

# Springdale First School

Imagine, Believe, Achieve

## Science – Substantive Knowledge Progression Map



Concepts	Three and four Year olds	Reception	Year 1	Year 2	Year 3	Year 4	Future Learning
<b>Plants</b>	<p>Plant seeds and care for growing plants</p> <p>Understand the key features of the life cycle of a plant.</p> <p>Begin to understand the need to respect and care for ...all living things.</p>	<p>Explore the natural world around them.</p> <p><b>Examples of how to support this:</b></p> <p>Provide children with frequent opportunities for outdoor play and exploration.</p> <p>Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences.</p> <p>Create opportunities to discuss how we care for the natural world around us.</p> <p>Offer opportunities to sing songs and join in with rhymes and poems about the natural world.</p> <p>After close observation, draw pictures of the natural world, including animals and plants.</p> <p>Describe what they see, hear and feel whilst outside.</p> <p><b>Examples of how to support this:</b></p> <p>Encourage focused observation of the natural world.</p> <p>Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.</p>	<p>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</p> <p>identify and describe the basic structure of a variety of common flowering plants, including trees</p>	<p>observe and describe how seeds and bulbs grow into mature plants</p> <p>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>(Link from Living Things and their Habitats concept)</p> <p>identify and name a variety of plants in their habitats, including microhabitats</p>	<p>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>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</p> <p>investigate the way in which water is transported within plants</p> <p>explore the part that flowers play in</p>	<p>(Link from Living Things and their Habitats concept)</p> <p>recognise that living things can be grouped in a variety of ways</p> <p>explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment (e.g. flowering and non-flowering plants)</p>	<p>(Link from Living Things and their Habitats concept)</p> <p><b>Year 5</b></p> <p>describe the life process of reproduction in some plants (e.g. sexual and asexual reproduction)</p> <p><b>Year 6</b></p> <p>describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including... plants...</p> <p>give reasons for classifying plants...based on specific characteristics</p> <p><b>KS3</b></p> <p>the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</p> <p>the adaptations of leaves for photosynthesis.</p>

		<p>Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in. Name and describe some plants and animals children are likely to see.</p> <p><b>Early Learning Goal:</b> 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.</p>			<p>the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>		<p>Transpiration of water</p>
<p><b>Living things and their habitats</b></p>	<p>Explore the natural world around them. Use all their senses in hands-on exploration of natural materials. Explore collections of materials with similar and/or different properties. Talk about what they see, using a wide vocabulary.</p>	<p>Explore the natural world around them. <b>Examples of how to support this:</b> Provide children with frequent opportunities for outdoor play and exploration. Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences. Create opportunities to discuss how we care for the natural world around us. Offer opportunities to sing songs and join in with rhymes and poems about the natural world. After close observation, draw pictures of the natural world, including animals and plants.  Describe what they see, hear and feel whilst outside. <b>Examples of how to support this:</b> Encourage focused observation of the natural world.</p>		<p>explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>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</p>		<p>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</p> <p>recognise that environments can change and that this can sometimes pose dangers to living things.</p>	<p><b>Year 5</b> describe the life process of reproduction in some plants (e.g. sexual and asexual reproduction)</p> <p><b>Year 6</b> describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including... plants... give reasons for classifying plants...based on specific characteristics</p>

	<p>Understand the key features of the life cycle of a plant and an animal.</p> <p>Begin to understand the need to respect and care for ...all living things.</p>	<p>Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.</p> <p>Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in.</p> <p>Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.</p> <p><b>Early Learning Goal:</b> Explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>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.</p>		<p>identify and name a variety of plants and animals in their habitats, including microhabitats</p> <p>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>			
<p><b>Animals including humans</b></p>	<p>Understand the key features of the life cycle of a plant and an animal.</p> <p>Begin to understand the need to respect and care for ...all living things.</p> <p>Continue developing</p>	<p>Explore the natural world around them.</p> <p><b>Examples of how to support this:</b></p> <p>Provide children with frequent opportunities for outdoor play and exploration.</p> <p>Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences.</p> <p>Create opportunities to discuss how we care for the natural world around us.</p> <p>Offer opportunities to sing songs and join in with rhymes and poems about the natural world.</p> <p>After close observation, draw pictures of the natural world, including animals and plants.</p>	<p>identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</p> <p>identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>describe and compare the</p>	<p>notice that animals, including humans, have offspring which grow into adults</p> <p>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>describe the importance for humans of exercise, eating the right amounts of different types</p>	<p>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</p> <p>identify that humans and some other animals have skeletons and</p>	<p>describe the simple functions of the basic parts of the digestive system in humans</p> <p>identify the different types of teeth in humans and their simple functions</p> <p>construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	<p><b>Year 5</b></p> <p>Describe the changes as humans develop to old age</p> <p><b>Year 6</b></p> <p>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p>

	<p>positive attitudes about the differences between people.</p>	<p>Describe what they see, hear and feel whilst outside.  <b>Examples of how to support this:</b>  Encourage focused observation of the natural world.  Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.  Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in.  Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.</p> <p><b>Early Learning Goal:</b> 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.</p>	<p>structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</p> <p>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>	<p>of food, and hygiene.</p>	<p>muscles for support, protection and movement.</p>		<p>describe the ways in which nutrients and water are transported within animals, including humans.</p>
<p><b>Materials and matter</b></p>	<p>Use all their senses in hands on exploration of natural materials  Explore collections of materials with similar and / or</p>	<p>Explore the natural world around them.  <b>Examples of how to support this:</b>  Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water.</p> <p>Describe what they see, hear and feel whilst outside.  <b>Examples of how to support this:</b></p>	<p><b>Everyday Materials</b>  distinguish between an object and the material from which it is made  identify and name a variety of everyday materials, including wood,</p>	<p><b>Uses of everyday materials</b>  identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and</p>	<p><b>Rocks</b>  compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p>	<p><b>States of matter</b>  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</p>	<p><b>Year 5:</b>  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</p>

