WHITCHURCH COMBINED SCHOOL

Science Knowledge and Skills Progression Map

Our aim is to incorporate the key skills into the teaching of the national curriculum objectives. These skills should not be taught in isolation but should be a continuous focus on how we approach, observe, perform, collect, analyse and conclude learning surrounding the key knowledge objectives.

Year	Working Scientifically (Key Skills)	Curriculum Objectives (Knowledge)		
		Biology	Chemistry	Physics
EYFS	**Personal, Social and Emotional Development** **ELG: Speaking** Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate. **ELG: Managing Self** Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. **Understanding the World** **ELG: People, Culture and Communities** Describe the immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps. **ELG: The Natural World** 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. **Characteristics of effective learning** Playing and exploring - children investigate and experience things, and 'have a go'. Active learning - children concentrate and keep on trying if they encounter difficulties, and enjoy achievements. Creating and thinking critically - children have and develop their own ideas, make links between ideas, and develop strategies for doing things. **Characteristics to support future science:** Reach for and accept objects. Make choices and explore different resources and materials. Bring their own interests and fascinations into early years settings. Respond to new experiences that is brought to their attention.			

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		Physics	Chemistry		Biology	
1	• ask simple questions about a topic that they are learning about • Observe what they can see closely, using simple equipment • perform simple tests that have been modelled first by an adult. • identify what they are observing and classify where appropriate. • use their observations and ideas to suggest answers to questions with adult to model examples.	**Seasonal changes** Pupils should be taught to: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	**Everyday materials** Pupils should be taught to: • 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	**Recycling** Pupils should be taught to: • identify and name a variety of recyclable materials, glass, metal, paper, cardboard, plastic, fabric and food waste • recognise that materials need to be recycled in order to protect the environment	**Animals, incl. humans** Pupils should be taught to: • 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	**Plants** Pupils should be taught to: • 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

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2	• ask simple questions and recognise that they can be answered in different ways • observe closely, using simple equipment in order to find questions that have been discussed as a class. • perform simple tests as part of a group. Taking care to follow the method that they have been given carefully. • identify what they are observing and classify where appropriate. • use their observations and ideas to suggest answers to questions. Know that this is called a conclusion and begin to share verbally using scientific vocabulary that they have been taught. • gather and record data to help in answering questions. Record in a table that has been provided for them.	**Uses of everyday materials** Pupils should be taught 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 • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	**Oceans and plastics** Pupils should be taught to: • notice that plastic is polluting the ocean causing harm to the environment and living things • identify and understand different ways of reducing plastic waste link to knowledge of recycling	**Living things and their habitats** Pupils should be taught to: • 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 microhabitats • 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	**Animals, incl. humans** Pupils should be taught to: • notice that animals, including humans, have offspring which grow into adults • 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	**Plants** Pupils should be taught to: • 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

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3	• Ask questions about a topic introduced to them. • Choose from investigation questions that a teacher has modelled creating from their initial ideas. • Understand that for a fair test they need to change one thing and keep the other variables the same. • To be able to explain what they are changing and what they are keeping the same. • To draw a diagram to show what they plan to do, using a ruler, with labels and the correct scientific vocabulary. • To be able to identify what they are measuring, how they will measure it and the unit of measurement. • Use standard units of measurement accurately and record results in a table. • Write or explain verbally a conclusion that explains what they have found out in answer to their question. Use appropriate	**Forces and magnets** Pupils should be taught to: • compare how things move on different surfaces • notice that some forces need contact between 2 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 2 poles • predict whether 2 magnets will attract or repel each other,	**Light** Pupils should be taught to: • 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	**Rocks** Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	**Animals, incl. humans** Pupils should be taught 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 • identify that humans and some other animals have skeletons and muscles for support, protection and movement	**Plants** Pupils should be taught to: • identify and describe the functions of different parts of flowering plants: 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 they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants,	**Deforestation** Pupils should be taught to: • identify and describe the important functions of rainforests • explore the impact of deforestation

	scientific language correctly. • Evaluate the success of their investigation and suggest improvements. This can be written or verbal.	depending on which poles are facing				including pollination, seed formation and seed dispersal	

