



Science

Knowledge and Skills Progression Document

Year 1 science

Plants

Working scientifically/skills

- Make close observations of leaves, seeds, flowers etc.
- Compare two leaves, seeds, flowers etc. (Do)
- Classify leaves, seeds, flowers etc. using a range of characteristics.

(Review)

- Identify plants by matching them to named images
- Make observations of how plants change over a period of time (Do)

Knowledge

- When further afield, spot plants that are the same as those in the local area studied regularly, describing the key features that helped them. (Do)
- Growing locally there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts but they vary between the different types of plants. Some trees keep their leaves all year whilst other trees drop their leaves during autumn and grow them again during spring.

Vocabulary

Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud

Names of trees in the local area

Names of garden and wild flowering plants in the local area

Animals including humans

Working scientifically/skills

- Make first hand close **observations** of animals from each of the groups (Do)
- **Compare** two animals from the same or different group (Do)
- **Classify** animals using a range of features (Review)
- **Identify** animals by matching them to named images (Do)
- Classify animals according to what they eat (Review)

Knowledge

- Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals.
- The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish. They do not need to use the terms mammal, reptiles etc. or know the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.
- Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.
- The children also do not need to use the words carnivore, herbivore and omnivore. If they do, ensure that they understand that carnivores eat other animals not just meat.

Vocabulary

Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves

Names of animals experienced first-hand from each vertebrate group

<p>Everyday materials</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Classify objects made of one material in different ways e.g. a group of object made of metal (Review) • Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials (Review) • Classify materials based on their properties (Review) • Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters (Plan, do, review) <p>Knowledge</p> <ul style="list-style-type: none"> • All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. • Materials can be described by their properties e.g. shiny, stretchy, rough etc. • Some materials e.g. plastic can be in different forms with very different properties. <p>Vocabulary</p> <p>Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through</p>	<p>Seasonal Changes</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Collect information about the weather regularly throughout the year (Plan, do, review) • Present this information in table and charts to compare the weather across the seasons • Gather data about day length regularly throughout the year and present this to compare the seasons (Plan, do, review) <p>Knowledge</p> <ul style="list-style-type: none"> • In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again. • The weather also changes with the seasons. In the UK, it is usually colder and rainier in Winter and hotter and dryer in the Summer. • The change in weather causes many other changes; some examples are numbers of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people. <p>Vocabulary</p> <p>Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length</p> <p>Root words</p> <p>-chron = time – chronological order</p>
<p>Sound and Hearing</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Recognise and describe many sounds 	

- Describe how sounds are generated by specific objects
- State that they hear sounds through their ears
- Describe what they observe when they move further away from a source of sound
- Make observations or measurements relating to sounds and with help present these in charts

Knowledge

- There are many different sources of sounds and we use our sense of hearing to explore these.
- There are many ways of making sounds and they can be described in and explored with touch.
- We hear with our ears and use our sense of hearing for a range of purposes, e.g. recognising hazards and risks.
- Sounds get fainter as you travel away from the source.

Vocabulary

Words describing sounds or ways of making sounds eg high, low, loud, quiet, shake, pluck, rattle, ring, silence, direction

Words and phrases for making comparisons eg louder, quieter, further away, nearer

near synonyms eg soft/quiet, noise/sound

Words which have different meanings in other contexts eg low, high, soft.

Year 2 science

Plants

Working scientifically/skills

- **Make** close observations of seeds and bulbs (Do)
- **Classify** seeds and bulbs
- **Research** and plan when and how to plant a range of seeds and bulbs (Plan, do, review)
- Look after the plants as they grow – weeding, thinning, watering etc.
- Make close observations and measurements of their plants growing from seeds and bulbs (Review)
- Make comparisons between plants as they grow (Plan, do, review)

Knowledge

- Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of the year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy.

Vocabulary

Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud

Names of trees in the local area

Names of garden and wild flowering plants in the local area

Light, shade, sun, warm, cool, water, grow, healthy

Animals including humans

Working scientifically/skills

- **Ask** people questions and use secondary sources to find out about the life cycles of some animals (Plan)
- **Observe** animals growing over a period of time e.g. chicks, caterpillars, a baby (Plan, do, review)
- Ask questions of a parent about how they look after their baby (Plan)
- Ask pet owners questions about how they look after their pet (Plan)
- **Explore** the effect of exercise on their bodies (Plan, do, review)
- **Classify** food in a range of ways, including using the Eatwell guide (Do)
- Investigate washing hands, using glitter gel (Plan, do, review)

Knowledge

- Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles.
- All animals including humans have basic needs of feeding, drinking and breathing that must be satisfied in order to survive, and to grow into healthy adults they also need the right amounts and types of food and exercise. Good hygiene is also important in preventing infections and illnesses.

