

Hose Church of England Primary School

'Respect, Bravery, Success, Pride'



KS2 Progression Overview of Knowledge & Skills in Science

End of Phase Expectations	
Lower KS2	Upper KS2
<p>Children should use the following practical scientific methods, processes and skills:</p> <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.• Taking accurate measurements using standard units, 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 and changes related to simple scientific ideas and processes.• Using straightforward scientific evidence to answer questions to support their findings.	<p>Children should use the following practical scientific methods, processes and skills:</p> <ul style="list-style-type: none">• Planning different types of scientific enquiries to answer questions, including recognizing and controlling variables when 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, casual relationships and explanations of and a degree of trust in result, 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.

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End of Phase Expectations	
Lower KS2	Upper KS2
<p>The principal focus of science teaching in lower key stage 2:</p> <p>Has experienced and observed phenomena, having looked more closely at the natural and humanly constructed world around them.</p> <ul style="list-style-type: none"> ● Shows curiosity, asking questions about what they have noticed. ● Has developed understanding of scientific ideas through the use of different types of scientific enquiry to answer own questions, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative tests and finding things out using secondary sources of information. ● Is beginning to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. 	<p>The principal focus of science teaching in upper key stage 2:</p> <ul style="list-style-type: none"> ● Enable pupils to develop a deeper understanding of a wide range of scientific ideas. ● Broadened their scientific view of the world around them through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living and non-living things and familiar environments and by beginning to develop ideas about functions, relationships and interactions. ● They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically ● Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. ● Recognise that scientific ideas change and develop over time. ● Select the most appropriate ways to answer science questions using different types of scientific enquiry, including 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 of information. ● Draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. ● Asks their own questions about what they observe and is able to make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. ● Draws simple conclusions and uses some scientific language, to both and write about what they have found out. ● Reads and spells scientific vocabulary correctly and with confidence, using their growing word and spelling knowledge.

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Disciplinary Knowledge		
	LKS2	UKS2
Ask questions	<ul style="list-style-type: none"> • Ask relevant questions when prompted and generate own ideas to explore through a range of different scientific enquiries • Ask a range of yes/no questions to aid sorting • With support, improves focus of question to clarify its scientific purpose. • Ask a range of questions linked to a topic 	<ul style="list-style-type: none"> • Independently ask relevant questions and offer ideas for scientific enquiry, which have a clear scientific purpose. • Ask a range of yes/no questions to aid sorting and decide which ways of sorting will give useful information. • Recognises scientific questions that do not yet have definitive answers. • Ask further questions based on the results
Planning an enquiry	<ul style="list-style-type: none"> • Make and record their predictions before an investigation • Plan and carry out comparative and fair investigations • Identify variables and ensure that it is a fair test. • Decide which information needs to be measured and how to collect the relevant information • Carry out a simple test controlling key variables 	<ul style="list-style-type: none"> • Make, record and justify a prediction using scientific information or knowledge • Select and plan an effective type of scientific enquiry to answer a specific question • Plan and set up comparative and fair investigations, identifying one variable to change and others to be controlled fairly and accurately • Devise their own questions and plan further enquiries to explore these questions
Observe, measure & record	<ul style="list-style-type: none"> • Describe observations with accurate detail • Suggest what observations to make, how long to observe for and what equipment is needed • Make systematic and careful observations • Measure results using simple equipment and standard units of measurement • Record observations and measurements in a variety of ways, choosing the most appropriate method. 	<ul style="list-style-type: none"> • Record detailed and relevant observations • Decide on the most appropriate observations to make and decide what data could help to identify patterns and relationships • Choose the most appropriate equipment, explain how to use it and take measurements with precision • Use a broader range of measurement equipment (eg, thermometers, data loggers) • Know how, when and why it would be helpful to repeat measurements • Choose how to record observations and measurements most appropriately

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Disciplinary Knowledge		
	LKS2	UKS2
Sort & Classify	<ul style="list-style-type: none"> Identify features that could help to group and sort objects, materials and living things. Suggest and discuss different criteria for grouping objects and living things. Use keys and other information to support classification 	<ul style="list-style-type: none"> Use a range of keys, charts and information to classify objects and living things. Identify patterns in the natural environment. Develop criteria and keys for sorting and classifying objects and living things Suggest the most useful criteria to use when sorting specific objects. Identify patterns and relationships between groups of living things or objects
Report & Interpret	<ul style="list-style-type: none"> Use relevant scientific language to describe and communicate findings Use a range of methods to record and display their data. Look for changes, similarities and differences in observations and data Use results to draw simple conclusions 	<ul style="list-style-type: none"> Use relevant scientific language to communicate, discuss and justify their scientific ideas Decide how to display data including use of scientific diagrams, tables, bar and line graphs, scatter graphs. Produce accurate tables, charts and graphs to display data Find patterns in observations and data, looking for correlation and causal relationships in their data Use evidence from results to explain and justify conclusions. Use secondary sources to research questions and ideas and separate fact from opinion
Evaluate	<ul style="list-style-type: none"> Explain whether their prediction was correct or not and suggest why Discuss and suggest ways to improve their enquiry or data collection. Make further predictions based on their data. 	<ul style="list-style-type: none"> Make connections between their prediction and results to explain if their prediction was correct. Evaluate the accuracy and quality of their enquiry and suggest possible improvements. Identify and explain anomalous results in data. Link what they have found out to other scientific ideas. Ask new questions arising from their observations or data. Identify evidence from enquiries or secondary sources that supports or refutes their ideas

