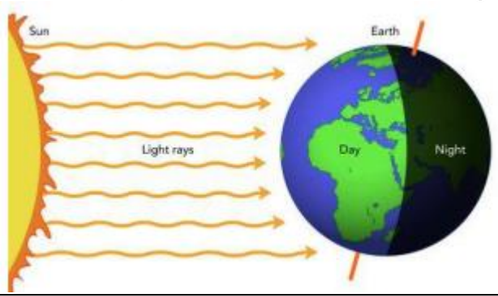
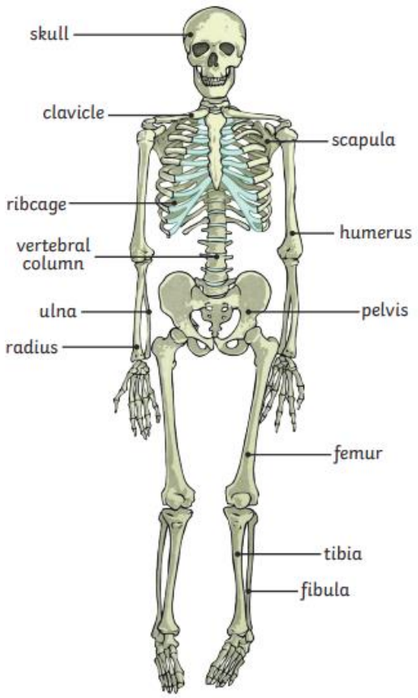
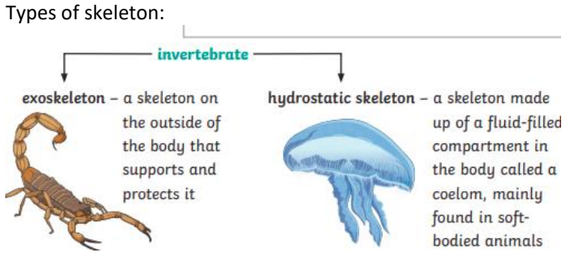
Stoke By Nayland Cof E Primary School

KS2 Science 4 Year Knowledge Cycle

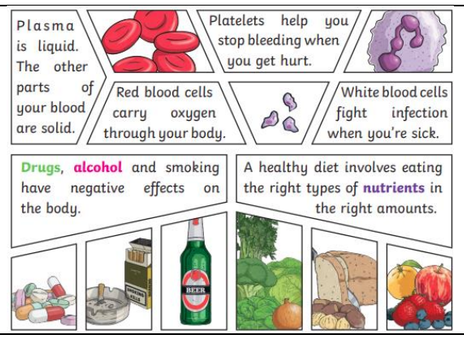
Cycle 1				
Cycle 1	**Purpose**	**Evidence**	**Characteristics**	**Key Vocabulary**
Plants	Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	 Celery and coloured water experiment Can explain the function of the parts of a flowering plant Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination Can give different methods of pollination and seed dispersal, including examples	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.	photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport
Earth and Space	recognise light from the sun can be dangerous and can find ways to protect my eyes. recognise that we need light in order to see things and that dark is the absence of light. Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	 The Moon orbits the Earth anti-clockwise and takes approximately 28 days. The Moon spins once on its axis every time it orbits Earth. This means that we only see one side of the Moon. The Moon has different phases depending on where it is in its orbit. At different times, the moon appears to be different shapes because the sun light up different parts of the moon as it moves around the Earth. The Moon's gravity causes high and low tides	Earth rotates on an axis. During the winter, the North Pole is tilted away from the Sun's rays. As Earth travels around the Sun, the tilt of Earth changes. By June, the North Pole is tilted towards the Sun and the days become very long. Earth takes a year to orbit the Sun and it is the tilt which creates the seasons. The Earth rotates one complete turn every 24 hours to give us day and night. Daytime occurs when the side of the Earth is facing the sun and night occurs when the side of the Earth is facing away from the sun. When Britain faces the Sun it is daytime in Britain but the other side of the world is in darkness. So, in Australia it is the middle of the night. 	Planet An object that orbits a star and does not emit its own light. Star A giant ball of gas held together by its own gravity and makes heat and light energy. Gravity The force that attracts an object towards a larger object. Orbit A curved path of a planet taken by one body circling around another body. The earth makes an orbit around the sun. Solar system The solar system consists of the Sun and everything that orbits, or travels around, the Sun. Astronomy Astronomy is the study of outer space and all of the objects and bodies outside of the Earth's atmosphere, like stars, planets and comets. Axis Astronomy is the study of outer space and all of the objects and bodies outside of the Earth's atmosphere, like stars, planets and comets. Time zone Time zones give specific areas on the Earth a time of day that is earlier or

