

## Science progression of knowledge- Biology (substantive knowledge)

Year Group	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Area of Study								
<b>Biology</b>  <b><u>Animals including humans</u></b>	<p>To explore and respond to different natural phenomena in their setting and on trips.</p> <p>To use all their senses in hands-on exploration of natural materials.</p> <p>To talk about what they see, using a wide vocabulary.</p> <p>To understand the key features of the life cycle of a plant and an animal.</p>	<p>To explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>To describe what they see, hear and feel whilst outside.</p>	<p>To identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals (including those that are kept as pets)</p> <p>To identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>To describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</p> <p>To 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>To notice that animals, including humans, have offspring which grow into adults</p> <p>To find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p>	<p>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</p> <p>To identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p>To describe the simple functions of the basic parts of the digestive system in humans</p> <p>To identify the different types of teeth in humans and their simple functions</p> <p>To construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p>To describe the changes as humans develop to old age</p> <p><i>Puberty - linked to RHE</i> <i>To know key facts about puberty and the changing adolescent body including physical and emotional changes</i></p> <p><i>To understand menstrual wellbeing including the key facts about the menstrual cycle</i></p>	<p>To identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>To describe the ways in which nutrients and water are transported within animals, including humans</p>
<b>Famous Scientists</b>	Rachel Carson (1907-1964)		George Mottershead (1894-1978)	Louis Pasteur (1822-1895)	Marie Curie (1867 -1934)	Carl Linnaeus (1707-1778)	Carl Linnaeus (1707-1778)	Marie Maynard Daly (1921-2003) William Harvey (1578-1657)
<b>Investigations</b>	<p>How do animals grow? Where do animals live in the winter? How do you keep your teeth healthy? What do you do to keep healthy physically? What food do you eat to be healthy?</p>		<p><b>Intermediate investigation</b> <b>Pattern seeking</b> Which animal is our favourite?</p>	<p><b>Modelled investigation</b> <b>Pattern seeking</b> Which fruit do we like the best?</p> <p><b>Intermediate investigation</b> <b>Pattern seeking</b> Which exercise does the class like the most?</p> <p><b>Independent</b> <b>Fair test?</b> Which habitat do woodlice like best?</p>	<p><b>Modelled investigation</b> <b>Pattern seeking</b> Which gender has the biggest hand span?</p> <p><b>Classifying</b> <b>Modelled investigation</b> Are the animals an invertebrate or a vertebrate?</p>	<p><b>Independent (GD)</b> <b>Modelled investigation</b> Fair Test Which liquid does the least damage to eggshells?</p>	<p><b>Intermediate investigation</b> <b>Pattern seeking</b> Do the tallest children jump the furthest?</p> <p><b>Independent Investigation</b> <b>Pattern seeking</b> How much sleep does the average child in KS2 get?</p>	<p><b>Intermediate investigation</b> <b>Pattern seeking</b> If we change the height of the person, how does it affect the capacity of the lungs?</p> <p><b>Independent Investigation</b> <b>Observation over time</b> Children to investigate how exercise changes their pulse rate.</p>
<b>Vocabulary</b>	Fox, rabbit, bat, badger, fur, legs, tail, wings, feathers, beak, big, small, alive, dead, living, head, eyes, nose, mouth, ears, hands, fingers, feet, toes, arms, legs, animal, nocturnal, human, five senses - touch, hear, taste, see, smell.		Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell	Adult, develop, life cycle, offspring, reproduce, young, dehydrate, diet, disease, exercise, hygiene, germs, heart rate, nutrition, pulse	Nutrients, healthy, energy, saturated fats, unsaturated fats, vertebrate, invertebrate, muscles, tendons, joints	oesophagus, stomach, small intestine, large intestine Carnivore, herbivore, omnivore rectum, producer, predator, prey	Fertilisation, prenatal, gestation, reproduce, asexual reproduction, sexual reproduction, life cycle, adolescence, puberty, menstruation, adulthood, life expectancy	Oxygenated blood, deoxygenated blood, blood vessels, heart, circulatory system, drug, alcohol, nutrients

