

Strand	KS1		KS2			
<p><b>Plants</b></p> <p>Key Concepts KS1:</p> <ul style="list-style-type: none"> <li>Basic structure of plants</li> <li>Germination</li> <li>Growth of plants</li> </ul> <p>Key Concepts KS2:</p> <ul style="list-style-type: none"> <li>Structure and functions of parts</li> <li>Transpiration</li> <li>Pollination</li> <li>MRS GREN (Movement, Respiration, Senses, Growth, Reproduction, Excretion and Nutrition)</li> </ul>	<p>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. <b>School survey of green spaces. Identifying of trees at school and field using leaves. Looking for wildflowers in the local environment.</b></p> <p>identify and describe the basic structure of a variety of common flowering plants, including trees. <b>Use magnifiers and hand held microscopes to look closely at plants and their structure. Identify roots, stem, leaves and flower.</b></p> <p>observe and describe how seeds and bulbs grow into mature plants <b>Grow seeds and bulbs in class (cress and beans) observe and test different germination conditions.</b></p> <p>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. <b>Test growing plants, create a plant maze. Observe seeds growing with a lack of light, heat and water.</b></p>		<p>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers <b>Perform plant dissections and use microscope to observe different types of plants including cacti, succulents, different leaf shapes/colours, orchid flowers</b></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 <b>Experiment on various plants, to see what effect changing the conditions has on the plant and drawing conclusions on the requirements of air, light, water, nutrients and room to grow.</b></p> <p>investigate the way in which water is transported within plants <b>Experiment on celery (or similar) and food dye to observe the way in which the dyed water is transported up the stem and to the leaves, bisect the celery, use microscopes and research to identify the xylem tubes in the stem and the stomata in the leaves to draw conclusions on how water travels up the plant. Demonstrate with siphoning and walking water.</b></p> <p>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. <b>Perform flower dissection identifying each part and the role it plays in pollination, provide images of a cross section of an apple from pollination to seed to observe and create a detailed life cycle of an apple tree. Investigate both angiosperms and gymnosperms and the differences in their pollination and seed dispersal methods. Experiment by making helicopter seeds and attempting to make them travel furthest from the parent plant.</b></p>			

## Living things and their habitats

### Key Concepts (KS1):

- Habitats
- Micro-habitats
- Food Chains
- Living, dead and used to be living

### Key Concepts (KS2):

- Environment and habitats
- Life cycles
- Classification
- Reproduction

explore and compare the differences between things that are living, dead, and things that have never been alive using games, images and items to classify and sort into groups, creating discussion about some that are ambiguous

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 Explore the local habitats in the area. Research other habitats – desert and arctic. Explore the living things there. Make a cactus out of sponge, one covered in wax paper one not. Blubber gloves to demonstrate the need for insulation in arctic animals.

identify and name a variety of plants and animals in their habitats, including micro-habitats Make woodlouse test house to discover what sort of habitat they prefer – light/dark, wet/dry. Create a bug habitat in school grounds.

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. Research food chains, make a model of a food chain. Link to plants

recognise that living things can be grouped in a variety of ways Group sweets/seeds together in a variety of ways. Ask children what criteria they have used to group, then ask them to regroup in a different way. Relate this to animals and introduce classification.

explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment use classification keys and fun quizzes to allow the children to understand what classification keys are. Create their own classification key for a given group of animals/plants

recognise that environments can change and that this can sometimes pose dangers to living things. Research on current issues, e.g. deforestation, drought, flood, fire etc. and the impacts that these have on habitats and the animals. Use philosophy session to discuss human impacts and natural disasters.

describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Compare and contrast the life cycles of the animal classes, create a representation of a chosen life cycle and present using different media.

describe the life process of reproduction in some plants and animals. Research reproduction in contrasting living organisms

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 Use classification cards and to group them by observable characteristics, encourage discussion and presentation of the groups to the class. Cards include all the kingdoms of life: plants, animals, fungi, prokaryotes and protists

give reasons for classifying plants and animals based on specific characteristics. Discussion throughout the practical sessions

construct and interpret a variety of food chains, identifying producers, predators and prey. Look at food chains relate to carnivores, herbivores and omnivores. Create food chains in creative and mixed media ways.

