Year	6	Topic	Living things and their habitats

National curriculum aims

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.
- Give reasons for classifying plants and animals based on specific characteristics.

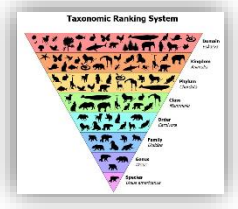
Prior learning	Key vocabulary
• Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)	vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, warm-blooded, cold-blooded, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

To know the 7 life processes: Movement, respiration, sensitivity, nutrition, excretion, reproduction and growth. (Mrs Nerg)

To know that 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. To revise that animals can be divided into two main groups: those that have backbones (vertebrates) and those that do not (invertebrates) – (Year 4 learning).



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.

To know that Carl Linnaeus created a system for naming plants and animals—a system we still use today. This system whereby each species of plant and animal is given a genus name, followed by a specific name (species), with both names being in Latin.

To be able to identify types of microorganisms and describe how different types can help and harm us.

To investigate the conditions in which mould grows on bread (See below)

Key vocabulary with definitions			
vertebrates	Vertebrates are organisms which have an internal backbone	**warm blooded**	Animals which maintain a constant body temperature, typically above that of the surroundings. (Birds / mammals)
fish	A cold-blooded animal with gills and fins, which lives in water. (A vertebrate)	**cold blooded**	Animals whose body temperature varies with that of the environment. (Reptiles and fish)
amphibians	A cold-blooded animal of a class that is gill-breathing when young and lung-breathing at the adult stage.	**insects**	A small animal that has six legs, three body parts and one or two pairs of wings
reptiles	A cold-blooded animal that has a dry scaly skin and typically laying soft-shelled eggs on land.	**flowering**	A plant in bloom or producing flowers
birds	A warm-blooded egg-laying animal that has feathers, wings, a beak, and typically is able to fly.	**non-flowering**	A plant that produces no flowers
mammals	A warm-blooded animal that has hair or fur, females that secrete milk for young, and (typically) give birth of live young	**mosses**	A small flowerless green plant that grows in damp habitats
invertebrates	Invertebrates are organisms which do not have an internal backbone. Many have a shell instead.	**ferns**	A flowerless plant which has feathery or leafy fronds. (The leaf like part)
		conifers	A tree that has cones and needle-like leaves. They are typically evergreen.

Common misconceptions
Some children may think: • all micro-organisms are harmful • mushrooms are plants.

Activities	Possible evidence
• 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 e.g. Venn diagrams, Carroll diagrams and keys. • Create an imaginary animal which has features from one or more groups. • To investigate the growth of mould on bead. (See 'working scientifically' below)	**For ARE** • Can give examples of animals in the five vertebrate groups and some of the invertebrate groups • Can give the key characteristics of the five vertebrate groups and some invertebrate groups • Can compare the characteristics of animals in different groups • Can give examples of flowering and non-flowering plants • Can use classification materials to identify unknown plants and animals • Can create classification keys for plants and animals • Can give a number of characteristics that explain why an animal belongs to a particular group **For GD** • Devise own keys to classify organisms and objects • Describe early ideas about classification (e.g. Aristotle) • Compare the rate of reproduction in microorganisms to other animals • Describe how the development of the microscope has contributed to our understanding of microorganisms • Describe how ideas about hygiene have changed over time (e.g. Semmelweis)
Future learning	
• Differences between species. (KS3)	

Working scientifically skills covered in this topic

Setting up fair tests	➢ Does the amount of light affect the growth of the mould?
Using other sources of information	➢ Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important.
Identifying and classifying	➢ Classify living things according to common characteristics. ➢ Dichotomous key for animals. ➢ Identify how we can stop food getting mouldy. ➢ Create an imaginary animal which has features from one or more groups.
Explaining results	➢ Draw conclusions on the growth of mould on the bread.

Year	6	Topic	Animals, including humans

National curriculum aims

- 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.

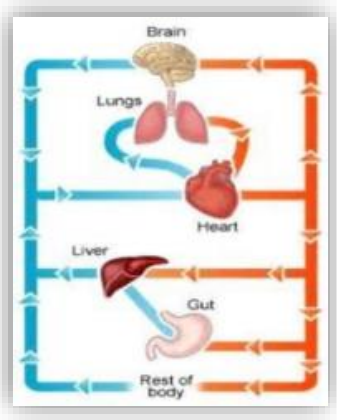
Prior learning	Key vocabulary
• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

To know that 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.

