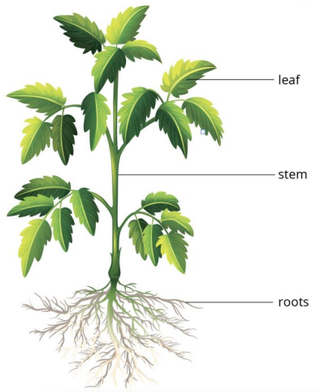
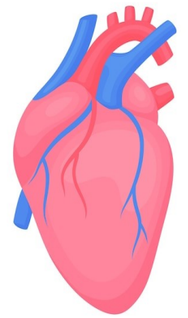
BILTON COMMUNITY FEDERATION

Science Progression Document





Inspire Challenge Achieve BTS

Stability, sexual orientation, gender, race, religion, marriage/civil partnership, pregnancy, gender identity, age, disability

Science

Curriculum Intent

It is our intent that children will leave our schools resilient, emotionally literate, aspirational, effective communicators who are happy and therefore ready for the next stage of their life through the behaviour, knowledge and skills they have learnt whilst in our care. If we can achieve this for our children then we believe we are giving them the best opportunity to achieve success in their life. Through an inclusive and stimulating environment we will develop every child and allow them to write their own story in life. This intent is defined as our REACH principles.

Resilient: Every child is resilient.
Emotionally Literate: Every child is aware of their feelings and those of others.
Aspirational: Every child aspires for more in their learning and in life.
Communicators: Every child is an effective communicator.
Happy: Every child has the right to be happy. Bilton Community Federation

Our vision is to empower children to make a positive impact on the world and to apply the following values in all they do: **Care, Co-operation, Honesty, Forgiveness, Respect and Resilience.**

At BJS, our vision is to give all children a science curriculum that allows them to be ambitious for their future by providing a strong understanding of the world around them and a curiosity about natural phenomena whilst acquiring specific skills and knowledge to help them to think scientifically.

The 5 types of scientific enquiry (see our school logos below) are embedded throughout each year group's topics. All children are given a variety of opportunities to work scientifically and develop a range of skills including observing, planning and investigating, working practically, evaluating, making choices, working independently and collaboratively and using scientific vocabulary, developing both substantive and disciplinary knowledge. Topics are revisited from Key Stage One and many are built on each year in Key Stage Two, which allows children to build upon their prior knowledge whilst embedding procedural knowledge into long-term memory. Specialist vocabulary for topics is taught and effective questioning to communicate ideas is encouraged. Children learn about the relevance of science through its cross-curricular approach, science weeks, the entering of competitions and visits to and from places of scientific interest.

Implementation:

At BJS, Science topics are taught within each year group in accordance with the National Curriculum.

The 5 topics for each year group are blocked roughly to each half term to allow children to focus on developing their substantive and disciplinary knowledge, studying each topic in depth.

Every year group will build upon the learning from prior year groups therefore developing depth of understanding and progression of skills.

Children can ask questions & plan enquiries, set them up, observe & measure, record, interpret & report and evaluate findings. These can be evidenced in books alongside the working scientifically assessment checklist.

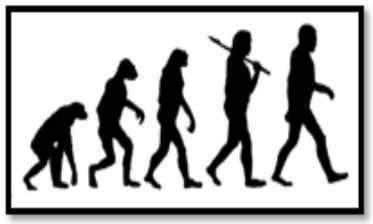
Children present their findings and learning using science specific language, observations and diagrams.

In order to support children in their ability to retain knowledge there are regular opportunities to review the learning taken place in previous topics as well as previous lessons. For example, using Explorify openers.

Animals including humans – Healthy Living

Key Vocabulary	Key learning	Exploring Animals including humans
Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle	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. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out 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.	Create a role play model for the circulatory system 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 Learn about the impact of exercise, diet, drugs and lifestyle on the body. 