# Animals, including humans

Key Concepts (KS1)

- Animal Kingdom
- Carnivores, herbivores and omnivores
- Offspring
- Healthy Lifestyle

Key Concepts (KS2):

- Nutrition, digestion and healthy lifestyles (Nutrition and Excretion)
- Muscular-skeletal system (Movement)
- Teeth
- Food Chains
- Human Growth

identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals  
 Classification of animals based on observable characteristics. Children to group as they see. Then look at characteristics of the animal kingdom groups, re-sort the animals.

identify and name a variety of common animals that are carnivores, herbivores and omnivores  
 Classify animals into groups of carnivores, herbivores and omnivores. Are they any common characteristics?

notice that animals, including humans, have offspring which grow into adults  
 Game: who's my mummy? Develop to hybrid animals, who are the parents? Why do they think this?

find out about and describe the basic needs of animals, including humans, for survival (water, food and air)  
 Research and discussion about what is necessary for life

describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.  
 Discussion about exercise and healthy lifestyle. Balance is key. Experiments to highlight importance of hygiene – bread in bag after being passed round the

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  
 Research RDAs and discuss the reasons for them, look at some types of vitamin deficiencies e.g. scurvy, rickets (and its recurrence). Investigate types of food – proteins, carbohydrates, vitamins and minerals and research their function and how we can create a balanced diet.

identify that humans and some other animals have skeletons and muscles for support, protection and movement.  
 Observe bones and joints, discuss their importance and function. Create a mechanical arm with card, balloons and split pins. Observe the contraction and relaxation of the balloon, discuss what would happen if there wasn't a bicep and tricep.

describe the simple functions of the basic parts of the digestive system in humans  
 Create a model digestive system, imitate the mechanical churning actions and create a bolus of food. At each point explain the functions of each representation.

identify the different types of teeth in humans and their simple functions  
 Investigation on the effect of acid on teeth, this will facilitate the learning of the types of teeth and their function. Relate to animals – (carnivores, herbivores and omnivores) and their types of teeth, use to classify.

describe the changes as humans develop to old age.  
 Teaching of puberty and changes in life stages.

identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood  
 Get a heart from the butchers to show and dissect in front of the class, make models of blood vessels and blood cells to display with information on structure and function.

recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function  
 Experiment on effect of exercise on heart rate, discuss implications for keeping fit and healthy on heart, blood vessels etc. Discuss diet and healthy eating being a balance. Explore the effects of smoking with smoky sue.

	<p>room.</p>	<p>describe the ways in which nutrients and water are transported within animals, including humans. Look at organs involved in water excretion, dissect kidney as a teacher demo. Revisit the digestive system, paying particular attention to the intestines and the transport of useful products to the rest of the body.</p>
<p><b>Evolution and inheritance</b></p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Evolution</li> <li>• Inheritance</li> <li>• Adaptation</li> </ul>		<p>recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago Look closely at fossils over time and recognise the differences in species. Compare animals of today with extinct ones e.g. woolly mammoth and elephant. Create a time line that indicates how old the Earth is and how short a time humans have inhabited it.</p> <p>recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Match babies to parents. Look particularly at hybrids and note that these have characteristics of both parents. Design their own hybrid animal with characteristics of both parents.</p> <p>identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. Research climates and animals/plants that live there and how they are suited to this environment. This could be a powerpoint or leaflet or poster.</p>
<p><b>Everyday</b></p>	<p>distinguish between an object and the material from which it is made Use well known objects for children to see and</p>	<p>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. Investigate materials and identify properties.</p>

<p>materials (KS1)</p> <p>Properties and changes of materials (KS2)</p> <p>Key Concepts (KS1)</p> <ul style="list-style-type: none"> <li>• Properties of materials</li> <li>• Squashing, bending, twisting and stretching</li> <li>• Uses of materials</li> </ul> <p>Key Concepts (KS2)</p> <ul style="list-style-type: none"> <li>• Properties of materials</li> <li>• Mixtures and Separation</li> <li>• Reversible reactions</li> <li>• Irreversible reactions</li> </ul>	<p>decide what they are and what they're made of</p> <p>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock <b>Have examples of these materials for children to handle and describe, highlight words used that are properties of that material.</b></p> <p>describe the simple physical properties of a variety of everyday materials <b>See above</b></p> <p>compare and group together a variety of everyday materials on the basis of their simple physical properties. <b>Children to group the materials by their attributes, children to explain their grouping choices</b></p> <p>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses <b>Waterproofing of paper to make boats experiment. Use 3 little pigs as an example of uses of materials</b></p> <p>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. <b>Demonstrate the movements with plasticine, create boats with plasticine by changing its shape.</b></p>	<p>Comparison Experiments on hardness, solubility, transparency, conductivity and magnetism. Draw out conclusions about the different materials and be able to comprehensively list and predict properties of materials they have not encountered before.</p> <p>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution <b>Experiment on solubility of materials "which is the most soluble?" Discuss and demonstrate this is a reversible reaction and evaporation can recover the solid. Demonstrate carbon dioxide is dissolved in fizzy drinks and it can be released with mentos.</b></p> <p>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating <b>Use chromatography to separate colours. Have mixtures to separate and equipment to use, children to select the best equipment to separate the mixtures. Demonstrate evaporation to retrieve a dissolved substance.</b></p> <p>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic <b>Use information found out in the properties experiment to explain why certain materials are used for certain products</b></p> <p>demonstrate that dissolving, mixing and changes of state are reversible changes <b>Covered in other experiments.</b></p> <p>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. <b>Demos – Green fire, burning of paper and weight change. Children's investigation - combustion of iron wool, children are to conclude why this combustion increases the weight of the wool, but the burning of paper decreases in weight. Experiments with bicarbonate of soda and vinegar – exploding bags.</b></p>
<p>States of Matter</p> <p>Key Concepts:</p>		<p>compare and group materials together, according to whether they are solids, liquids or gases <b>Observe different materials in different states, conclude the criteria for</b></p>