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



Key vocabulary with definitions			
heart	The muscular organ that pumps the blood through the circulatory system by rhythmic contraction and dilation.	**oxygen**	Oxygen is a colourless, odourless, tasteless gas that is essential to living organisms. It is a part of the air around us.
pulse	A rhythmical throbbing of the arteries as blood is propelled through them,	**carbon dioxide**	A colorless, odorless gas that is a waste product made by the body. Breathing out clears carbon dioxide from the lungs.
rate	The measure or frequency of the pulse.	**nutrients**	A substance that provides nourishment essential for the maintenance of life and for growth.
pumps	The force to move the blood around the circulatory system	**muscles**	A band of tissue in a human or animal body that has the ability to contract, producing movement or maintaining the position of parts of the body.
blood	The red liquid that circulates in the arteries and veins of humans and animals, carrying oxygen to and carbon dioxide from the body	**circulatory system**	The system that circulates blood and through the body, consisting of the heart, veins, arteries, capillaries and blood.
blood vessels	The tubes that carry blood around the body; a vein, artery, or capillary	**diet**	The kinds of food that a human or animal eats.
transported	To take or carry blood from one place in the body, to another.	**drugs**	A medicine or other substance, which has a physiological effect when introduced into the body.
lungs	A pair of organs in the chest that supplies the body with oxygen, and removes carbon dioxide from it.	**lifestyle**	The way in which a person lives their life.

Common misconceptions

Some children may think:

- your heart is on the left side of your chest
- the heart makes blood
- the blood travels in one loop from the heart to the lungs and around the body
- when we exercise, our heart beats faster to work the muscles more
- some blood in our bodies is blue and some blood is red
- we just eat food for energy
- all fat is bad for you
- all dairy is good for you
- protein is good for you, so you can eat as much as you want
- foods only contain fat if you can see it
- all drugs are bad for you.

Activities	Possible evidence
• 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. 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.	**For ARE** • 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 • Use the role play model to explain the main parts of the circulatory system and their role • Can use subject knowledge about the heart whilst writing conclusions for investigations • Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body • Present information e.g. in a health leaflet describing impact of drugs and lifestyle on the body
Future learning	

• The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3) • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3) • The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3) • The mechanism of breathing to move air in and out of the lungs. (KS3) • The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)	**For GD** • explain the effect of diet on particular organs of the body / aspects of health • explain the effect of exercise on particular organs of the body/aspects of health • explain how ideas about the circulatory system have changed over time • explain how ideas about smoking have changed over time • explain why advice on diet changes • (e.g. butter vs margarine, five a day, tax on sugary drinks)

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions in investigations (see below tests carried out)
Setting up fair tests	➢ To investigate how exercise effects the heart
Measuring	➢ Measure their own pulses, following a series of exercises.
Using other sources of information	➢ To know the main parts of the circulatory system. ➢ To understand how the circulatory system works
Recording	➢ Repeated reading of their own pulse, following a variety of exercises.
Explaining results	➢ Draw conclusion as to the effect of exercise on the heart.

Year	6	Topic	Evolution and Inheritance

National curriculum aims

- 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 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.

Prior learning	Future learning
• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)	offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution

What pupils need to know or do to be secure

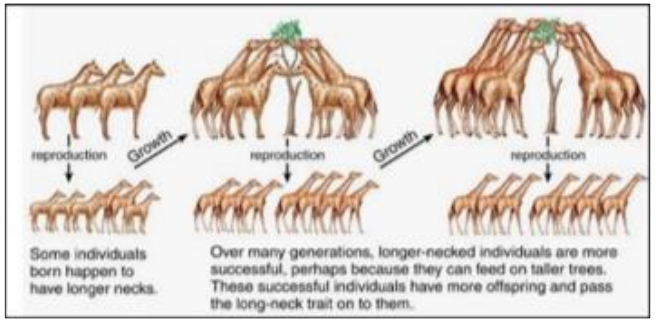
Key learning

To know that 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.

To know that 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.



Key vocabulary with definitions			
Offspring	An animal's young, including a person'	**Inherited**	The passing on of traits from parents to their offspring.
Sexual reproduction	This occurs when the sperm from the male fertilizes an egg from the female, producing an offspring.	**Species**	A group of organisms that can reproduce with one another in nature and produce offspring
Vary	The difference between organisms caused either by genetic differences or environmental factors	**Fossils**	The preserved remains of plants and animals whose bodies were buried in sediments, such as sand and mud, under water.
Characteristics	A distinguishing quality, trait, or feature of an individual. Often a distinctive mark, feature or attribute.	**Evolve**	The change in the properties of groups of organisms over the course of generations.
Suited	Adapted in a way that an organism is able to live and reproduce offspring in an environment.	**evolution**	The change in the characteristics of a species over several generations.
Adapted	The adjustment of organisms to their environment in order to improve their chances at survival in that environment.	**Environment**	The place where organisms live or occupy.