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4	• Ask questions about a topic introduced to them. • Come up with their own investigation questions with support from an adult. • Understand that for a fair test they need to change one thing and keep the other variables the same. • To be able to explain what they are changing and what they are keeping the same. To begin to show this in more formal written methods e.g. a labelled diagram or a written method. • To know that it is often important to test each change more than once to check their results. • To independently draw a diagram to show what they plan to do, using a ruler, with labels and the correct scientific vocabulary. • To be able to identify what they are measuring, how they will measure it and the unit of measurement. Likewise what they plan to observe and how they will	**Electricity** Pupils should be taught to: • identify common appliances that run on electricity • 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	**Sound** Pupils should be taught to: • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear	**States of matter** Pupils should be taught to: • 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	**River pollution** Pupils should be taught to: • recognise the effects of pollution on rivers • identify ways to keep rivers clean	**Animals, incl. humans** Pupils should be taught to: • 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	**Living things and their habitats** Pupils should be taught to: • 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

	record it if this is more appropriate. • Use standard units of measurement accurately and record results in a table. To make systematic and careful observations. • Write a conclusion that explains what they have found out in answer to their question. Use appropriate scientific language correctly. • Present their findings to the rest of the class. Make reference to their results and use scientific language. Answer questions. • Where appropriate begin to present results in graph form. This could be bar charts, line graph, pictogram etc. This will be first modelled by the teacher. • Evaluate the success of their investigation and suggest improvements.	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		associate the rate of evaporation with temperature			

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5	• As part of a group, develop their own questions about a topic that is being studied in class. Adult support to refine question if needed. • To independently identify what the variables are, which they need to change and which will need to be kept the same in order to answer their question. • To know that a test must often be repeated in order to get accurate results. • To record a written hypothesis to explain what they think the result of their investigation will be and why they think that. • To plan their investigation with the support of their peers, sharing ideas, compromising and learning from each other. • To create a more formal written plan. This can include a method written as a numbered set of instructions and a diagram with labels. Both would include appropriate scientific language. These do not both need to be completed for	**Forces** Pupils should be taught to: • 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	**Earth and space** Pupils should be taught to: • 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	**Properties and changes of materials** Pupils should be taught to: • 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	**Energy creation** Pupils should be taught to: • to explore and understand different types of energy including fossil fuels and renewable energy • compare the advantages and disadvantages of different energy sources	**Animals, incl. humans** Pupils should be taught to: • describe the changes as humans develop to old age	**Living things and their habitats** Pupils should be taught to: • 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

	each investigation – teacher to guide on most appropriate. • take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • Record their results, initially as a table but then, with adult modelling, presented in the form of scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • To be able to explain verbally what they can understand from these graphs. • To present their conclusion in a variety of forms – written, verbal, presentation to the class – both poster and digital (e.g. PowerPoint) • Evaluate the success of their investigation and suggest improvements. • using test results to make predictions to set up further comparative and fair tests			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			

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6	• As part of a group, develop their own questions about a topic that is being studied in class. • To independently identify what the variables are, which they need to change and which will need to be kept the same in order to answer their question. • To know that a test must often be repeated in order to get accurate results. • To record a written hypothesis to explain what they think the result of their investigation will be and why they think that. • To plan their investigation with the support of their peers, sharing ideas, compromising and learning from each other. • To create a formal written plan. This can include a method written as a numbered set of instructions and a diagram with labels. Both would include appropriate scientific language. These do not both need to be completed for each investigation – teacher	**Electricity** Pupils should be taught to: • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram	**Light** Pupils should be taught to: • 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	**Climate change** Pupils should be taught to: • recognise factors contributing to climate change including energy creation and deforestation • explore and understand carbon footprints	**Evolution and inheritance** Pupils should be taught to: • 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	**Animals incl. humans** Pupils should be taught to: • 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	**Living things and their habitats** Pupils should be taught to: • 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

	to guide on most appropriate. • take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • Record their results, initially as a table but then presented in the form of scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • To be able to explain verbally and in writing what they can understand from these graphs. • To present their conclusion in a variety of forms – written, verbal, presentation to the class – both poster and digital (e.g. PowerPoint) • Evaluate the success of their investigation and suggest improvements. • using test results to make predictions to set up further comparative and fair tests • identify scientific evidence that has been used to support or refute ideas or arguments				different ways and that adaptation may lead to evolution		