<ul style="list-style-type: none"> <li>• Solids, liquids and gases</li> <li>• Water cycle</li> </ul>		<p>each group. Show a plasma (flame or plasma ball) and how it doesn't fit the criteria for solid, liquid or gas. Use semi solids (putty and non-Newtonian fluids) to challenge the pupil to think about what state they are in</p> <p>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) Making ice cream, measuring the temperature of the ice salt mixture, observing how cold it need to get to freeze the milk mixture. Experiment with chocolate, change its state and reverse this – displaying a reversible reaction</p> <p>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Demonstrate a model of the water cycle, relate this to the reversible processes of changing solids liquids and gases. Use acid rain to demonstrate the impact of human activity on the environment **Linked to animals incl. humans.</p>
<p>Seasonal Changes</p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Weather</li> <li>• Seasons</li> <li>• Day and Night</li> </ul>	<p>observe changes across the four seasons Use prior knowledge and images to discuss seasons and what happens. Tree puppet to show trees across the seasons. Use inflatable globe to show how the sun shines on the earth depending on the tilt.</p> <p>observe and describe weather associated with the seasons and how day length varies. Use weather monitoring equipment to see what happens over the term. Thermometer installed on window so children can observe temp throughout the year. Globe to demonstrate day length</p>	
<p>Rocks</p> <p>Key Concepts:</p>		<p>compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Using samples of different rocks and</p>

<ul style="list-style-type: none"> <li>• Rocks and Minerals</li> <li>• Fossil formation</li> <li>• Soil</li> </ul>		<p>minerals the children are to group them together on similar observable characteristics. Repeat with microscopes, re-categorise. Steer towards looking at the crystals in the rocks. Include florescent rocks</p> <p>describe in simple terms how fossils are formed when things that have lived are trapped within rock <b>Make fossils out of plaster of paris describing the process at each stage.</b></p> <p>recognise that soils are made from rocks and organic matter. <b>Make a model of soil using sweets/ biscuits etc. to represent the layers of soil. Separation of soil using graduated sieves.</b></p>
<p>Light</p> <p>Key Concepts:</p>		<p>recognise that they need light in order to see things and that dark is the absence of light <b>Simple experiment in darkened room/under a sheet/blindfolded children to draw conclusions of why they can't see.</b></p>

<ul style="list-style-type: none"> <li>• Sources of light</li> <li>• Reflection</li> <li>• Shadows</li> <li>• Travelling light</li> </ul>		<p>notice that light is reflected from surfaces <b>Experiment with mirrors, collimated light and the angle of incidence. Use convex and concave mirrors for comparison.</b></p> <p>recognise that light from the sun can be dangerous and that there are ways to protect their eyes <b>Research on the damage the sun can do to your eyes and what can be done to protect them.</b></p> <p>recognise that shadows are formed when the light from a light source is blocked by an opaque object <b>Shining torches on opaque objects onto graph paper, so comparisons can be made when the light source is moved further or closer. Make shadow shows using tracing paper and black card.</b></p> <p>find patterns in the way that the size of shadows change. <b>Sundials – making their own, explaining how they work. Experiment with shadows and distance of the light source.</b></p> <p>recognise that light appears to travel in straight lines <b>Copper tube and candle experiment to demonstrate that light travels in a straight line. use light boxes to shine a beam of light and demonstrate that it cannot go around a corner. Make periscopes.</b></p> <p>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 <b>Use Periscopes to explain this.</b></p> <p>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 <b>Correct misconception that light travels from our eyes. Draw diagrams to show how this works. Make camera obscurer to show how light travels and flips the image in a lens.</b></p> <p>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. <b>Use the shadow puppet theatre to teach this.</b></p>
<p>Forces and Magnets</p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Friction</li> <li>• Magnetism</li> </ul>	<p><b>Basic introduction to pushes, pulls, electricity, magnetism and gravity during “toys” unit</b></p>	<p>compare how things move on different surfaces <b>Experiment pulling a shoe with a Newton meter to measure the friction of different surfaces. STEM link – air powered cars.</b></p> <p>notice that some forces need contact between two objects, but magnetic forces can act at a distance <b>Experiments including making compasses, testing of materials,</b></p>