Year 6 Evolution and inheritance

Key Vocabulary	Key learning	Exploring Evolution and inheritance
Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils	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.	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 Research the work of Mary Anning and how this provided evidence of evolution 

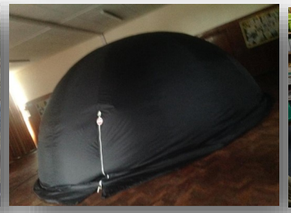
At the start of each topic children will review previous learning and will have the opportunity to share what they already know about a current topic. Children are given a knowledge organiser at the start of each topic which details some key Science Curriculum Statement information and vocabulary. This is to support children with their acquisition of knowledge and are used as a reference document. At the end of each topic children will review their learning and have opportunity to demonstrate their new knowledge through posters, fact files and assessments. Through using a range of assessment tools, differentiation is facilitated by teachers, to ensure that each pupil can access the Science curriculum. Effective modelling by teachers ensures that children are able to achieve their learning intention, with misconceptions addressed within it. Assessment for learning is used in each lesson to ensure misconceptions are highlighted and addressed. Pupils are regularly given the opportunity for self or peer assessment, which will then be used to inform planning, preparation, differentiation and address misconceptions within that lesson, or for the next lesson. Effective CPD and training opportunities are available to staff to ensure high levels of confidence and knowledge are maintained. Effective use of education visits (including to local secondary schools) and visitors are planned, to enrich and enhance the pupil's learning experiences within the Science curriculum. Cross-curricular links are planned for, with other subjects such as Maths, English and Computing.

Our Christian Values

Our Christian Values of care, honesty, respect, co-operation, forgiveness and resilience are all skills required to become a successful and inquisitive scientist. In Science, care manifests through ethical considerations and responsible handling of data. Honesty is crucial to the reporting of results and findings in an investigation. Respect for peers and equipment as well as for the rules of investigating. Co-operation facilitates teamwork and diverse perspectives. Importance of challenge and questioning. There are likely to be ethical dilemmas with current and future developments in the World of Science. We aim for our children to draw upon their morals and Christian Values to do the right thing. Ultimately, being resilient helps Scientists adapt to new information and refine their understanding. All these core values allow children to becomes successful and inquisitive scientists.

Enrichment

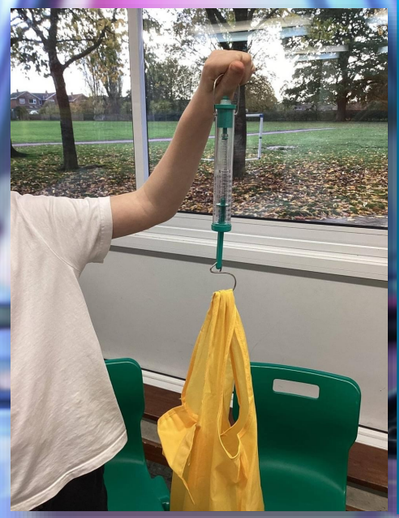
There are a wide range of enrichment opportunities beyond the classroom. We are lucky to have a fantastic school site where learning can take place outside of the classroom. There is a CREST Award Science club which extends opportunities beyond the National Curriculum. We have a yearly Science week and have wide links with local secondary schools to support this. There are cross-curricular links which provide application of knowledge and deepen understanding. An example of this is when Year 4 visit Cadbury's World for their humanities topic—there are great links to Science work on States of Matter. We capitalise on these links where possible to support children to retain new learning in their long term memory. We invest in opportunities such as the Space Planetarium to support the learning in the Earth and Space topic. Our aim is to develop their interests and talents of our children and prepare them for future success.

