Skills and Knowledge Progression for Science

Strand	Stage One	Stage Two	Stage Three	Stage Four	Stage Five	Stage Six	Stage Seven
Working Scientifically Planning	Ask questions based on exploration of the world around them. Respond to prompts by making some suggestions about how to find an answer.	Ask simple questions and recognise that they can be answered in different ways. Use simple secondary sources to find answers. Talk about similarities	Respond to suggestions of how to answer questions about the world around them and ask effective and relevant questions. Recognise when and how secondary sources should be used. Discuss the most appropriate type of scientific enquiry to use to answer questions. Recognise that questions can be answered in different ways	Raise own relevant questions and use different types of scientific enquiry to answer questions. Recognise when and how secondary sources should be used. Make decisions about the most appropriate type of scientific enquiry to answer questions. Recognise and identify the factors needed to make a test 'fair'. Identify the factors in a simple 'fair' test that we will measure (variables) and keep the same (control).	Explore ideas and raise a range of relevant questions. Recognise which secondary sources are most useful and begin to recognise the difference between fact and opinion. Select and plan the most appropriate type of scientific enquiry for answering a scientific question. Decide which variables to measure change and keep the same. Demonstrate how to change one factor (variable) whilst keeping others the same (control). Identify and use an appropriate unit to measure variables effectively.	Explore ideas and raise a range of different kinds of relevant questions based on accurate scientific principles. Recognise and use the secondary sources that are most useful separating opinion from fact. Select and plan accurately the most appropriate type of scientific enquiry for answering scientific questions. Decide which variables to measure change and keep the same. Demonstrate how to change one factor (variable) whilst keeping others the same (control). Identify and use an appropriate unit to measure variables effectively	Scientific ideas. Explain how to construct a complex test. Plan different types of enquiries to answer questions and put measures in place to ensure accuracy and reliability. Select the most suitable variables to be investigated. Identify some variables that cannot be controlled or explain. Recognise some situations in which a fair test cannot be carried out.
Working Scientifically Observation & Recording	Respond to prompts by making some suggestions about how to make an observation. Use senses and simple equipment to make observations. Talk about what	Carry out instructions for a simple investigation. Talk about and record what is seen and observed Take accurate measurements using simple equipment, **e.g. cm and scales with one interval.**	Describe what happens when taking part in simple investigations/fair tests. Begin to make decisions about what to observe, how long to observe for? Read simple scales and take accurate measurements using standard units, **e.g.**	Recognise when to set up simple practical enquires, comparative and fair tests. Make decisions about what to observe, how long to observe for, and the type of equipment needed. Make systematic and accurate	Recognise when and how to set up comparative and fair tests and begin to explain which variables need to be controlled and why. Make decisions about what to observe, what measurements to use and how long to measure them for.	Recognise when and how to set up comparative and fair tests and clearly explain which variables need to be controlled and why. Make independent and well-founded decisions about what to observe, what measurements to use and how long to measure them for.	Recognise when and how to set up comparative and fair tests and clearly explain which variables need to be controlled and why. Record observations and measurements systematically. Choose the most efficient units of

