

# Substantive Knowledge Progression Map: Science

Biology - Plants						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To make simple observations about plants and explain why some things occur	To name some common plants	To describe how seeds and bulbs grow into mature plants	To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers			
	To identify and describe the basic structure of a variety of common flowering plants, including trees	To describe how plants needs water, light and suitable temperature to grow healthy and strong	To describe the requirements of plants for life and growth and how they vary from plant to plant.			
	To describe the basic structure of flowering plants, including deciduous and evergreen		To describe the way in which water is transports within plants.			
			To know the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			
plants flowers grow	stem trunk petal leaf branch deciduous evergreen	blossom seed bulb soil nutrients root growth	photosynthesis pollen pollination dispersal reproduce germination carpel stamen			

# Substantive Knowledge Progression Map: Science

Biology - Animals including humans						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To describe changes in their bodies after exercise, such as heart beating faster	To identify a variety of common animals, including: fish, amphibians, reptiles, birds and mammals	To know animals including humans, have offspring which grow into adults.	To identify the right types and amount of nutrition human and animal's needs.	To describe the simple functions of the basic parts of a human digestive system.	To describe the changes as humans develop from birth to old age.	To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
To understand the importance of hand washing	To identify a variety of common animals that are carnivores, herbivores and omnivores.	To describe the basic needs of animals, including humans, for survival (water, food and air)	To explain that most animals (including humans) have skeletons muscles for support, protection and movement.	To identify the functions of different human teeth.	To describe the life cycle of humans and other animals	To identify the main parts of the human circulatory system and describe the function of the heart, blood vessels and blood.
	To describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds, mammals)	To describe the importance of exercise, eating the correct amount of different types of food, hygiene.		To construct and interpret a variety of food chains (identifying the producers, predators and prey).	To describe the life cycle of plants	To describe they ways in which nutrients and water are transported within animals, including humans.
To respond to the human senses e.g. sights, sounds and smells in the environment.	To label the body parts of a human body and say which part of the body is associated with each sense.					
head body eyes ears mouth teeth leg	amphibian mammal omnivore carnivore herbivore  senses wings claw tail scale feather	offspring nutrition reproduce nutrition carbohydrate protein vitamin	skeleton muscle spine joint vertebrate invertebrate hydrostatic exoskeleton endoskeleton	digestion oesophagus pancreas organ intestine molars canine incisors	puberty gestation reproduction embryo teenager hormones	capillary artery vein ventricle chamber circulation vessel cell

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Biology - Living Things						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To identify similarities and differences between themselves and others, and among families, communities and traditions.		To describe differences between things that are living, dead and things that have never been alive		To recognise that living things can be grouped in a variety of ways.	To describe the differences in the lifecycles of a mammal, an amphibian, an insect and a bird.	To describe how living things are classified into broad groups according to common characteristics and based on similarities and differences, including micro - organisms, plants and animals.
They can talk about their environment.		To identify that most living things live in habitats to which they are suited		To group, identify and name a variety of living things in their local environment.	To describe the life processes of reproduction in some plants and animals.	To give reasons for classifying plants and animals based on specific characteristics
		To identify and name a variety of plants and animals in their habitats, including microhabitats.		To recognise that environments can change and that this can sometimes pose dangers to living things.		
		To describe how animals obtain their food from plants and other animals using a simple food chain.				
environment tradition community		habitat rainforest desert species pond indigenous		classification arthropod amphibian deforestation industrial waste pollution	reproduction naturalist pollination behaviourist cutting fertilise metamorphosis	species fungi bacteria algae organism virus organism micro-organism

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Biology - Evolution and Inheritance						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
						To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
						To identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
						To recognise that living things have changed over times and fossils provide information about living things that inhabited the Earth millions of years ago.
						adaptation evolution inheritance palaeontologist genotype fossil
Physics – Materials and their properties						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To introduce and encourage children to use the vocabulary of manipulation e.g. squeeze and prod	To distinguish between an object and the material from which it is made.	To identify the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and			To use understanding of material's properties to compare uses, including hardness, solubility, transparency,	