	<p>different properties. Talk about what they see, using a wide vocabulary. Explore and talk about different forces they can feel. Talk about the differences between different materials and changes they notice.</p>	<p>Encourage focused observation of the natural world. Listen to children describing and commenting on things they have seen whilst outside...</p> <p><b>Early Learning Goals</b>          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.</p>	<p>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>	<p>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.</p>	<p>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.</p> <p>(Link from key concept Forces)          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.</p>	<p>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>	<p>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> <p><b>Year 6</b>          recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</p>
<p><b>Seasons</b></p>	<p>Talk about what they see, using a wide vocabulary.</p>	<p>Understand the effect of changing seasons on the natural world around them  <b>Examples of how to support this:</b></p>	<p><b>Seasonal Changes</b>          observe changes across the four seasons</p>				<p><b>Year 5</b>          describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p>

	<p>Guide children’s understanding by draw children’s attention to the weather and seasonal features. Provide opportunities for children to note and record the weather. Select texts to share with the children about the changing seasons. Throughout the year, take children outside to observe the natural world and encourage children to observe how animals behave differently as the seasons change. Look for children incorporating their understanding of the seasons and weather in their play.</p> <p><b>In Reception Year:</b> Explore the natural world around them.</p> <p><b>Examples of how to support this:</b> Provide children with frequent opportunities for outdoor play and exploration. Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences. Offer opportunities to sing songs and join in with rhymes and poems about the natural world. After close observation, draw pictures of the natural world, including animals and plants. Observe and interact with natural processes, such as ice melting...</p> <p><b>In Reception Year:</b> Describe what they see, hear and feel whilst outside.</p> <p><b>Examples of how to support this:</b> Encourage focused observation of the natural world. Listen to children describing and commenting on things they have seen whilst outside, including plants and animals. Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to</p>	<p>observe and describe weather associated with the seasons and how day length varies.</p>				<p>describe the movement of the Moon relative to the Earth</p> <p>describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.</p>
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		<p>themselves and the environment within which they are in. Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.</p> <p><b>In Reception Year:</b> Recognise some environments that are different from the one in which they live.</p> <p><b>Examples of how to support this:</b> Teach children about a range of contrasting environments within both their local and national region.</p> <p><b>Early Learning Goal:</b> Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>					
<p><b>Energy: Light and Sound</b></p>	<p>Talk about the differences between materials and changes they notice: Explore how you can shine light through some materials, but not others. Explore shadows.</p>	<p>Explore the natural world around them.</p> <p><b>Examples of how to support this:</b> Observe and interact with natural processes, such as... a sound causing a vibration, light travelling through transparent material, an object casting a shadow.</p>	<p><b>From Key concept: Seasons</b> Observe and describe weather associated with the seasons and how day length varies. It is not safe to look directly at the Sun, even when wearing dark glasses. Children will have a prior learning of light due to discussing changes in daylight hours.</p>		<p><b>Light</b> 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</p>	<p><b>Sound</b> 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</p>	<p><b>Year 5</b> 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 Know how simple optical instruments work, e.g. periscope, telescope,</p>

			<p><b>From Key concept: Materials</b> Describe the simple physical properties of a variety of everyday materials. (This will have included shiny, not shiny and is a building block to learning that light is reflected from surfaces).</p> <p><b>From Key concept: Animals including humans</b> Know that sight is a sense and we use eyes to see. Know that hearing is a sense and we use ears to hear.</p>		<p>the light from a light source is blocked by an opaque object find patterns in the way that the size of shadows change.</p>	<p>recognise that sounds get fainter as the distance from the sound source increases</p>	<p>binoculars, mirror, magnifying glass etc</p> <p><b>KS3</b> frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound sound needs a medium to travel, the speed of sound in air, in water, in solids sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal auditory range of humans and animals.</p>
<b>Forces</b>	<p>Explore how things work. Explore and talk about different forces they can feel.</p>	<p>Explore the natural world around them.</p> <p><b>Examples of how to support this:</b> Provide children with have frequent opportunities for outdoor play and exploration. Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences. Observe and interact with natural processes, such as ...a magnet attracting an object and a boat floating on water.</p>		<p><b>From Key Concept: Materials</b> <b>Uses of everyday materials</b> find out how the shapes of solid objects made from some materials can be changed by squashing,</p>	<p><b>Forces and Magnets</b> compare how things move on different surfaces notice that some forces need contact between two objects, but magnetic</p>		<p><b>Year 5</b> <b>Year 5</b> compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), <b>and response to magnets</b> explain that unsupported objects fall towards the</p>

		<p><b>Early Learning Goal</b> Understand some important processes and changes in the natural world around them</p>		<p>bending, twisting and stretching.</p>	<p>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.</p>		<p>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. <b>KS3</b> Magnetic fields by plotting with compass, representation by field lines. Earth's magnetism, compass and navigation. Forces as pushes or pulls, arising from the interaction between two objects. Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. Moment as the turning effect of a force. Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. Forces measured in Newtons, measurements of stretch or compression as force is changed.</p>
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<b>Electricity</b>	Explore how things work.	<p><b>From personal experiences:</b>          Know that some objects/devices need batteries to work.          Know that some devices use electricity and are plugged in at a socket.          Know that some electrical devices have a switch that can be turned on or off.</p> <p><b>From Eco-Schools enhancement:</b>          Know that we should not waste electricity.          Know that electricity has an effect on the environment.</p>	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 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.	<p><b>In Year 6:</b>          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.</p>
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