Common misconceptions

Some children may think:

- adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life
- offspring most resemble their parents of the same sex, so that sons look like fathers
- all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited
- cavemen and dinosaurs were alive at the same time.

Activities	Possible evidence
• 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 and 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.	**For ARE** • Can explain the process of 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 • Can identify characteristics that will make a plant or animal suited or not suited to a particular habitat • Can link the patterns seen in the model to real examples • Can explain why the dominant colour of the peppered moth changed over a very short period of time
Future learning	

• Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3) • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3) • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3) • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)	**For GD** • explain that animals which are better adapted to an environment are more likely to survive, reproduce and pass on characteristics to their offspring meaning the animal species will gradually change and evolve (giraffe with the tallest neck could reach more leaves to feed on) • describe the story of the peppered moth and how this provides evidence for natural selection • explain how antibiotic resistant bacteria provide evidence for natural selection • explain why we can see evidence for natural selection in fast reproducing organisms like bacteria (e.g. antibiotic resistant bacteria and pesticide resistant insects) • explain how the introduction of a new species to an isolated environment can affect native species (e.g. Dodo, Kakapo or Stephen's Island Wren) • compare the ideas of Darwin and Lamarck about evolution

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions in investigations (see below tests carried out)
Setting up fair tests	➢ Investigate how a different sized / shaped beak can affect the diet of a bird.
Observing	➢ Observe the types of food that different beak shapes are able to pick up
Measuring	➢ Count the amount of pieces of food that the different beaks can pick up.
Using other sources of information	➢ Use secondary sources to learn about: 1. Inherited characteristics and variation. 2. Adaptions and mutations. 3. How human intervention can effect evolution.
Recording	➢ Repeated readings during the investigation, including taking an average
Explaining results	➢ Draw a conclusion as to whether beak shape supports Darwin's idea about natural selection

Year	6	Topic	Light

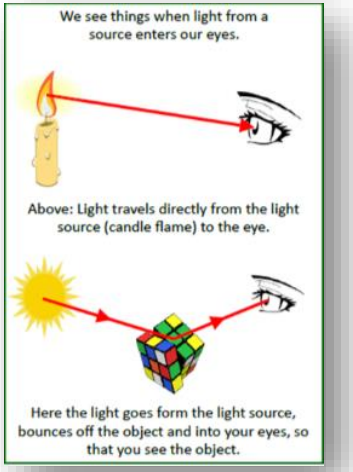
National curriculum aims

- 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.

Prior learning	Key vocabulary
• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light) • Notice that light is reflected from surfaces. (Y3 - Light) • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light) • Find patterns in the way that the size of shadows change. (Y3 - Light) • 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. (Y5 - Properties and changes of materials)	• Year 3 - light, light source, Sun, sunlight, dangerous • Year 6 - Straight lines, light rays, reflection, refraction, shadow

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

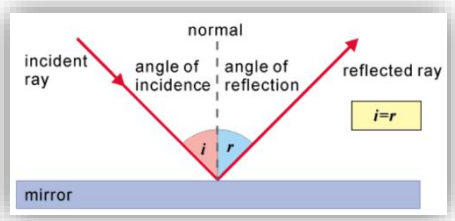


To know that **Light** appears to travel in **straight lines**, and we see objects when light (from a light source) reflects off them and goes into our eyes. The light may come directly from **light sources** or **reflected** off a surface (such as the moon), then into our eyes. (Children create a model representing the way in which we see things.)

To know that all surfaces reflect light, which enables us to see them. However, shiny surfaces reflect light better than dull surfaces, which absorb more of the light. Also that smooth and rough surfaces reflect light differently.

To know that smooth and shiny surface reflect all the rays of light at scattering the rays of light like rough or dull surfaces. The light ray object is described as the incident ray, and the ray of light that reflected ray. On shiny, smooth surfaces – such as a mirror – the size as the angle of reflection.

When light travels from air to water, it changes speed (slows down), slightly. This change in direction is called **refraction**. **Refraction** makes shape to the one they actually are.



the same angle, rather than that hits the mirror or other bounces off is known as the angle of incidence is the same

causing it to change direction objects appear to be a different

Common misconceptions

Some children may think:

- We see objects because light travels from our eyes to the object.

Activities

- 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.