<p><b>Misconceptions</b></p>	<p>All food is good for you. All animals are furry and have four legs. Animals live in the same habitat all year.</p>		<p>Plants, eggs and seeds are not living. A duck is a bird, therefore it is not an animal. Humans are not animals. A whale is a fish because it lives in the sea. All birds can fly.</p>	<p>The arrow in a food chain means 'eat'. We are not animals because we are people.</p>	<p>Earthworms are invertebrates so snakes must be too.</p>	<p>The arrow in a food chain means 'eat'. The digestive system comprises two separate tubes - one for faeces, the other for urine. When we eat food it stays in our body forever.</p>	<p>Humans have children to look after them in their old age.</p>	<p>Organs are not multi-coloured like in diagrams. The only time when my heart beats more quickly is when I exercise. The blood in our veins is blue. The heart lies at the left side of the chest.</p>
<p><b>Texts, rhymes and songs</b></p>	<ul style="list-style-type: none"> <li>• The Squirrel's Busy Year by Martin Jenkins</li> <li>• The Weaver by Quan Shi</li> <li>• The Growing Story by Ruth Krauss and Helen Oxenbury</li> <li>• Yucky Worms by Vivian French</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• The Tree by Neal Layton</li> <li>• A Butterfly is Patient By Dianna Hutts Aston And Silvia Long</li> <li>• The Bee Book by Charlotte Milner</li> </ul>		<ul style="list-style-type: none"> <li>• Monkey Puzzle by Julia Donaldson and Axel Scheffler</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• Look, Listen, Taste, Touch, and Smell by Pamela Nettleton</li> <li>• Curriculum Visions: Ourselves</li> <li>• Curriculum Visions: Giraffes</li> <li>• Curriculum Visions: Safari Life</li> <li>• Twinkl Animals all around</li> </ul>	<ul style="list-style-type: none"> <li>• Oliver's vegetables by Vivian French</li> <li>• Oliver's fruit Salad by Vivian French</li> <li>• Once There Were Giants by Martin Waddell and Penny Dale</li> </ul> <p><b>Non-Fiction</b></p>	<ul style="list-style-type: none"> <li>• Tiger, Tiger, Burning Bright! An Animal Poem for Every Day of the Year by Fiona Waters</li> <li>• Funny Bones by Allan Ahlberg</li> <li>• I Will Never Ever Eat a Tomato by Lauren Child</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• Moving and growing- (Dr Brian Knapp)</li> <li>• Muscles and movement- (Izzi Howell)</li> </ul>	<ul style="list-style-type: none"> <li>• Walliman and Ben Newman</li> <li>• Wolves by Emily Gravett</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• David Attenborough Little people, big dreams book by Isabel Vegara</li> <li>• Professor Astro Cat's Human Body Odyssey by Dominic</li> </ul>	<ul style="list-style-type: none"> <li>• Hair in Funny Places by Babette Cole</li> <li>• Mummy Laid an Egg by Babette Cole</li> <li>• Giant by Kate Scott</li> </ul> <p><b>Non-Fiction</b></p>	<ul style="list-style-type: none"> <li>• Pig heart Boy by Malorie Blackman</li> <li>• Skellig by David Almond</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• Great Scientists</li> <li>• The Visual Dictionary of the Human Body</li> <li>• Eyewitness Visual Dictionaries</li> <li>• The Human Bodies - Pathfinders</li> </ul>
<p><b><u>All living things and their habitats</u></b></p>	<p>To begin to understand the need to respect and care for the natural environment and all living things.</p> <p>To talk about what they see, using a wide vocabulary.</p>	<p>To explore the natural world around them, making observations and drawing pictures of animals and plants.</p> <p>To 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>To explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>To 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>To identify and name a variety of plants and animals in their habitats, including microhabitats</p> <p>To 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>To recognise that living things can be grouped in a variety of ways</p> <p>To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>To recognise that environments can change and that this can sometimes pose dangers to living things</p>	<p>To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>To describe the life process of reproduction in some plants and animals</p> <p>To name, locate and describe the functions of the main parts of plants, including involving those in reproduction and sexual reproduction in animals.</p>	<p>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</p> <p>To give reasons for classifying plants and animals based on specific characteristics</p>

<b>Famous Scientists</b>	Rachel Carson (1907-1964)		Rachel Carson (1907-1964)		Carl Linnaeus (1707-1778)	Eva Crane (1912-2007) David Attenborough (1926-)	Carl Linnaeus 1707- 1778) Libby Hyman (1888-1969)