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	happens and record using words and pictures Begin to record data in simple templates.	Begin to identify and classify data and information. Record data using simple charts, tables and block graphs.	**Thermometers, graduated beakers and data loggers.** Talk about criteria for grouping, sorting and classifying, use simple keys. Record data using a range of charts, tables and block graphs and labelled diagrams.	observations and measurements. Use a range of measuring equipment appropriately including thermometers, data loggers etc. Gather, record, classify and present data in a variety of ways to help answer questions. Use and construct increasingly complex tables, line graphs and keys to record findings.	Choose appropriate equipment to make measurements, using standard units of measure and simple scales accurately and with precision. Gather, record, classify and present a range of data in different ways. Record data and results using scientific diagrams and labels, classification keys, tables, and bar and line graphs	Choose the most appropriate equipment (with a variety of intervals and units) to make measurements and explain how to use accurately and with precision. Gather, record, classify and present data in a wide range of ways. Use a wide range of methods to record data including line graphs, scientific diagrams, classification keys, scatter, bar and line graphs etc.	measurement and convert as and when appropriate. Present comparative data in a range of formats including, pie charts, line graphs and scatter grams etc. Label diagrams using appropriate scientific symbols, **e.g. circuit diagrams in parallel.**
Working Scientifically Conclusions	Begin to use simple features to compare objects, materials and living things. Identify what has changed when observing objects, living things or events. Talk in simple terms about what might happen based own experiences.	Talk about describe and sort simple similarities and differences, noting patterns and relationships. Record and communicate findings in a range of ways using simple scientific language. Talk about what has been found out and how it was discovered. Talk in simple scientific terms about what might happen and why? (prediction)	Begin to look for patterns and decide what data to collect to identify them. Talk about data collected from observations and measurements,using drawings, labelled diagrams, notes, simple tables and keys, standard units and simple equipment including data loggers. Begin to draw and express some conclusions, by looking at changes, patterns, similarities and differences in data. Begin to identify new questions arising from data, make new predictions for	Look for patterns and decide on the range of data needed to identify them. Collect data from observations and measurements, using notes, simple tables and standard units, using drawings, labelled diagrams, keys, bar charts and tables. Identify changes, patterns, similarities and differences in data in order to draw conclusions. Suggest improvements and identify new questions arising from data, make new predictions for new values within or	Decide how to record data from a choice of familiar approaches. Use relevant scientific language to communicate findings and justify scientific ideas. Look for different relationships in data and begin to identify evidence that refutes or supports ideas. Make practical suggestions about how working methods could be improved. Use results to identify when further tests and observations might be needed. Make general statements such as:	Decide in detail how to record data accurately from a choice of familiar approaches. Use relevant scientific language and illustrations to discuss, communicate and justify findings and scientific ideas. Look for a range of different relationships in data and begin to identify evidence that refutes or supports ideas. Identify when tests need to be repeated in order to attain reliable results. Use test results to make predictions and set up further comparative and fair tests.	Use quantitative and qualitative data to support conclusions. Use scientific knowledge and understanding to challenge the conclusions of others. Identify a range of scientific evidence that has been used to support or refute ideas or arguments. Identify when tests need to be repeated in order to attain reliable results. Use test results to make predictions, supported by relevant and accurate evidence

			new values within or beyond the data collected.	beyond the data collected. Report on findings from enquires including oral and written explanations.	'the hotter the water, the faster the sugar dissolves'	Make increasingly measured general statements such as: 'As the temperature increases the mass of the sugar which can be dissolved increases.'	to set up further comparative and fair tests.
Plants **Key Questions** *S1- What is a plant?* *S2- What do plants need to grow?* *S3- How do plants function?* *S4- Are all plants the same?* *S5- What do we know about plant life cycles?* *S6 - What do we know about the features and functions of plants?*	Use senses to explore and talk about plants. Describe what a plant looks like. Identify, name and describe the basic structure of common plants, including garden plants and trees, both deciduous and evergreen.	Observe and describe how seeds and bulbs grow into mature plants. Identify and describe the basic structure of a flowering plant including roots, stem/trunk, leaves and flowers. Find out about and describe what plants need to grow and stay healthy, including, water, light and temperature.	Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Identify and describe the functions of different parts of flowering plants, including roots, stem/trunk, leaves and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how these vary from plant to plant and the way in which water is transported in plants.		Describe using scientific vocabulary the key functions of a plant, including reproduction.	Describe the features and function of the stigma, root and leaf.	Describe using accurate scientific vocabulary the features of a plant, such as the function of a stamen. Describe and explain the main functions of a plant and its organs. Describe the process of photosynthesis.
Animals, including Humans **Key Question** *S1 – Are all animals the same?* *S2 – How do animals live and grow?*	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Identify, name and describe a variety	Name and talk about the young of humans and other animals. . Find out about and describe the basic needs of animals including humans for	Identify and describe simple features of human and other animal skeletons, and how muscles are used for support, protection and movement. Identify that animals including humans need the right types and	Describe the simple functions of the human digestive system in humans. Identify the different types of teeth in humans and their simple functions.	Describe the changes that take place as humans develop from birth to old age. Learn about the changes that take place during puberty. Draw a timeline to indicate stages in the	Describe scientifically the function of the main organs in the body, including muscles, the skeleton and their main functions. Use scientific terms to describe the key features	Explain how and why our muscles use oxygen. Explain in detail the impact of diet, exercise, drugs and lifestyle on the way the body functions.