			It appears to us that the Sun moves across the sky during the day but the Sun does not move at all. It seems to us that the Sun moves because of the movement of the Earth.	later than the neighbouring time zones. The time zone is dependent on the Earth's rotation. Sphere A round 3D shape in the shape of a ball. Sun A huge star that the Earth and other planets in our solar system orbit around. Moon A natural satellite which orbits Earth or other planets. Geocentric model A belief people used to have that other planets and the Sun orbited around the Earth. Heliocentric model The structure of the solar system where the planet orbits around the sun
Animals including Humans	Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat. Identify that humans and some other animals have skeletons and muscles for support, protection and movement	Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection Can describe how muscles and joints help them to move Food labels investigation	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 – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. 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.	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine
Food, teeth and digestive system	Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey.	Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part Can record the teeth in their mouth (make a dental record) Can explain the role of the different types of teeth Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores Can create food chains based on research 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.	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; and molars and premolars for grinding (chewing).	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
Circulatory system –affect of diet and exercise	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans	Can draw a diagram of the circulatory system and label the parts and annotate it to show what the parts do Produces a piece of writing that demonstrates the key knowledge e.g. explanation text, job description of the heart 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	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	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

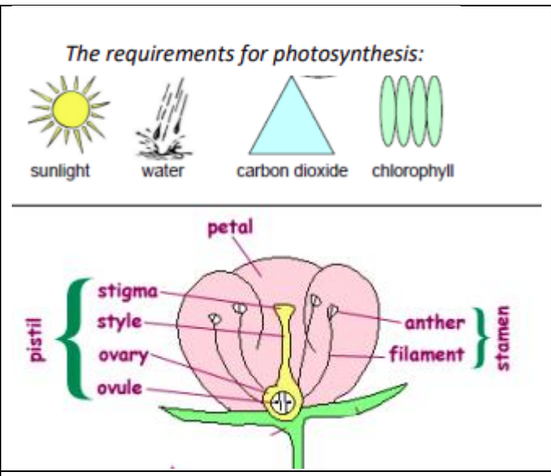
		observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate) pattern seeking – exploring recovery rate for different groups of people. Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources.	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. This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below: https://www.gov.uk/government/publications/relationships-education-relationships-and-sex-education-rse-and-health-education/physical-health-and-mental-wellbeing-primary-and-secondary	
Animals including humans – skeletons/muscles	• identify that humans and some other animals have skeletons and muscles for support, protection and movement		Types of skeleton:  Endoskeleton – a skeleton on the inside of the body that supports and protects it such as humans Skeletal muscles work in pairs to move the bones they are attached to by taking turns to contract (get shorter) and relax (get longer) Skeletons do three important jobs: protect organs inside the body; allow movement; support the body and stop it from falling on the floor	Vertebrae, invertebrate, muscles, tendons, joints

Cycle 2				
Cycle 2	**Purpose**	**Respect**	**Characteristics**	**Key Vocabulary**
Light	Recognise that they need light in order to see things, and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.	Can describe how we see objects in light and can describe dark as the absence of light Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses Can define transparent, translucent and opaque Can describe how shadows are formed Shadow Puppets	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	light, light source, Sun, sunlight, dangerous