<b>Investigation</b>	How do animals and humans grow and change over time? Order life cycle of humans, animals and plants. Walk outside in the different seasons and talk about what you can see. Explain why things happen.		<b>Independent investigation</b> <b>Fair test</b> Which habitats do woodlice like best?		<b>Independent investigation</b> <b>Pattern seeking</b> Which is the most popular minibeast in the school ground?  <b>Independent investigation</b> <b>Classifying</b> To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.	<b>Intermediate investigation</b> <b>observation over time</b> What do plants need to grow?  <b>Independent investigation</b> <b>Fair test</b> What effect the different conditions on a plant growth?	<b>Intermediate investigation</b> <b>Classifying</b> Classify plants and animals based on specific characteristics.
<b>Vocabulary</b>	Life cycle, pupa, caterpillar, cocoon, butterfly, frogspawn, tadpole, froglet, frog, egg, chick, hen, baby, toddler, child, adult, elderly		living, dead, habitat, microhabitat, depend, survive, life processes, never living, food chain, food sources, carnivore, herbivore, omnivore		classification, vertebrates, invertebrates, specimen, characteristics, organisms, life processes, respiration, sensitivity, reproduction, excretion, nutrition, habitat, environment, endangered species, extinct	Sexual and asexual reproduction, gestation, fertilise, life cycle, metamorphosis, pollination, reproduction, sexual reproduction	Characteristic, classify, taxonomist, key, bacteria, microorganism, microscope, species
<b>Misconceptions</b>			Animals adapt to their environment during their lifetime. For example, polar bears grow thick coats because they live in cold places or giraffes grow long necks to reach the leaves on the trees. Tables may be considered as a never lived item without considering all the materials e.g. wood.				All germs (microbes) are harmful Microorganisms are germs that live on dirty surfaces
<b>Texts, rhymes and songs</b>	<ul style="list-style-type: none"> <li>• Titch by Pat Hutchins</li> <li>• Somebody Swallowed Stanley by Sarah Roberts</li> </ul> <b>Non-Fiction</b> <ul style="list-style-type: none"> <li>• Peep Inside: Bug Homes by Anna Milbourne and Simona Dimitir</li> </ul>		<ul style="list-style-type: none"> <li>• Meerkat Mail by Emily Gravett</li> <li>• I am the seed that grew the tree (Nature Poems) by Fiona Waters &amp; Frann Preston-Gannon</li> </ul> <b>Non-Fiction</b> <ul style="list-style-type: none"> <li>• Lots (or Many): The Diversity of Life on Earth by Nicola Davies and Emily Sutton</li> </ul>		<ul style="list-style-type: none"> <li>• The Great Kapok Tree by Lynne Cheery</li> <li>• The Vanishing Rainforest (see <a href="http://www.stem.org.uk/teaching-science-through-stories">www.stem.org.uk/teaching-science-through-stories</a> )</li> <li>• Charlotte's Web by EB White</li> </ul> <b>Non-Fiction</b>	<ul style="list-style-type: none"> <li>• Spirit of the Jungle by Bear Grylls</li> </ul> <b>Non-Fiction</b>	<b>Non-Fiction</b>
<b>Plants</b>	To plant seeds and care for growing plants.  To understand the key features of the life cycle of a plant and an animal.	To explore the natural world around them, making observations and drawing pictures of animals and plants.	To identify and name a variety of common wild and garden plants, including deciduous and evergreen trees  To identify and describe the basic structure of a variety of common flowering plants, including trees	To observe and describe how seeds and bulbs grow into mature plants  To find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers  To explore the requirements of plants for life and growth (air, light, water, nutrients)		

	To talk about what they see, using a wide vocabulary.				from soil, and room to grow) and how they vary from plant to plant  To investigate the way in which water is transported within plants  To explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			
<b>Famous Scientists</b>	Rachel Carson (1907-1964)	Jane Colden (1724 - 1766)	Jane Colden (1724 - 1766) David Douglas (1799-1834)	David Douglas (1799-1834)				
<b>Investigations</b>	What do plants need to grow? How does the seed grow and change over time?	<b>Intermediate investigation</b> <b>Observation over time</b> Bean investigation How will the bean change over three weeks?	<b>Intermediate investigation</b> <b>Classifying</b> To classify living things into groups according to a range of criteria they have been given  <b>Independent investigation</b> <b>Observation over time</b> What do plants need to grow?	<b>Independent investigation</b> <b>Observation over time</b> What do plants need to help them grow?  <b>Independent investigation</b> <b>Observation over time</b> How do plants transport water?				
