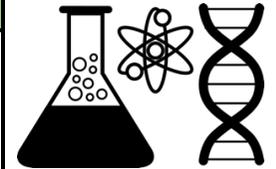


Purpose of Study [from National Curriculum]:

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.



Whitecote Curriculum Intent Statement:

At Whitecote we recognise the importance of science in every aspect of daily life. Our science curriculum fosters a healthy curiosity, excitement and understanding in children about our universe. The science curriculum should encompass the acquisition of knowledge, concepts, skills and positive attitudes. Throughout our school children are encouraged to develop and use a range of working scientifically skills including questioning, researching and observing for ourselves. Scientific language is to be taught and built upon as topics are revisited in different year groups and across key stages, as well as identifying significant individuals. The science curriculum also ensures progression of skills and cumulative learning, building on and supporting the children's metacognitive learning strategies through effective pedagogical and vocabulary rich teaching.

Aims [from National Curriculum]:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.

Working Scientifically Skills			
Foundation Stage*	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
N/A	<ul style="list-style-type: none"> • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions ☐ gathering and recording data to help in answering questions. 	<ul style="list-style-type: none"> • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. 	<ul style="list-style-type: none"> • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • 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.

*Not taken from the National Curriculum.



Science Intent and Coverage LTP

Subject Core Concepts	Suggested Cognitive Strategies
<p>The core concepts, taken from the aims of the curriculum, will be used to inform suggested sequences of learning and focus the learners on the principle aims of effective subject-specific understanding:</p> <ul style="list-style-type: none"> • Change: The natural world changes continually. Some changes may be slow, others may be fast. Some changes may be temporary, others permanent. • Systems and Processes: Systems are a whole, comprised of parts (processes). Without the processes, the systems may fail or change. • Organisation and Classification: Natural phenomena is organised and classified by scientists to make things easier to identify. • Cause and Effect: Scientists tells us that for every effect, there is a cause. There can be no effect, without cause. • Properties and Function: Properties are the fundamental descriptive components that make up organisms and objects; while functions are the things that they do. • Variation: Refers to the difference in properties between individuals in a species or other scientific phenomena and objects. • Scale: The size, quantity or value of a phenomena (<i>i.e., force</i>), object, or organism (<i>i.e., weight, number</i>). It can also refer to the proportion of these. • Diversity: Represents the many different types of organisms. Natural diversity is essential for systems to survive (<i>i.e., food chains</i>). 	<p>The Whitecote cognitive strategies are suggested strategies that might be used across the subject’s curriculum to allow them to internalise and retain knowledge:</p> <ul style="list-style-type: none"> • Physically Do It. • Make It, Build objects and models to represent scientific phenomena, objects and organisms, systems and processes. • Make mnemonics to remember scientific knowledge and facts. • Dual Code scientific phenomena and organisms • Test it for practical tasks and create own self-testing exercises to remember scientific knowledge and facts.

	National Curriculum	Additional Whitecote Info
EYFS	<p><u>ELG: The Natural World</u> Children at the expected level of development will:</p> <ul style="list-style-type: none"> • Explore the natural world around them, making observations and drawing pictures of animals and plants; • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. 	<ul style="list-style-type: none"> •



Science Intent and Coverage LTP

	National Curriculum	Additional Whitecote Info
Year 1	<p>Plants</p> <ul style="list-style-type: none">• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees• identify and describe the basic structure of a variety of common flowering plants, including trees. <p>Animals, including Humans</p> <ul style="list-style-type: none">• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals• identify and name a variety of common animals that are carnivores, herbivores and omnivores• describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)• identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. <p>Everyday Materials</p> <ul style="list-style-type: none">• distinguish between an object and the material from which it is made• identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock• describe the simple physical properties of a variety of everyday materials• compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>Seasonal Changes</p> <ul style="list-style-type: none">• observe changes across the four seasons• observe and describe weather associated with the seasons and how day length varies.	<ul style="list-style-type: none">•
Year 2	<p>Living Things and Their Habitats</p> <ul style="list-style-type: none">• explore and compare the differences between things that are living, dead, and things that have never been alive• identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other• identify and name a variety of plants and animals in their habitats, including micro- habitats• describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. <p>Plants</p> <ul style="list-style-type: none">• observe and describe how seeds and bulbs grow into mature plants• find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <p>Animals, including Humans</p> <ul style="list-style-type: none">• notice that animals, including humans, have offspring which grow into adults	<ul style="list-style-type: none">•