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Substantive knowledge		
	LKS2	UKS2
Plants	<ul style="list-style-type: none"> • Know and identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • Know what plants need for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • Know how water is transported within plants 	
Living things & their habitats	<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. 	<ul style="list-style-type: none"> • Know that reproduction is when a plant produces one or more individuals similar to itself. • Use prior knowledge of parts of a flower to explain the stages involved in the reproduction process (pollination, fertilisation and germination) • Explain and describe the life cycle of a mammal, amphibian, insect and a bird noting the differences. • Find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. • Explain the process of metamorphosis using frogs and butterflies as examples. • Know that living things can be grouped according to different criteria. • Know that a cell is made up of nucleus, cytoplasm and membrane. • Know that living things can be multicellular or unicellular (bacteria).
Animals including humans	<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 eat • Identify that humans and some other animals have skeletons and muscles for support, protection and movement • 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 	<ul style="list-style-type: none"> • Describe the changes as humans develop to old age • Describe the key stages in the growth and development of humans. • Recall some of the changes experienced in puberty. • Understand that the gestation periods of other animals are different to humans. • 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

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Substantive knowledge		
	LKS2	UKS2
Materials	<p>States of Matter:</p> <ul style="list-style-type: none"> • Know that all things are made up of particles which are arranged differently in solids, liquids and gases. • Name the properties of solids, liquids and gases. • Understand that melting and freezing are a state change between solids and liquids. • Know that water freezes at 0oc and boils at 100oc. • Understand that condensation is a state change from a gas to a liquid. • Understand that evaporation is a state change from liquid to gas. • Know that the speed of evaporation depends on a number of variables including the temperature. • Describe the water cycle. • Identify the parts played by evaporation and condensation in the water cycle. 	<p>Properties and changes of materials:</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. • Discuss the suitability of everyday materials for different purposes based on their properties. • Know the difference between reversible and irreversible changes. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes results 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. • Understand some materials will dissolve in liquid to form a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving, and evaporating.
Forces	<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 • Describe magnets as having two poles • Observe how magnets attract or repel each other and attract some materials and not others • Use knowledge of polarity to predict whether two magnets will attract and repel each other • 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 	<ul style="list-style-type: none"> • Know the work of Isaac Newton and know that force is measured in Newtons by a Newton Meter • 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 • Identify the effects of water resistance • Identify the effects of friction acting between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater affect
Light	<ul style="list-style-type: none"> • Recognise that they need light in order to see things and that dark is the absence of light • 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 • Recognise that shadows are formed when the light from a light source is blocked by an opaque object • Find patterns in the way that the size of shadows change. 	<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.
Sound	<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 produce it • Recognise that sounds get fainter as the distance from the sound source increases. 	

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Substantive knowledge		
	LKS2	UKS2
Electricity	<ul style="list-style-type: none"> • Electricity is a form of energy, used for lighting, heating, making sound and making machines and appliances work. • Some appliances run on electricity; some plug into the mains electricity and others run on batteries. • An electrical circuit consists of a cell or battery connected to a component using wires. • A series circuit is where all the components of the circuits are joined in one loop. If one part of the loop is incomplete, then the circuit will not work • Names of components include cells ,wires, bulbs/ lamps, switches and buzzers • Know a cell is a single unit, and a battery is a collection of cells • Know how to test a circuit using a bulb. • Switches open and close circuits. When a switch is open the bulb/lamp will not light up as the series circuit is incomplete. • Wires are made from metals as they are good conductors of electricity e.g. iron, copper and steel • Insulators are materials that do not allow electricity to pass through them easily e.g., plastic, wood, rubber and glass. 	<ul style="list-style-type: none"> • Recognise circuit symbols in a simple circuit- identify the simple circuit used in a hand torch • Know electric current is measured in amperes, current is a flow of charge • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Investigate the brightness of a bulb if the voltage or the number of bulbs increased in a series circuit • 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
Earth & Space		<ul style="list-style-type: none"> • Name the planets of Our Solar System and understand Our place in Our universe, describe the Sun, Earth, Moon and other planets as approximately spherical bodies • Describe the movement of the Earth around the sun in the solar system (a full orbit is 365 days, the Earth spins on its axis every 24 hours) • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the day • Describe the movement of the moon relative to the Earth (lunar cycles take 28 days, the lunar cycle and eclipses) • Describe the movement of the other planets relative to the sun in the solar system (fixed orbits)
Rocks & Soil / Evolution & Inheritance	<p>Rocks & Soil:</p> <ul style="list-style-type: none"> • Name and describe 3 different kinds of rocks. • Group and compare different kinds of rocks on the basis of appearance and simple physical properties, basis of appearance and simple physical properties. • Describe how each rock type is formed within the rock cycle. • Understand different uses for selected rocks and how they change over time. • Explain simply how a fossil is formed. • Recognise that soils are made from rocks and organic matter, (living and dead) and be introduced to different soil types. 	<p>Evolution & Inheritance:</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.