<b>Vocabulary</b>	Dead, living, roots, bulb, stem, leaves, flower, grow, petals, roots, seed, fruit, vegetable, water, rain, light, tree, trunk, branch, bark, leaves,	Roots, stem, leaves, flowers, petals, fruit, seed, bulb, wild plants, garden plants, weed, deciduous, evergreen	water, sunlight, temperature, germination, nutrition, sprout, shoot	Roots, stem, leaves, flowers, nutrients, evaporation, fertilisation, petal, stamen, carpel, sepal, pollination, pollinator, germination, seed dispersal				
<b>Misconceptions</b>	All plants have flowers, with coloured petals, green leaves and a stem.	All plants have flowers, with coloured petals, green leaves and a stem.	Most plants need light to grow Seeds and bulbs have a store of food inside them.	Plants obtain their energy directly from the sun.				
<b>Texts, rhymes and songs</b>	<ul style="list-style-type: none"> <li>Titch by Pat Hutchins</li> </ul> <b>Non-Fiction</b> <ul style="list-style-type: none"> <li>Peep Inside: Bug Homes by Anna Milbourne and Simona Dimitir</li> </ul>	<ul style="list-style-type: none"> <li>Ten Seeds by Ruth Brown</li> </ul> <b>Non-Fiction</b>	<ul style="list-style-type: none"> <li>A small, small seed by Judith Nicolls</li> </ul> <b>Non-Fiction</b> <ul style="list-style-type: none"> <li>Seed to Sunflower by Camilla De La Bedoyere</li> <li>Roots, Leaves, Stems and Flowers by Ruth Owen</li> </ul>	<ul style="list-style-type: none"> <li>The Extraordinary Gardener by Sam Broughton</li> </ul> <b>Non-Fiction</b>				

<p><b><u>Evolution and Inheritance</u></b></p>							<p>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</p> <p>To recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p> <p>To identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>
<p><b>Famous Scientists</b></p>							<p>Mary Anning (1799- 1847) Charles Darwin (1809- 1882)</p>
<p><b>Vocabulary</b></p>							<p>offspring, inheritance, variations, characteristics, adaptations, habitat, environment, evolution, natural selection, fossil, adaptive traits, inherited traits</p>
<p><b>Misconceptions</b></p>							<p>Adaption has to happen quickly Humans are descended from monkeys Animals are perfectly adapted to their environment Sons take after their fathers, daughters take after their mothers</p>
<p><b>Texts, rhymes and songs</b></p>							<ul style="list-style-type: none"> <li>• Molliebird by Jules Pottle</li> <li>• Moth by Isobel Thomas</li> </ul> <p><b>Non-Fiction</b></p> <ul style="list-style-type: none"> <li>• DNA Detectives by Dr Mandy Hartley</li> <li>• Great Scientists</li> <li>• Evolution - Eye Witness Science</li> </ul>