Vocabulary

Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)

Root words

	-tion = nutrition
<p>Everyday materials</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Classify materials (Do) • Make suggestions about alternative materials for a purpose that are both suitable and unsuitable (Plan, do, review) • Test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for Elastigirl's costume, test materials for waterproofness to select the most appropriate for a rain hat. (Plan, do, review) <p>Knowledge</p> <ul style="list-style-type: none"> • All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. • When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. • A material can be suitable for different purposes and an object can be made of different materials. • Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness. <p>Vocabulary</p> <p>Names of materials – increased range from year 1</p> <p>Properties of materials - as for year, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not</p>	<p>Living things and their habitats</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Explore the outside environment regularly to find objects that are living, dead and have never lived (Do) • Classify objects found in the local environment (Review) • Observe animals and plants carefully, drawing and labelling diagrams (Do) • Create simple food chains for a familiar local habitat from first hand observation and research (Do) • Create simple food chains from information given e.g. in picture books (Gruffalo etc.) (Plan, do, review) <p>Knowledge</p> <ul style="list-style-type: none"> • All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. • Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (this is a simplification but appropriate for year 2 children). • An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels). • Animals and plants live in a habitat to which they are suited which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry.

<p>see through, plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid</p> <p>Shape, push/pushing, pull/puling, twist/twisting, squash/squashing. Bend/bending, stretch/stretching</p>	<p>These conditions affect what plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc.</p> <ul style="list-style-type: none"> The way that animals obtain their food from plants and other animals can be shown in a food chain. <p>Vocabulary</p> <p>Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes etc.</p> <p>Root words</p> <p>carn = flesh, meat - carnivore</p> <p>omni = all, every – omnivore</p> <p>herb = plant, grass – herbivore</p> <p>vore= devour, eat – omnivore, carnivore, herbivore</p>
<p>Variation</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> Classify similarities between animals and between plants and differences within these groups suggest questions relating to differences between living things make measurements of length using standard units and, with help, present results in block graphs, making simple interpretations of these <p>Knowledge</p> <ul style="list-style-type: none"> Animals and plants have different characteristics and they need to be treated with care. Living things, called animals, include humans. Humans are more like each other than they are like other animals. Humans are similar to each other in some ways and different in others. 	

- Plants in the local environment are similar to each other in some ways and different in others.
- Living things in the locality can be grouped according to observable similarities and differences.

Vocabulary

Words naming features of animals and plants eg feathers, fur, shell, branch

Comparative expressions eg long, longer, longest, small, smaller, smallest, similar to, different from

Expressions making generalisations eg 'we all...', 'most have...'

Expressions of time related to change.

Year 3 science

Plants

Working scientifically/skills

- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers (3-Plants) (Do)
- 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 (3-Plants) (Plan do, review)
- Investigate the way in which water is transported within plants (3-Plants) (Plan do, review)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (3-Plants) (Review)

Knowledge

- Plants grow from seeds and all need the basics to survive – note differences.
- Know the different parts of a plant and why they are needed.
- Know that water is transported in plants due to the rate of evaporation. Know that seeds are dispersed in a range of ways.

Vocabulary

Seed dispersal, transportation, stem, leaves, photosynthesis (MA chn), nutrients, trunk, seed formation, pollination.

Root words:

-photo = light -photosynthesis

Animals including humans

Working scientifically/skills

- **Classify** food in a range of ways (Do)
- Use food labels to explore the nutritional content of a range of food items (Do)
- Use secondary sources to find out the types of food that contain the different nutrients (Do)
- Use food labels to answer **enquiry questions** e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? (Plan, do, review)
- **Plan** a daily diet contain a good balance of nutrients (Plan)
- **Explore** the nutrients contained in fast food (Do)
- Use secondary sources to research the parts and functions of the skeleton
- **Investigate** pattern seeking questions such as
 - Can people with longer legs run faster?
 - Can people with bigger hands catch a ball better?
- Compare, contrast and classify skeletons of different animals.

