves problems	Using scientific terms, evaluating, drawing conclusions, explaining patterns and processes, presenting and interpreting data	Working scientifically, observing, classifying, patterns, fair testing, using evidence