S3- What do animals need to be healthy? *S4 – 'What's inside my body?* *S5 – How do my organs work?* *S6 – How do animals live and grow?*	of common animals including fish, amphibians, reptiles, birds and mammals, carnivores, herbivores and omnivores. Describe and compare the structure of common animals such as birds, fish, reptiles and pets.	survival (water, food and air). Describe the importance for humans of exercise, a balanced diet and hygiene, including how to look after teeth.	amount of nutrition and that they cannot make their own food, that they need nutrition from what they eat.		growth and development of humans.	of a healthy diet, including main food groups. Identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the functions of the body. Describe the ways in which nutrients and water are transported within animals, including humans.	Name all the main food groups and explain how they are used by the body.
Life Processes Key Questions *S1-What do living things need to survive?* *S2-What is the difference between living and non-living?* *S3- What do all living things do?* *S4- What causes disease?* *S5- What are the effects of Disease?* *S6- Do all plants and animals share the same life processes?*		Explore and compare the differences between things that are living, dead and things that have never been alive.	Describe the basic conditions that plants and animals need in order to survive.		Describe the life process of reproduction in some plants and animals. Use scientific vocabulary to describe life processes, **e.g. respiration in animals, pollination in flowering plants etc.**	Recognise that micro-organisms feed, grow and reproduce like other organisms. Recognise and suggest ways of preventing the spread of harmful micro-organisms. Identify an increasing range of features of living and non-living things in detail.	Use scientific vocabulary to discuss and explore relationships between related processes, **e.g. pollution and fertilisation.** Describe how micro-organisms move between food sources and how this causes food poisoning. Explain how and why feeding, growing and reproduction are essential for micro-organisms.
All Living Things Key Question *S1- What is similar a group of animals or plants?*	Identify and talk about a range of common animals.	Sort and group plants and animals according to simple features.	Identify ways in which an animal or plant is suited to its environment, for	Describe features of plants and animals and compare similarities and differences between sub-groups, recognising	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	Describe how living things are classified into broad groups according to common observable characteristics and based	Explain why different organisms, including micro-organisms are found in different habitats.

S2-What is the difference between a selection of animals or plants? *S3- What questions could you ask to sort a group of living animals/plants?* *S4-How could you sort a group of animals or plants?* *S5- How are groups of animals interdependent?* *S6-How have groups of animals changed over time?*	Talk about similarities between animals and plants and where some animals & plants are found. Talk about what animals eat.	Identify a range of similarities and differences between animals and plants including their habitats. Describe how habitats provide for the basic needs for different kinds of animals and plants Describe how animals obtain their food from plants and other animals – using the idea of a simple food chain.	example, a fish having fins to help it swim.	that all living things can be grouped in different ways. Explore and use classification keys to help to group, identify and name a variety of living things in the local and wider environment. Construct and interpret a variety of food chains, identifying producers, predators and prey. Recognise that environments can change and that this can pose dangers to living things.	Use keys based on external features to help identify and group living things systematically. Describe relationships using food chains, for example, predator and prey. Explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird.	on similarities and differences including micro-organisms, plants and animals. Give reasons for classification of plants and animals based on specific characteristics. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not be identical to their parents. Recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago. Identify and describe the environmental factors needed to support a given plant or animal. Identify how animals and plants adapt to suit their environment in different ways and that adaptation may lead to evolution.	Explain the purpose & importance of classification. Develop and use complex keys and food chains. Generate detailed life cycles for plants and animals. Describe the impact of changes to environmental factors [for example, the availability of light or water].
Earth and Space Key Question *S1- What's the difference between the winter and summer?* *S2- Where does this animal/ plant live?*	Name the four seasons and describe the changes that take place. Observe and describe the weather associated with the seasons.				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.		Identify the links between organisms, their habitats and environmental factors. Link adaptations to the changes in an organism's environment and