Knowledge

- Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need.
- Food contains a range of different nutrients that are needed by the body to stay healthy – carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water.
- A piece of food will often provide a range of nutrients.
- Humans and some other animals have skeletons and muscles which help them move and provide protection and support

Vocabulary

	<p>Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints</p> <p>Root words:</p> <p>-dent = teeth</p> <p>carn = flesh, meat - carnivore</p> <p>omni = all, every – omnivore</p> <p>herb = plant, grass – herbivore</p> <p>vore= devour, eat – omnivore, carnivore, herbivore</p>
<p>Rocks</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Observe rocks closely (Do) • Classify rocks in a range of ways based on their appearance (Do) • Devise a test to investigate the hardness of a range of rocks (Plan, do, review) • Devise a test to investigate how much water different rocks absorb (Plan, do, review) • Observe how rocks change over time e.g. gravestones or old building (Do) • Research using secondary sources how fossils are formed (Do) • Observe soils closely (Do) • Classify soils in a range of ways based on their appearance (Do) • Devise a test to investigate the water retention of soils (Plan) • Observe how soil can be separated through sedimentation (Review) <p>Knowledge</p> <ul style="list-style-type: none"> • Research the work of Mary Anning • Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks 	<p>Light</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • Explore how different objects are more or less visible in different levels of lighting • Explore how objects with different surfaces e.g. shiny vs matt are more or less visible • Explore how shadows vary as the distance between a light source, an object or surface is changed • Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground (Plan, do, review) • Choose suitable materials to make shadow puppets (Plan, do, review) • Create artwork using shadows <p>Knowledge</p> <ul style="list-style-type: none"> • We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example the sun, light bulbs and candles are sources of light. • Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look

<p>can be hard or soft. They have different sizes of grain or crystal. They may absorb water.</p> <ul style="list-style-type: none"> • Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock piece and the amount of organic matter affect the property of the soil. • Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. <p>Vocabulary Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil</p> <p>Root words Lithic = rock – Neolithic, Paleolithic, Mesolithic (link to history) Sedi = settle, sit = sedimentary Pre-before - prehistoric</p>	<p>directly at the Sun and can protect our eyes by wearing sunglasses or sunhats in bright light.</p> <ul style="list-style-type: none"> • Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface. <p>Vocabulary Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous</p> <p>Root words -photo = light -photograph</p>
<p>Forces – Magnets</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> • 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, depending on which poles are facing

Knowledge

- Objects move on different surfaces because of friction. Some materials will generate more friction than others. This will be applied to everyday experiences.
- Some objects will require contact to move whilst others will not (friction and magnetism).
- Magnets have two poles which attract or repel. Some materials will attract to a magnet whilst others will not. Some magnets are stronger than others.

Vocabulary

Force, contact force, non-contact force, magnet, magnetism, attract, repel, material, magnetic, resistance, friction, pole, magnetic field, North, South

Root words

pel = push repel, compel, impel

tract = draw, pull attract, traction, tractor

tact = touch contact, tactile, intact

Year 4 science

Disciplinary

Dict = say, speak – predict

Scrib = write, draw = describe,

Graph = draw, write = graph

Struct – make, build - construct

Living things and their habitats

Working scientifically/skills

- **Observe** plants and animals in different habitats throughout the year (Do)
- **Compare** and **contrast** the living things observed (Plan, do, review)
- Use classification keys to name unknown living things
- **Classify** living things found in different habitats based on their features
- Create a simple **identification key** based on observable features
- Use fieldwork to explore **human impact** on the local environment e.g. litter, tree planting (Plan, do, review)
 - Litter survey on site at school.
- Use **secondary sources** to find out about how environments may naturally change
 - Web research
 - Books and news articles related to environmental changes
- Use secondary sources to find out about **human impact**, both positive and negative, on environments

Knowledge

- Living things can be grouped (classified) in different ways according to their features.
- **Classification keys** can be used to identify and name living things.
- Living things live in a habitat which provides an environment to which they are suited (year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way i.e. positive human

Animals, including humans

Working scientifically/skills

- Research the **function** of the parts of the **digestive system**
- Create a model of the digestive system using household objects
 - T Shirt Digestive System
- Explore eating different types of food, to **identify** which **teeth** are being used for cutting, tearing and grinding (chewing) (Plan, do, review)
- **Classify** animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls (Review)
- Use **food chains** to identify producers, predators and prey within a habitat
- Use secondary sources to identify animals in a habitat and find out what they eat

Knowledge

- Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.
- Humans have four types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing).