<ul style="list-style-type: none"> <li>• Gravity</li> <li>• Levers, pulleys and gears</li> </ul>		<p>making magnetic games (STEM link), iron filings poured onto a magnet and recorded in slow motion to show the 3D field. Lenz's Law – magnet down a copper tube. Gauss gun</p> <p>observe how magnets attract or repel each other and attract some materials and not others Test magnets against lots of different materials, and against each other. Conclude which materials are magnetic and which are not. Demonstrate a magnetic field using iron filings and magnets.</p> <p>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 Combination of previous experiment and from materials unit.</p> <p>describe magnets as having two poles Use the iron filings to show magnets approaching each other and observe the field when this happens. Explain that they have poles.</p> <p>predict whether two magnets will attract or repel each other, depending on which poles are facing. Covered in the testing magnets experiments</p> <p>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Vitamin C rockets</p> <p>identify the effects of air resistance, water resistance and friction, that act between moving surfaces Making rockets that fly the furthest distance by reducing the air resistance. Helicopter seeds investigation – does size of helicopter affect the speed that it falls, why? Parachute investigation with raw egg. Vitamin C rockets investigation covers forces and gravity. Magdeburg spheres to demonstrate air pressure. Egg and Flask problem covers forces and reminder of changes – burning. Investigations into water resistance TBC</p> <p>recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. Levers, pulleys and gears experiment. Testing variables to work out how levers, pulleys and gears work. STEM project - making a mechanical machine to use a lever, pulley or gear. (study bridges)</p>
<p>Sound</p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Vibration</li> <li>• Pitch</li> </ul>		<p>identify how sounds are made, associating some of them with something vibrating Making different noises with vibrations. Bazooka straws, Whirling Pipes and noise balloons. Use a pitch fork to demonstrate vibrations.</p> <p>recognise that vibrations from sounds travel through a medium to the ear</p>

<ul style="list-style-type: none"> <li>Amplitude</li> </ul>		<p>Demonstrate sound waves with a metal slinky. Research travelling sound.</p> <p>find patterns between the pitch of a sound and features of the object that produced it Creating a bottle orchestra using a tuner to get the correct pitch. Notice how they adjust the pitch of the bottles.</p> <p>find patterns between the volume of a sound and the strength of the vibrations that produced it Making ear defenders and testing the effectiveness of different materials. Use a decibel meter to measure the sound of a ball bearing being dropped from different heights to compare and conclude why there is a difference.</p> <p>recognise that sounds get fainter as the distance from the sound source increases. On field have groups, with decibel meter, at a given distance from sound source and an observer group, create noise and get groups to raise flags when they hear it and record the decibels.</p>
<p>Electricity</p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>Flow of electrons</li> <li>Circuits</li> </ul>		<p>identify common appliances that run on electricity Use research and prior knowledge to discuss electrical appliances and how much we rely on them.</p> <p>construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers Circuit experiments – a variety of challenges involving making circuits with different criteria and components.</p>

<ul style="list-style-type: none"> <li>• Components</li> <li>• Conductors and insulators</li> </ul>		<p>Identifying effects of adding more components/batteries and concluding reasons for these effects using prior knowledge.</p> <p>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 <b>Included in the challenges above.</b></p> <p>recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit <b>Explain and demonstrate the flow of electrons and what happens when there is a break in the circuit – using this to relate to switches. Make burglar alarms.</b></p> <p>recognise some common conductors and insulators, and associate metals with being good conductors. <b>Build on knowledge from properties of materials.</b> associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit <b>Included in circuit challenges, conclusions built from experiments.</b></p> <p>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 <b>Circuit challenges</b></p> <p>use recognised symbols when representing a simple circuit in a diagram. <b>Demonstrate the symbols and make paper circuits and test with components.</b></p> <p>Van de Graff generator to explain static and movement of electrons to help support knowledge of electricity.</p>
<p>Earth and space</p> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Orbits</li> <li>• The Moon</li> <li>• Day and night</li> </ul>		<p>describe the movement of the Earth, and other planets, relative to the Sun in the solar system <b>Orbits of the planets – make a human model of the solar system and a pocket solar system with till roll. Class model for the room with painted planets. Use Orrery to show the movements of the planets. Research and model the Kepler system. Link to literacy – writing about distant exoplanets.</b></p> <p>describe the movement of the Moon relative to the Earth <b>Create a human model</b></p>

using scale to give an idea of the moons distance from the Earth and its orbit. Model the moon with a light source to show the phases of the moon.

describe the Sun, Earth and Moon as approximately spherical bodies Research and model these celestial bodies as spherical.

use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Use desk lamp, globe and thermochromatic paper to demonstrate day and night, include axial tilt to demonstrate the seasons. Trip to Greenwich Museum.