S3- How do we get day and night? *S4-Why does the shape of the moon change?* *S5- What's in our Solar system?* *S6-How are organisms, habitats and environmental factors linked?*					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.		know that adaptation leads to evolution. Represent feeding relationships as food chains and webs including primary, secondary and tertiary consumers.
Everyday Materials **Key Question** *S1 How could you describe this material?* *S2 How would you sort these materials?* *S3- Where do you find rocks?* *S4- What could this material be used for?* *S5- What material would keep something warm?* *S6 – Why is this material good for…?*	Distinguish between an object and the material from which it is made. Identify, group, compare and name some everyday materials. Use senses to explore a wide range of materials including their physical properties. .	Identify and name a variety of everyday materials, including wood, plastics, glass, metal, water and rock. Describe the physical properties of a range of everyday materials. Identify and compare the suitability of a range of everyday materials based on simple physical properties**, e.g. smooth, soft, hard…** Talk about what common materials are used for, **e.g. glass for windows**.	Compare and group different kinds of rocks based on appearance and simple physical properties. Recognise that soils are made from rocks and organic matter. Describe in simple terms how fossils are formed when things that have lived are trapped within rock.	Compare and group materials together, according to whether they are solids, liquids or gases.	Identify and give reasons why materials are used for a specific task or purpose. Compare and group everyday materials based on evidence from comparative and fair tests, based on hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.		Describe in detail properties of metals, e.g. electrical conductivity. Use my growing knowledge to compare the similarities and differences between a wide range of materials and their properties, including metals and other solids. Give reasons for the magnetic behaviour of a range of materials.

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Changing Materials **Key Question** *S1-What happens when I squash, roll stretch this material?* *S2- How can I separate a simple solids mixture?* *S3- What happens when I warm this material in warm water?* *S4- What are reversible changes and irreversible changes?* *S5-How does temperature change water and other materials?(states of matter)* *S6-How has this material, mixture, solution solution been changed?*	Name some familiar solids and liquids.	Name and describe some simple solids and liquids. Find out how the shapes of solid objects made from some materials can be changed, **e.g.bending, twisiting and stretching. melting, freezing and forces etc**		Observe that some materials change state when heated or cooled and that some can be reversed, **e.g. freezing water** and that some are irreversible, **e.g. baking clay.** Measure or research the temperature at which materials change state when heated or cooled. Describe the difference between solids and liquids. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Demonstrate that dissolving, mixing and changes of state are reversible changes. 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. 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 vinegar (acid) on bicarbonate of soda. Describe in detail the properties of liquids, solids and gases. Describe evaporation and condensation in the water cycle making the link between the rates of		Identify and describe a range of contexts in which change takes place, **e.g. evaporation and condensation.** Describe, and give reasons for the differences between solids, liquids and gases. Describe in detail, processes such as separation, filtration, mixtures and solutions. Describe the way in which the arrangement of molecules is affected by the change of state.