<p>impact, such as setting up nature reserves or in a bad way i.e. negative human impact, such as littering. These environments also change with the seasons; different living things can be found in a habitat at different times of the year</p> <p>Vocabulary</p> <p>Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate</p>	<ul style="list-style-type: none"> Living things can be classified as producers, predators and prey according to their place in the food chain. <p>Vocabulary</p> <p>Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain</p> <p>Root words</p> <p>carn = flesh, meat - carnivore</p> <p>omni = all, every – omnivore</p> <p>herb = plant, grass – herbivore</p> <p>vore= devour, eat – omnivore, carnivore, herbivore</p>
<p>States of Matter</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> Observe closely and classify a range of solids Observe closely and classify a range of liquids Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind Classify materials according to whether they are solids, liquids and gases Observe a range of materials melting e.g. ice, chocolate, butter <ul style="list-style-type: none"> Links to Mayans (history of chocolate) Investigate how to melt ice more quickly Observe the changes when making rocky road cakes or ice-cream Investigating melting point of different materials e.g. ice, margarine, butter and chocolate Explore freezing different liquids e.g. tomato ketchup, oil, shampoo Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration) 	<p>Sound</p> <p>Working scientifically/skills</p> <ul style="list-style-type: none"> Classify sound sources Explore making sounds with a range of objects such as musical instruments and other household objects Explore how string telephones or ear gongs work Explore using objects that change in feature to change pitch and volume such as length of guitar string, bottles of water or tuning forks Measure sounds over different distances Measure sounds through different insulation materials <p>Knowledge</p> <ul style="list-style-type: none"> A sound source produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.

- Observe water *evaporating* and *condensing* e.g. on cups of icy water and hot water
- Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers
- Use secondary sources to find out about the water cycle

Knowledge

- A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.
- Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0°C. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when heated to 100°C. Evaporation is the same state change as boiling (liquid to gas) but happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if temperature is higher, liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.
- Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.

Vocabulary

Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

- The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.
- Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Vocabulary

Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation, connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

Root words

-phono = sound -microphone,

Phoneme

-aud = listen, hear, sound -audio, audible

Electricity

Working scientifically/skills

- **Construct** a range of circuits
- **Explore** which materials can be used instead of wires to make a circuit
- **Classify** the materials that were suitable/not suitable for wires
- Explore how to connect a range of different switches and investigate how they function in different ways
- **Choose** switches to add to circuits to solve particular problems such as a pressure switch for a burglar alarm
- **Apply** their knowledge of conductors and insulators to design and make different types of switch
- **Make** circuits that can be controlled as part of a D&T project
- DT Lamp project N.B. Children should be given one component at a time to add to circuits.

Knowledge

- Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there's a break in the circuit, a loose connection or a short circuit the component won't work. A switch can be added to turn the components on and off.
- Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity

Vocabulary

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose

Root words

-struct = make, build -construct, structure

Year 5 science

Disciplinary

Dict = say, speak – predict

Scrib = write, draw = describe,

Graph = draw, write = graph

Struct – make, build – construct

Contra = against – contrast, contradict

Living things and their habitats

Working scientifically/skills

- Use **secondary sources** and, where possible, first hand **observations** to find out about the life cycle of a range of animals
- **Compare** the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth
- Look for **patterns** between the size of an animal and its expected life span
- Grow and **observe** plants that reproduce asexually e.g. strawberries, spider plant, potatoes
- Take cuttings from a range of plants e.g. African violet, mint
- Plant bulbs and then harvest to see how they multiply
- Use secondary sources to find out about pollination

Knowledge

- As part of their life cycle plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals including humans have offspring which grow into adults. In humans and some animals these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.
- Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only

Animals, including humans

- This unit is likely to be taught through direct instruction due to its sensitive nature

Knowledge

- When babies are young they grow rapidly. They are very dependent on their parents. As they develop they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.
- This needs to be taught alongside PSHE
- Useful guidance can be obtained at:
<http://www.ase.org.uk/news/aseviews/teaching-about-puberty/>
- <http://www.ase.org.uk/documents/2016-joint-statement-on-reproduction/>

Vocabulary

- **Puberty, primary and secondary sexual characteristics**

one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.

Vocabulary

Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings

Root words

Ambi = both -amphibian

Forces

Working scientifically/skills

- **Investigate** the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter
- Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water
- Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats
- **Explore** how levers, pulleys and gears work
- Make a product that involves a lever, pulley or gear
- **Create** a timer that uses gravity to move a ball

Knowledge

- Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.

Properties and Changes of Materials

Working scientifically/skills

- **Investigate** the **properties** of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat
- **Explore** adding a range of solids to water and other liquids e.g. cooking oil, as appropriate
- **Investigate** rates of dissolving by carrying out comparative and fair test
- Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture
- Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning
- Carry out **comparative** and fair tests involving **non-reversible** changes e.g. What affects the rate of rusting? What affects the amount of gas produced?
- Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton)

- Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water or the air and water may be moving over a stationary object.
- A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.