Science Intent and Coverage LTP

	National Curriculum	Additional Whitecote Info
	<ul style="list-style-type: none">find out about and describe the basic needs of animals, including humans, for survival (water, food and air)describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. <p>Uses of Everyday Materials</p> <ul style="list-style-type: none">identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular usesfind out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	
Year 3	<p>Plants</p> <ul style="list-style-type: none">identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowersexplore 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 plantinvestigate the way in which water is transported within plantsexplore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <p>Animals, including Humans</p> <ul style="list-style-type: none">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 eatidentify that humans and some other animals have skeletons and muscles for support, protection and movement. <p>Rocks</p> <ul style="list-style-type: none">compare and group together different kinds of rocks on the basis of their appearance and simple physical propertiesdescribe in simple terms how fossils are formed when things that have lived are trapped within rockrecognise that soils are made from rocks and organic matter. <p>Light</p> <ul style="list-style-type: none">recognise that they need light in order to see things and that dark is the absence of lightnotice that light is reflected from surfacesrecognise that light from the sun can be dangerous and that there are ways to protect their eyesrecognise that shadows are formed when the light from a light source is blocked by an opaque objectfind patterns in the way that the size of shadows change.	<ul style="list-style-type: none">



Science Intent and Coverage LTP

	National Curriculum	Additional Whitecote Info
	<p><u>Forces and Magnets</u></p> <ul style="list-style-type: none"> • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • 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 • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing. 	
Year 4	<p><u>Living Things and Their Habitats</u></p> <ul style="list-style-type: none"> • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things. <p><u>Animals, including Humans</u></p> <ul style="list-style-type: none"> • describe the simple functions of the basic parts of the digestive system in humans ▪ identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey. <p><u>States of Matter</u></p> <ul style="list-style-type: none"> • compare and group materials together, according to whether they are solids, liquids or gases • 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) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. <p><u>Sound</u></p> <ul style="list-style-type: none"> • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases. <p><u>Electricity</u></p> <ul style="list-style-type: none"> • identify common appliances that run on electricity 	<ul style="list-style-type: none"> •



Science Intent and Coverage LTP

	National Curriculum	Additional Whitecote Info
	<ul style="list-style-type: none"> • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • 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 • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors. 	
Year 5	<p><u>Living Things and Their Habitats</u></p> <ul style="list-style-type: none"> • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals. <p><u>Animals, including Humans</u></p> <ul style="list-style-type: none"> • describe the changes as humans develop to old age. <p><u>Properties and Changes of Materials</u></p> <ul style="list-style-type: none"> • 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 • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. <p><u>Earth and Space</u></p> <ul style="list-style-type: none"> • 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 • use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky. <p><u>Forces</u></p>	<ul style="list-style-type: none"> •



Science Intent and Coverage LTP

	National Curriculum	Additional Whitecote Info
	<ul style="list-style-type: none"> explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. 	
Year 6	<p><u>Living Things and Their Habitats</u></p> <ul style="list-style-type: none"> 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. <p><u>Animals, including Humans</u></p> <ul style="list-style-type: none"> 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 describe the ways in which nutrients and water are transported within animals, including humans. <p><u>Evolution and Inheritance</u></p> <ul style="list-style-type: none"> 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. <p><u>Light</u></p> <ul style="list-style-type: none"> 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 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 use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. <p><u>Electricity</u></p> <ul style="list-style-type: none"> associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit 	<ul style="list-style-type: none">



Science Intent and Coverage LTP

National Curriculum	Additional Whitecote Info
<ul style="list-style-type: none"> 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 use recognised symbols when representing a simple circuit in a diagram. 	

Topic Coverage per Year Group			
Year Group	Autumn	Spring	Summer
Nursery		Observational Drawings: Local Environment (Animals & Habitats)	
Reception	Seasonal Change – Autumn Under the Sea: Animals & Environments	Seasonal Change - Winter	Seasonal Change – Spring & Summer Observational Drawings: Local Environment (Animals & Habitats)
1	Animals , including humans Seasonal Change – Autumn	Everyday Materials Seasonal Change – Winter	Plants Seasonal Change – Spring & Summer
2	Everyday Materials Seasonal Change – Autumn	Animals , including humans Seasonal Change - Winter	Plants Living Things and Habitats Seasonal Change – Spring & Summer
3	Rocks Light	Plants Forces and Magnets <ul style="list-style-type: none"> <i>inc. Isaac Newton</i> 	Animals , including Humans <ul style="list-style-type: none"> <i>Links to Aristotle – Zoology and Classification</i>
4	Circuits and Electricity Sound	States of Matter Living Things and Habitats	Animals , including Humans