Curriculum Overview

Physics | **Chemistry** | **Biology**

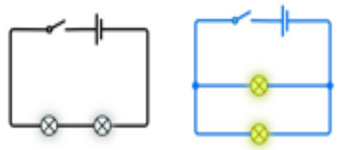
Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
3	Bones and Nutrition	Rocks and Soil		Forces and Magnets	Plants	Light and Shadow
4	States of Matter		Sound	Electricity	Living things and their Habitat Food Chains	Animals Including Humans Teeth and Digestion
5	Earth and Space	Forces and Movement	Properties and Changes of Materials	Living Things Their Habitat and Life Cycles	Animals Including Humans Changes/Adaptation	
6	Animals Including Humans – Circulatory System	Light and Sight	Electricity	Classification	Evolution and Inheritance	Healthy Living



Living things and their Habitats – Classification

Key Vocabulary	Key learning	Exploring living things and their habitats
○ organisms ○ microorganisms ○ vertebrates ○ invertebrates ○ flowering ○ non-flowering ○ classify ○ classification ○ compare ○ Linnaean system (Carl Linnaeus) ○ species ○ genus ○ family ○ order ○ class ○ phylum ○ kingdom ○ domain	Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings 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 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.	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 

Year 6 Electricity

Key Vocabulary	Key learning	Exploring Electricity
Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch voltage toggle switch, push switch, slide switch, tilt switch, trembler switch, pressure switch, reed switch, series circuit, resistance, resistor, current, circuit diagram, recognised symbols, generate,	The effect of adding more cells to a complete circuit to bulb brightness, the speed a motor spins or the loudness of a buzzer. The effect of using a battery with a higher voltage. The effect of adding more bulbs to a circuit. The effect of using more motors or buzzers. The effect of turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. What will happen to bulbs, motors or buzzers on the circuit? You can use recognised circuit symbols to draw simple circuit diagrams. Use recognised symbols when representing a simple circuit in a diagram. Label and learn the recognised symbols for representing components in a circuit diagram. Make circuits then represent them in circuit diagrams and applying component symbols appropriately.	Explain 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 Make circuits to solve particular problems such as a quiet and a loud burglar alarm Carry out fair tests exploring changes in circuits Make circuits that can be controlled as part of a D&T project  

Working Scientifically Lower Key Stage 2

Science Teacher Assessment Sheet: Years 3&4

Name_____ Class_____ Date_____

Working Scientifically: The pupil can:	WT	At
ask relevant questions and use different types of scientific enquiries to answer them, including:		
• observing changes over different periods of time		
• noticing patterns		
• grouping and classifying things,		
• setting up simple comparative and fair tests		
• finding things out using a range of secondary sources		
make systematic and careful observations		
take accurate measurements using standard units (where appropriate), using a range of equipment, including:		
• thermometers		
• data loggers		
gather, record, classify and present data in a variety of ways to help in answering questions		
record findings using:		
• simple scientific language		
• drawings		
• labelled diagrams		
• keys		
• bar graphs		
• tables		
report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions		
use results to:		
• draw simple conclusions		
• make predictions for new values		
• suggest improvements		
• raise further questions		
identify differences, similarities or changes related to simple scientific ideas and processes		
use straightforward scientific evidence to answer questions or to support their findings		

Working Scientifically
Upper Key Stage 2

Science Teacher Assessment Sheet: Years 5&6

Name_____ **Class**_____ **Date**_____

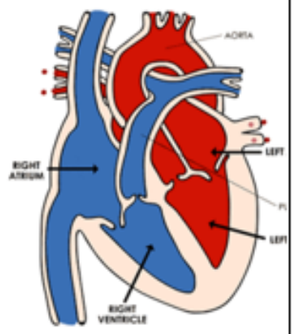
Working Scientifically The pupil can, **using appropriate scientific language** from the national curriculum:	**WT**	**At**
describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources		
ask their own questions about the scientific phenomena that they are studying		
select the most appropriate ways to answer these questions, recognising and controlling variables where necessary, to include:		
• observing changes over different periods of time		
• noticing patterns		
• grouping and classifying things,		
• carrying out comparative and fair tests		
• finding things out using a wide range of secondary sources		
use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate		
records data and results using:		
• scientific diagrams and labels		
• classification keys		
• tables		
• scatter graphs		
• bar graphs		
• line graphs		
draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways		
raise further questions that could be investigated, based on their data and observations		