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		cardboard for particular uses.			conductivity and response to magnets	
To talk about why things happen and how things work.	To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.	To discover how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching			To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution	
To notice changes in properties as they are transformed through becoming wet, dry, flaky or fixed.	To describe the simple physical properties of a variety of everyday materials.				To use knowledge of solids, liquids gases to decide how mixtures might be separated, including through filtering, sieving and evaporating	
To show an interest in technological toys with knobs or pulleys, or real objects such as cameras or mobile phones	To compare everyday materials based on their simple physical characteristics.				To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals wood and plastic	
					To know that dissolving, mixing and changes of state are reversible changes	
					To know that some changes result in the formation of new materials and 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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Wet, dry, shiny, dull, bendy, stiff, squashy, hard/soft, lumpy, wrinkly. Smooth, rough, push, pull, twist, stretch, turn, open, lift, squeeze, pinch, flick, tap	plastic stretch stiff metal liquid solid	stretching squashing bending twisting John Dunlop Charles Macintosh			dissolve solubility filtering melting separating thermal	
Chemistry - States of Matter						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				To know the difference between solids, liquids or gases		
				To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius		
				To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.		
				solid liquid gas condensation evaporate		

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Biology - Rocks and Soils						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			To use descriptive language to compare different kinds of rocks on the basis of their appearance and simple physical properties			
			To name different types of rocks and how they are formed.			
			To describe in simple terms how fossils are formed when things that have lived are trapped within a rock.			
			To recognise that soils are made from rocks and organic matter.			
			sedimentary metamorphic igneous crystals fossil permeable impermeable			
Biology - Seasonal Changes						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
To show concern and care for the environment.	To know how the four seasons are different					
To notice changes and differences in the environment.	To observe and describe weather associated with the living the seasons					

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To develop an understanding of decay and changing over time.	To know that day length changes through the seasons					
snow wind sun rain	autumn winter spring summer heat symbol shadow					
Physics - Earth and Space						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					To describe the movement of the Earth and other planets, relative to the sun in the solar system.	
					To describe the movement of the moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies.	
					To use Earth rotation to explain day and night due to the apparent movement of the sun across the sky.	
					solar system planet spherical crescent moon gibbous moon eclipse	



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Physics – Light						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			To recognise that they need light in order to see things and that dark is the absence of light.			To recognise that light travels in straight lines.
			To notice that light is reflected from surfaces.			To explain that objects are seen because they give out or reflect light into the eye.
			To recognise that light from the sun can be dangerous and there are ways to protect eyes.			To explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
			To recognise how shadows are formed.			To use the idea that light travels in straight lines to explain why shadows have the same shape as the object that casts them.
			To know that there are patterns in the way that shadows change throughout the day and seasons			
			reflection shadows opaque refraction convex concave			retina cornea iris pupil lens light wave

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Physics – Sound						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				To identify how sounds are made, associating some of them with something vibrating		
				To recognise that vibrations from sounds travel through a medium to the ear		
				To know that there are patterns relating pitch of a sounds		
				To know that there is a relationship between the volume of sounds and the strength of the vibrations that produced it		
				To recognise that sound gets fainter as the distance from the sound increases		
				pitch volume vibrating frequency hammer sound wave		
Physics - Electricity						
Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
				To identify common appliances that run on electricity.		To associate the brightness of a lamp or the volume of a buzzer with the number and

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						voltage of cells used in the circuit
				To construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.		To know why there are variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
				To identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.		To use recognised symbols when representing a simple circuit in a diagram.
				To recognise that a switch opens and closes a circuit.		
				To recognise common conductors and insulators.		
				circuit conductor insulator battery cells appliance		series circuits voltage generator turbine fuses socket

## Physics - Forces

Early Years	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
			To know that objects move differently on different surfaces		To explain how gravity acting between an object and the Earth makes an object fall	
			To notice that some forces need contact between two objects		To identify the effects of air resistance, water resistance and friction	

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			but magnetic forces can act at a distance		between moving surfaces	
			To know how magnets attract and repel		To recognise that some mechanism, including levers, pulleys and gears, allow a smaller force to have a greater effect	
			To identify magnetic materials.			
			To describe the poles of a magnet			
			force repel attract surface pole magnetism		friction gravity air resistance water resistance pulley lever	