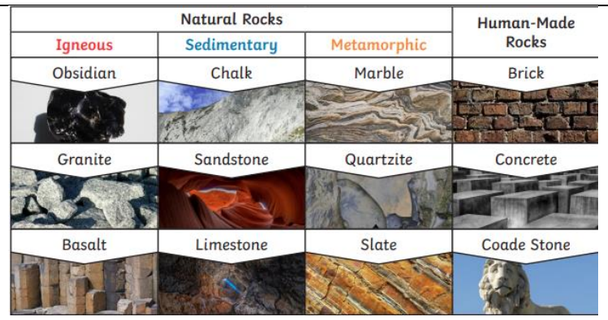
	Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change.	Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change Can clearly explain, giving examples, that objects are not visible in complete darkness Can describe and demonstrate how shadows are formed by blocking light Can describe, demonstrate and make predictions about patterns in how shadows vary	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.	
Rocks and soils **Forces and magnets**	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter Understand the work of Mary Anning Compare how things move on different surfaces. Notice that some forces need contact between two 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 two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing	Can name some types of rock and give physical features of each Can explain how a fossil is formed Can explain that soils are made from rocks and also contain living/dead matter Hardness of rock investigation Can give examples of forces in everyday life Can give examples of objects moving differently on different surfaces Can name a range of types of magnets and show how the poles attract and repel Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets Classification of materials according to whether they are magnetic Investigation to test magnet strength	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). 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 pieces 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 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.	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, soil, types of soil (e.g. peaty, sandy, chalk, clay) Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole
Animals including Humans – impact of diet and exercise	Consider how diet and exercise keeps us healthy 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. This content is also included in PSHE.	Blood transports: gases (mostly oxygen and carbon dioxide); nutrients (including water); waste products. If you linked up all of the body's blood vessels, including arteries, capillaries, and veins, they would measure over 60,000 miles.	Regular exercise: strengthens muscles including the heart muscle; improves circulation; increases the amount of oxygen around the body; releases brain chemicals which help you feel calm and relaxed; helps you sleep more easily; strengthens bones. It can even help to stop us from getting ill.	drug A substance containing natural or man-made chemicals that has an effect on your body when it enters your system. alcohol A drug produced from grains, fruits or vegetables when they are put through a process called fermentation. nutrients Substances that animals need to stay alive and healthy

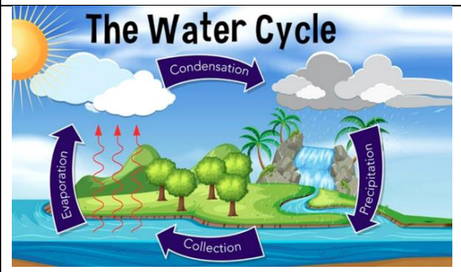
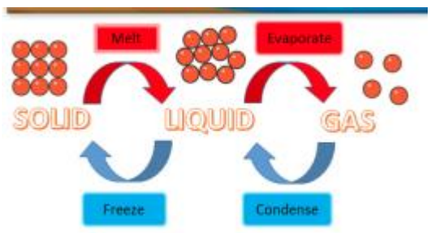
				
Changes in states of matter/ properties and changes in materials	Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Can give reasons to justify why something is a solid liquid or gas Can give examples of things that melt/freeze and how their melting points vary From their observations, can give the melting points of some materials Using their data, can explain what affects how quickly a solid melts Can measure temperatures using a thermometer Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup From their data, can explain how to speed up or slow down evaporation Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration). 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.	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 0oC. 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 100oC. 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. Condensation is the change back from a gas to a liquid caused by cooling.	solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature,
Electricity	Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.	Can name the components in a circuit Can make electric circuits Can control a circuit using a switch Can name some metals that are conductors Can name materials that are insulators 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	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.	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
Sound	Identify how sounds are made, associating some of them with	Can name sound sources and state that sounds are produced by the vibration of the object	A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as	

	something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases.	Can state that sounds travel through different mediums such as air, water, metal Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases Explore how string telephones or ear gongs work.  Explore altering the pitch or volume of objects, such as the length of a guitar string, amount of water in bottles, size of tuning forks. Measure sounds over different distances. Measure sounds through different insulation materials.	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.	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation
Cycle 3	**Purpose**	**Evidence**	**Characteristics**	**Key Vocabulary**
Earth and space	Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of the Moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.	Can create a voice over for a video clip or animation Can show, using diagrams, the movement of the Earth and Moon Can explain the movement of the Earth and Moon Can show using diagrams the rotation of the Earth and how this causes day and night Can explain what causes day and night 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.	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 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 (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.	Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit

Plants	Understanding the importance of plants and pollination Consideration of pollinators and their key role in our food chain Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.		Characteristics of Living Things – MRS NERG/MRS GREN M Movement Animals move around, plants grow toward light and their roots grow into the soil. R Respiration The process of using oxygen to turn food into energy. S Sensitivity Living things react to their environment. N Nutrition Food provides energy for plants and animals to live. E Excretion Removing waste products from the body. R Reproduction Animals have babies & plants grow from seeds. G Growth Animals and plants both develop over time Chlorophyll is a green substance found inside leaves which is responsible for absorbing light.	Roots, stem, leaves, petal, flower, seed, pollen, Ovule, Stamen, Pistil Nutrient, pollination, pollinator, fertilisation, seed dispersal, photosynthesis
Animals including humans	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the life process of reproduction in some plants and animals.	Can draw the life cycle of a range of animals identifying similarities and differences between the life cycles Can explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways 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 plants, potatoes. Take cuttings from a range of plants e.g. African violet, mint. Can compare two or more animal life cycles they have studied Can explain how a range of plants reproduce asexually	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	life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, bulbs, cuttings
Materials and their properties	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might	Can use understanding of properties to explain everyday uses of materials, for example, how bricks, wood, glass and metals are used in buildings Can explain what dissolving means, giving examples Can name equipment used for filtering and sieving Can use knowledge of liquids, gases and solids to suggest how materials can be recovered from solutions or mixtures by evaporation, filtering or sieving Can describe some simple reversible and non-reversible Key vocabulary changes to materials, giving examples	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.	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

	be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).	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? Investigate rates of dissolving by carrying out comparative and fair test.	Can group solids based on their observations when mixing them with water Can give reasons for choice of equipment and methods to separate a given solution or mixture such as salt or sand in water Can explain the results from their investigations	
Circulatory system – living things and their habitats	Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things.	Can name living things living in a range of habitats, giving the key features that helped them to identify them Can give examples of how an environment may change both naturally and due to human impact Can keep a careful record of living things found in different habitats throughout the year (diagrams, tally charts etc.) Can use classification keys to identify unknown plants and animals Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter Create a simple classification chart based on observable features Fieldwork to explore human impact on the local environment – tree planting litter	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. 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.	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate
Forces	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction that act between moving surfaces. Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	Can demonstrate the effect of gravity acting on an unsupported object Can give examples of friction, water resistance and air resistance Can give examples of when it is beneficial to have high or low friction, water resistance and air resistance Can demonstrate how pulleys, levers and gears work Can explain the results of their investigations in terms of the force, showing a good understanding that as the object tries to move through the water or air or across the surface the particles in the water, air or on the surface slow it down Can demonstrate clearly the effects of using levers, pulleys and 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.	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

		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.		
Cycle 4	**Purpose**	**Evidence**	**Characteristics**	**Key Vocabulary**
Light	Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	Can describe, with diagrams or models as appropriate, how light travels in straight lines either from sources or reflected from other objects into our eyes Can describe, with diagrams or models as appropriate, how light travels in straight lines past translucent or opaque objects to form a shadow of the same shape 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	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.	Light, plus straight lines, light rays
Rocks and soils	An animal dies. It gets covered with sediments which eventually become rock. More layers of rock cover it. Only hard parts of the creature remain, e.g. bones, shells and teeth. Over thousands of years, sediment might enter the mould to make a cast fossil. Bones may change to mineral but will stay the same shape. Changes in sea level take place over a long period. As erosion and weathering take place, eventually the fossil becomes exposed.	3 types of naturally occurring rock Igneous Sedimentary Metamorphic Some words you might use to discuss the properties of a rock: hard, soft, permeable, impermeable, durable (meaning resistant to weathering), high density, low density. Density measures how 'bulky' the rock is (how tightly packed the molecules are).	 Soil is the uppermost layer of the Earth. It is a mixture of different things: minerals (the minerals in soil come from finely broken-down rock); • air; • water; • organic matter (including living and dead plants and animals)	igneous rock Rock that has been formed from magma or lava. sedimentary rock Rock that has been formed by layers of sediment being pressed down hard and sticking together. You can see the layers of sediment in the rock. metamorphic rock Rock that started out as igneous or sedimentary rock but changed due to being exposed to extreme heat or pressure. magma Molten rock that remains underground. lava Molten rock that comes out of the ground is called lava. sediment Natural solid material that is moved and dropped off in a new place by water or wind, e.g. sand. permeable Allows liquids to pass through it. impermeable Does not allow liquids to pass through it.
Animals including humans **Evolution and inheritance**	Describe the changes as humans develop to old age Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring	Can explain the changes that takes place in boys and girls during puberty Can explain how a baby changes physically as it grows, and also what it is able to do Can present information about the changes occurring during puberty as an information leaflet for other children or answers to 'problem page questions' Can explain the process of evolution	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. The new statutory requirements for relationships and health education can be found below: https://www.gov.uk/government/publications/relationships-education-relationships-and-sex-education-rse-and-health-	Puberty – the vocabulary to describe sexual characteristics offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution

	vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	Can give examples of how plants and animals are suited to an environment Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth Give examples of living things that lived millions of years ago and the fossil evidence we have to support this Can give examples of fossil evidence that can be used to support the theory of evolution 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.	education/physical-health-and-mental-wellbeing-primary-and-secondary 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.	
States of matter – water cycle	To understand the water cycle To consider how the water cycle impacts on life cycles	 	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. SOLID - Stays the same shape, can be held in your hands and can be cut into a new shape. Examples – wood, metal, rock, ice LIQUID - Flows and can be poured, changes shape to its container and volume never changes. Examples – water, juice, oil GAS - Often invisible, always fills its container and shape & volume change. Examples – oxygen, hydrogen, carbon dioxide The Water Cycle - Water cannot be made, it is constantly recycled through the Water Cycle. Water in seas, oceans, rivers and lakes is heated by the Sun and evaporates, changing from liquid to a gas (water vapour) that rises into the air. The water vapour condenses as it cools and changes back into tiny drops of water, forming clouds. The clouds get blown over high ground, where the water falls back to Earth as rain, snow, sleet or hail, called precipitation. The rainwater runs off the land into rivers and streams and travels back to the sea. The cycle then starts again.	changing state The physical process where matter moves from one state to another. Water Cycle The process in which water is constantly recycled. boil To reach the temperature at which it bubbles and turns to vapour (100° C). freeze To reach the temperature at which liquid water turns into ice (0°C). solid The shape of a solid does not change on its own – it is rigid. liquid The shape of a liquid does change, it is not rigid. It fits the shape of the container it is put in. evaporate/ evaporation The process of a liquid heating up and changing to gas. condense/ condensation The process of a gas cooling down and changing into a liquid. precipitate/ precipitation Rain, snow, sleet or hail that falls to the ground from clouds. climate The usual weather patterns of a place. collection The process of water gathering in oceans, rivers, lakes and streams
Electricity	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.	Explain how a circuit operates to achieve particular operations, such as to control the light from a torch with different brightness's or make a motor go faster or slower.	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	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage N.B. Children do not need to understand what voltage is, but will use

	Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.	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 DT project	will spin more slowly and each buzzer will be quieter. 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. You can use recognised circuit symbols to draw simple circuit diagrams.	volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably.
Sound	Understanding the effect of sound on the ear Understand how sound travels	Sound is a type of energy. Sounds are created by vibrations. The louder the sound, the bigger the vibration. Pitch is a measure of how high or low a sound is. A whistle being blown creates a high-pitched sound. A rumble of thunder is an example of a low-pitched sound You can change the pitch of a sound in different ways depending on the type of instrument you are playing. For example, if you are playing a xylophone, striking the smaller bars with the beater causes faster vibrations and so a higher pitched note. Striking the larger bars causes slower vibrations and produces a lower note.	Sound can travel through solids, liquids and gases. Sound travels as a wave, vibrating the particles in the medium it is travelling in. Sound cannot travel through a vacuum. When you hit the drum, the drum skin vibrates. This makes the air particles closest to the drum start to vibrate as well. The vibrations then pass to the next air particle, then the next, then the next. This carries on until the air particles closest to your ear vibrate, passing the vibrations into your ear. If you throw a stone in a pond, it will produce ripples. As the ripples spread out across the pond, they become smaller. When sound vibrations spread out over a distance, the sound becomes quieter, just like ripples in a pond.	Vibration, sound wave, volume, amplitude, pitch Ear, particles, distance, soundproof, absorb sound, vacuum, eardrum