Light and Sight

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

Year 6

Animals including humans Circulatory System

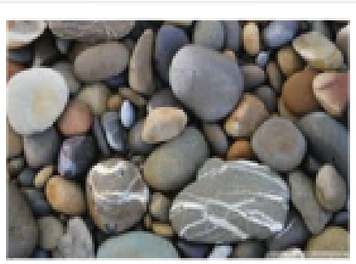
Key Vocabulary	Key learning	Exploring Animals including humans
Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle	The heart pumps blood in the blood vessels around to the 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. Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out 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.	Create a role play model for the circulatory system 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 Learn about the impact of exercise, diet, drugs and lifestyle on the body. 

Year 3

Year 3 Animals Including Humans

Key vocabulary	Key learning	Exploring animals including humans
Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, skull, ribs, spine, joints	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, 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	Classify food in a range of ways Use food labels to explore the nutritional content of a range of food items Use secondary sources to find out the types of food that contain the different nutrients 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 a daily diet contain a good balance of nutrients Explore the nutrients contained in fast food 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 

Y3 Rocks and Soils

Key vocabulary	Key learning	Exploring rocks
Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/ clay	Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). 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.	Observe rocks closely Classify rocks in a range of ways based on their appearance Devise a test to investigate the hardness of a range of rocks Devise a test to investigate how much water different rocks absorb Observe how rocks change over time e.g. gravestones or old building Research using secondary sources how fossils are formed Observe soils closely Classify soils in a range of ways based on their appearance Devise a test to investigate the water retention of soils Observe how soil can be separated through sedimentation Research the work of Mary Anning 

Adaptation and Change

Key Vocabulary	Key Learning	Adaptation and Change
mammal, amphibian, insect, bird, metamorphosis, tadpole, nymph, pupae, chrysalis, caterpillar, migrate, hibernate, courtship, plumage, habitat, adaptation, behaviour, young, chick, life cycle, egg, pupae, adult, butterfly, nectar, death rate, nest, brood, fledgling, juvenile, diet, migration, resident, invertebrate, mollusc, worm, snail, woodlouse, centipede, millipede, beetle, aphid, adaptation, predator, prey, survival, habitat, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions, justify, analyse	Describe the changes as humans develop to old age. Describe the main changes in the human body from a child to an adult to old age. What are (describe) the physical signs of humans ageing? Compare and contrast the physical appearance of children and adults. Graph changes in average heights of males and females at different ages. Interpret data about normal blood pressure in children and adults and draw some conclusions. Make generalisations between the relationship between age and changes in humans.	Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. Read and answer questions about the importance of diet and exercise. Observe and record the effect of exercise on heartbeat. Describe a healthy, balanced diet. Describe some of the possible effects of poor exercise, drug misuse (including smoking) and poor diet on the way the human body functions. Graph the effect of exercise on pulse rate. Explain the possible effects of too much sugar in one's diet on how the human body functions. Argue this statement: You are what you eat. 

Living Things and their Habitats

Key Vocabulary	Key Learning	Exploring living things and their habitats
Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings Puberty, primary and secondary sexual characteristics	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 one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.	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 

Y3 Forces and Magnets

Key vocabulary	Key learning	Exploring Forces and Magnets
Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, button magnet, attract, horseshoe magnet, repel, magnetic material, metal, iron, steel, poles, north pole, south pole bar magnet, ring magnet	A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. A magnet attracts magnetic material. Iron and nickel and other materials containing these e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles e.g. a north and south, are brought together they will pull together – attract. For some forces to act there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts	Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc. Explore what materials are attracted to a magnet Classify materials according to whether they are magnetic Explore the way that magnets behave in relation to each other Use a marked magnet to find the unmarked poles on other types of magnets Explore how magnets work at a distance e.g. through the table, in water, jumping paper clip up off the table Devise an investigation to test the strength of magnets  