Vocabulary

Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

Root words

-aero = air, atmosphere -aerodynamic

Knowledge

- Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.
- Mixtures can be separated by filtering, sieving and evaporation.
- Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.

Vocabulary

Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material

Root words

-solv/solu = loosen, set free – dissolve, solution

Earth and Space

Working scientifically/skills

- Use secondary sources to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth.
- Use secondary sources to help make a model to show why day and night occur
- Make first-hand observations of how shadows caused by the Sun change through the day
- Make a sundial

- Research time zones

Knowledge

- Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel
- The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes $365\frac{1}{4}$ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night). As the Earth rotates the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.

Vocabulary

Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune)
spherical, solar system, rotates, star, orbit, planets

Root words

-astro = star, space – astronomy

Vac = empty – vacuum

Sol = sun – solar, parasol

Year 6 science

Disciplinary

Dict = say, speak – predict

Scrib = write, draw = describe,

Graph = draw, write = graph

Struct – make, build – construct

Contra = against – contrast, contradict

Living Things and their habitats

Working Scientifically/skills

- Use secondary sources to learn about the formal **classification** system devised by Carl Linnaeus and why it is important
- Use first hand observation to identify **characteristics** shared by the animals in a group
- Use secondary sources to research the characteristics of animals that belong to a group
- Use information about the characteristics of an unknown animal or plant to assign it to a group
- **Classify** plants and animals presenting this in a range of ways – Venn diagrams, Carroll diagrams and keys
- **Create** an imaginary animal which has features from one or more groups

Knowledge

- Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.
- Animals can be divided into two main groups – those that have backbones (vertebrates) and those that do not (invertebrates). Vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Each group has common characteristics. Invertebrates can

Animals including humans

Working scientifically/skills

- Carry out a range of pulse rate **investigations**
 - Fair test – effect of different activities on my pulse rate
 - Pattern seeking – exploring which groups of people may have higher or lower resting pulse rates
 - Observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)
 - Pattern seeking – exploring recovery rate for different groups of people

Knowledge

- Learn about the impact of exercise, diet, drugs and lifestyle on the body. This is likely to be taught through direct instruction due to its sensitive nature
- The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.
- Create a role play model for the circulatory system

be divided into a number of groups including insects, spiders, snails and worms.

- Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.

Vocabulary

Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering

Root words

carn = flesh, meat - carnivore

omni = all, every – omnivore

herb = plant, grass – herbivore

vore= devour, eat – omnivore, carnivore, herbivore

- Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.

Vocabulary

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle

Root words

derm = skin – epidermis, dermatology

hem/haem = blood - haemoglobin

Evolution

Working scientifically/skills

- **Design** a new plant or animal to live in a particular habitat
- Use models to demonstrate evolution e.g. Darwin's finches bird beak activity
- Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution
- Make **observations** of fossils to identify living things that lived on Earth millions of years ago
- **Identify** features in animals and plants that are passed on to offspring
- **Explore** this process by considering the artificial breeding of animals or plants e.g. dogs
- **Compare** the ideas of Charles Darwin and Alfred Wallace on evolution

Electricity

Working scientifically/skills

- Fair test – effect of different number & voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer.
- Controlling Variables - effect of different number & voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer
- **Compare** the role of components within a circuit.

Knowledge

- Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter.

<p>Knowledge</p> <ul style="list-style-type: none"> Research the work of Mary Anning and how this provided evidence of evolution All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time these inherited characteristics become more dominant within the population. Over a very long period of time these characteristics may be so different to how they were originally that a new species is created. This is evolution. Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics. <p>Vocabulary</p> <ul style="list-style-type: none"> Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils <p>Root words</p> <p>Bio=life – biology, biodiversity</p>	<ul style="list-style-type: none"> Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. Recognise the circuit symbols to draw simple circuit diagrams. Know how a circuit operates to achieve particular operations, such as control the light for a torch with different brightnesses or make a motor go faster or slower <p>Vocabulary</p> <p>Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage</p>
<p>Light</p> <p>Working scientifically/skills</p>	

- *Explore* different ways to demonstrate that light travels in straight lines
e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card
- *Explore* the uses of the behaviour of light, reflection and shadows such as in periscope design, rear view mirrors and shadow puppets.

Knowledge

- Light appears to travel in straight lines and we see objects when light from them goes into our eyes. The light may come directly from light sources but for other objects some light must be reflected from the object into our eyes for the object to be seen.
- Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.

Vocabulary

Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous, straight lines, light rays.

Root words

Sol = sun – solar, parasol