Science Intent and Coverage LTP

Topic Coverage per Year Group			
Year Group	Autumn	Spring	Summer
5	Properties and Changes of Materials	Living Things and Habitats Animals & Humans and Change	Earth and Space <ul style="list-style-type: none"> • <i>Links to Copernicus, Galileo</i> Forces
6	Living Things and Habitats Evolution and Inheritance <ul style="list-style-type: none"> • <i>Charles Darwin , 'Theory of Evolution'</i> • <i>Mary Anning, Fossils</i> 	Light Electricity	Animals, including Humans Rainforests

Sequence of Learning: Investigation-Based Topics		
#	Phase	Explanation
1.	Engage:	Engage children through an exciting, scientific hook.
2.	Establish:	Discuss what is already known, explain the scientific brief and criteria for success. Discuss the process of being a scientist and investigation – <i>what skills and actions do we need to succeed? Make a plan as to how we will learn and assess learning at specific review points [metacognition].</i>
3.	Explore:	Develop concepts through discovery.
4.	Demonstrate:	Plan and predict using a whole class demonstration.
5.	Plan:	Make a plan of resources, fair test, variables and methodology.
6.	Investigate:	Conduct investigation based on plan, justifying any changes to the plan. Apply working scientifically skills to support knowledge acquisition.



Science Intent and Coverage LTP

Sequence of Learning: Investigation-Based Topics		
#	Phase	Explanation
7.	Record:	Record results and present data.
8.	Evaluate:	Evaluate the investigation against the intended purpose and success criteria.
9.	Real-World Application	How does the investigation apply to our real-world knowledge?

Sequence of Learning: Theory-Based Topics		
#	Phase	Explanation
1.	Engage:	Engage children through an exciting, scientific hook.
2.	Establish:	Discuss what is already known, explain the scientific brief and criteria for success. Discuss the process of being a scientist and knowledge-acquisition – <i>what skills and actions do we need to succeed?</i> Make a plan as to how we will learn and assess learning at specific review points [metacognition].
3.	Understand:	Understand knowledge and theory of topic and explain to others.
4.	Work Scientifically:	Look at shared qualities and characteristics. Apply working scientifically skills to support knowledge acquisition.
5.	Record Observations:	Record real world observations using drawings, tables of information, descriptions, keys etc. link this to ICT and maths, where possible.
6.	Interpret:	Explain the meaning of what you have found in observations.



Science Intent and Coverage LTP

Sequence of Learning: Theory-Based Topics		
#	Phase	Explanation
7.	Present:	Present findings in a variety of ways to the class.

Tier 2 Vocabulary													
Children need to know, understand and use the relevant vocabulary for their age group by the end of the year and will be provided with opportunity throughout the year. This list is cumulative and should be revisited and built upon each year.													
Reception		Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
	Same Different	Test Experiment Change											

Tier 3 Vocabulary													
Children need to know, understand and use the relevant vocabulary for their age group by the end of the year and will be provided with opportunity throughout the year. This list is cumulative and should be revisited and built upon each year.													
Reception		Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
		absorbent bendy dull hard material object opaque rough shiny smooth		adult develop diet disease exercise germs hygiene life cycle live young nutrition		carpel (pistil) evaporation fertilisation flowers germination leaves nutrients ovary petal	light light source dark reflection reflect reflective ray pupil retina shadow	condense evaporate freeze gas liquid melt precipitation solid states of matter		amphibian asexual reproduction fertilise gestation life cycle metamorphosis pollination pregnancy		incident ray light light source opaque prism reflected ray reflection refraction	



Science Intent and Coverage LTP

Tier 3 Vocabulary

Children need to know, understand and use the relevant vocabulary for their age group by the end of the year and will be provided with opportunity throughout the year. This list is cumulative and should be revisited and built upon each year.

Reception		Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
		soft stretchy transparent waterproof		offspring pulse young		pollination pollinator root seed dispersal sepal stamen stem stigma style	opaque translucent transparent	water vapour		sexual reproduction		shadow the law of reflection translucent transparent visible spectrum	

Useful Websites

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