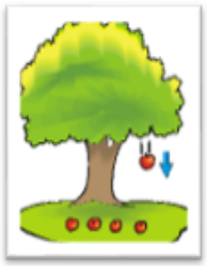
Plants

Key vocabulary	Key learning	Exploring plants
Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal - wind dispersal, animal dispersal, water dispersal, germination	Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth	Observe what happens to plants over time when the leaves or roots are removed Observe the effect of putting cut white carnations or celery in coloured water Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space Spot flowers, seeds, berries and fruits outside throughout the year Observe flowers carefully to identify the pollen Observe flowers being visited by pollinators e.g. bees and butterflies in the summer Observe seeds being blown from the trees e.g. sycamore seeds Research different types of seed dispersal Classify seeds in a range of ways including by how they are dispersed Create a new species of flowering plant 

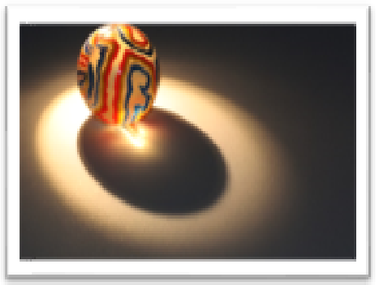
Properties and changes of materials

Key Vocabulary	Key learning	Exploring properties and changes of materials
Thermal/ electrical insulator/ conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material	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.	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)

Forces and Movement

Key Vocabulary	Key learning	Exploring Forces
Force, gravity, Earth, air resistance, water resistance, friction, mechanisms , simple machines, levers, pulleys, gears	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. 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.	Investigate the effect of friction in a range of contexts e.g. trainers, bath mats, 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 Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation  

Light and Shadow

Key vocabulary	Key learning	Exploring light
Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	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 directly at the Sun and can protect our eyes by wearing sunglasses or sunhats in bright light. 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.	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 Choose suitable materials to make shadow puppets Create artwork using shadows 

Year 4

States of Matter

Key Vocabulary	Key learning	Exploring
Solid, **liquid,** **gas,** **state change,** **melting,** **freezing,** **melting point,** **boiling point,** **evaporation,** **temperature,** **water cycle**	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 it is heated to 100°C. Evaporation is the same state change as boiling (liquid to gas) but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. 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.	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 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 Observe and measure temperature of icy water, tap water, hot water Observe water evaporating and condensing e.g. on cups of icy 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 

Year 5

Earth and Space

Key Vocabulary	Key Learning	Exploring Earth and Space
Earth, **Sun,** **Moon,** **(Mercury,** **Jupiter,** **Saturn, Venus,** **Mars, Uranus,** **Neptune)** **spherical,** **solar system,** **rotates,** **star,** **orbit,** **planets**	The Sun is a star. It is at the centre of our solar system. There are 8 planets These travel around the Sun in fixed orbits. Earth takes 365¼ 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.	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 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 

Teeth and Digestion

Key Vocabulary	Key learning	Exploring animals including humans
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	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). Living things can be classified as producers, predators and prey according to their place in the food chain.	Research the function of the parts of the digestive system Create a model of the digestive system using household objects Explore eating different types of food, to identify which teeth are being used for cutting, tearing and grinding (chewing) Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls 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 

Sound

Key Vocabulary	Key learning	Exploring sound
Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation	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. 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.	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 

Electricity

Key Vocabulary	Key learning	Exploring electricity
Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol	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 is a break in the circuit, a loose connection or a short circuit the component will not work. A switch can be added to the circuit to turn the component 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	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 

Living Things and Their Habitats

Key Vocabulary	Key learning	Exploring
Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	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 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	Observe plants and animals in different habitats throughout the year Compare and contrast the living things observed 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 Use secondary sources to find out about how environments may naturally change Use secondary sources to find out about human impact, both positive and negative, on environments