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					evaporation with temperature. Use developing knowledge of solids, liquids and gases to describe how mixtures might be separated, including through filtering, sieving and evaporating.		
Light and Sound **Key Question** *S1- Where do light /sounds come from?* *S2- What are the differences between light and dark?* *S2 - How are sounds made?* *S3- How is a shadow formed?* *S4- Why does a shadow length change?* *S4- How does distance affect light or sound?* *S5 - How does light /sound travel.* *S5- Why can I hear sounds?*			Recognise that light is needed to see things and that dark is the absence of light. Recognise that shadows are formed when light from a light source is blocked by a solid object. Notice that light is reflected from surfaces. Recognise that light from the sun is dangerous and that there are ways to protect the eyes. Describe what happens to a light source in the dark. Find patterns that determine the size of shadows. Describe the way in which light is reflected from surfaces. Describe in simple terms how light travels and what happens.	Talk about how sound travels. Use the term vibration, when describing sounds and recognise that vibrations from sounds travel through a medium to the ear. Recognise that sounds get fainter as the distance from the sound source increases. Describe in detail how sound travels and how it can be changed. 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.		Use the terms transparent & opaque when describing light. Use scientific terms to describe shadows, including the way in which they are formed and can be altered. Recognise and explain how light appears to travel in straight lines. Use the idea that light travels in straight lines to explain why shadows have the same shape as the object that casts them. Use knowledge of how light travels to explain the formation of shadows. Use the idea that light travels in straight lines to explain that objects can be seen because they give out or reflect light into the eye. Explain that things are seen because light travels from light sources to our eyes or from light sources	Use knowledge of how light travels to predict the size of a shadow when the position of the light source changes. Explain the concept of reflection and explain how a non-luminous object can be seen. Use my knowledge of materials and the way in which sound travels to explain

						to objects and then to our eyes.	
Electricity **Key Question** *S1- How can I light a bulb/make a circuit?* *S2-How can I turn a bulb on and off?* *S3- How can I make this component work better?* *S4- Why doesn't this circuit in series work?* *S5- Which material would make the best switch?* *S6- How does this circuit (series and parallel) work?*				Describe why a bulb won't light and identify the problem within the circuit. Construct and record a simple series circuit, and name its basic parts, including cells, wires, bulbs, switches and buzzers. Know that a bulb lights up when there is an effective conducting material in the circuit and is part of a complete circuit. Describe what happens when making and breaking a circuit, recognise that a switch opens and closes a circuit and link to the lighting of a bulb. Identify common appliances that run on electricity. Recognise common conductors and insulators and associate metals with being good conductors.		Understand the necessary precautions for working safely with electricity. Explain scientifically what happens if you change the number of bulbs. Record and construct a series electrical circuit, identifying and naming its basic parts. Identify whether or not a bulb will light in a simple series circuit based on whether or not the bulb is part of a complete loop with a battery. Explain how to/what happens when you connect more than 1 battery. Record and construct a series electrical circuit, identifying and naming its basic parts. Explain the link between the brightness of a bulb or volume of a buzzer with the number and voltage of cells used in the circuit.	Draw a complex circuit using standard scientific symbols. Explain and use the term resistance correctly. Talk about what happens when connecting components in circuits. Use an effective model to explain electrical flow.

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				Recognise that batteries are a source of electricity. Make circuits with more one than 1 bulb. Explain simply how the number of batteries affects the amount of electricity. Talk about the effect of making or breaking contacts in a 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. Use recognised symbols when representing a simple circuit diagram. Identify whether or not a bulb will light in a simple series circuit based on whether or not the bulb is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and the impact on a bulb within a series circuit.	
Forces & Magnets **Key Question** *S1-How do things move?* *S2-What makes things move?* *S3- What is a force?* *S4- Why do magnets move each other?* *S5- How can I measure the size of a force?* *S6-*			Compare how things move on different surfaces. Identify the effects of friction acting between moving surfaces. Observe how magnets attract or repel each other and attract some materials and not others. Describe magnets as having two poles. Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance.		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. Recognise that weight is a force and is measured in Newtons find out about Scientists such as Isaac Newton. Use a Force meter accurately.		Draw a diagram to show the size and direction of forces acting on an object. Use a force meter, with a range of scales to weigh objects accurately.

			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. Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.		Recognise that when an object is at rest the forces are balanced. Recognise that unsupported objects fall to Earth because of the force of gravity acting between the earth and the falling object.		