Future learning

- The similarities and differences between light waves and waves in matter. (KS3)
- Light waves travelling through a vacuum; speed of light. (KS3)
- The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)
- Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3)
- Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3)
- Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)

Possible evidence

- 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
- Can explain how evidence from enquiries shows that light travels in straight lines
- Can predict and explain, with diagrams or models as appropriate, how the path of light rays can be directed by reflection to be seen, e.g. the reflection in car rear view mirrors or in a periscope
- Can predict and explain, with diagrams or models as appropriate, how the shape of shadows can be varied

Key vocabulary with definitions

Light	• The natural agent that makes things visible	**reflection**	• When light 'bounces' back off a surface, rather than it being absorbed
Light source	• Something that makes its own light	**Light rays**	• A path that light takes through space, visible as a column of light
Sun	• The star around which the Earth orbits	**shadow**	• A dark area produced by an object coming between rays of light and a surface

Sunlight	• Light from the sun	**refraction**	• The change in direction of light, as a result of its travelling at different speeds through different materials.
transparent	• Allows light to pass through, so that objects can be seen clearly	**vacuum**	• A space that has nothing in it, including air
opaque	• Not able to be seen through • An object that does not let light pass through it.	**Angle of incidence, angle of reflection and the normal**	The angle between the **incident ray** and the **normal** is equal to the angle between the **reflected ray** and the **normal**
translucent	• Allows light, but not detailed shapes, to pass through; semi-transparent.		

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions in investigations (see below tests carried out)
Setting up fair tests	➢ Investigate how light refracts in water and glass
Choosing and using equipment	➢ Use source of light (torch) and a mirror to prove that: 1. Light travels in a straight line. 2. The angle of reflection is equal to the angle of incidence
Observing	➢ Observe the effects of refraction
Measuring	➢ Measuring the angle of incidence and the angle of reflection.

Year	6	Topic	Electricity

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- 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.

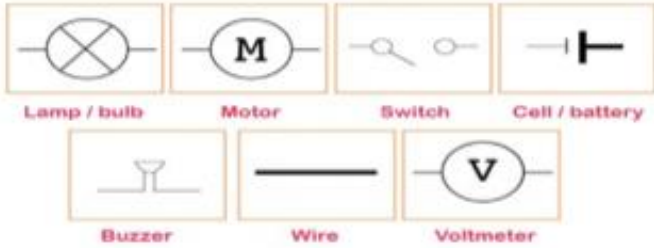
Prior learning	Key vocabulary
• Identify common appliances that run on electricity. (Y4 - Electricity) • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity) • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. (Y4 - Electricity) • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity) • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

To know that:

- Electricity can flow through components in a complete electrical circuit.
- A circuit always needs a power source - such as a cell (or battery) - with wires connected to both the positive (+) and negative (-) ends.
- A circuit can also contain other electrical components, such as bulbs and buzzers, which allow electricity to pass through.
- There are symbols that represent the different components in a circuit.
- The more cells that are used in a circuit, the higher the voltage. A higher voltage results in a brighter bulb or louder buzzer.
- Different cells can have different voltages.
- Mains electricity is 240 volts and can be extremely dangerous if used incorrectly.



Key vocabulary with definitions			
Circuit	A complete circular path that electricity flows through.	**Bulb**	An electrical component that produces light.
Complete circuit	As above	**Buzzer**	An electrical device that is used to make a buzzing sound.
Circuit diagram	A diagrammatic representation of an electrical circuit.	**Motor**	An electrical device that is used to turn something.
Circuit symbol	A symbol that represents a component in an electrical circuit.	**Switch**	An electrical component that is used to turn a circuit on or off.
Cell	A device used to power electrical circuits, such as a 'battery'.	**Voltage**	The measure of how much electricity flows through a circuit.
Battery	A container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power		

Common misconceptions

Some children may think:

- larger-sized batteries make bulbs brighter
- a complete circuit uses up electricity
- components in a circuit that are closer to the battery get more electricity.

Activities	Possible evidence

- Explain how a circuit operates to achieve particular operations, such as to control the light from 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 DT project.

Future learning

- Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3)
- Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3)
- Differences in resistance between conducting and insulating components (quantitative). (KS3)
- Static electricity. (KS3)

For ARE

- Can make electric circuits and demonstrate how variation in the working of particular components, such as the brightness of bulbs, can be changed by increasing or decreasing the number of cells or using cells of different voltages
- Can draw circuit diagrams of a range of simple series circuits using recognised symbols
- Can incorporate a switch into a circuit to turn it on and off
- Can change cells and components in a circuit to achieve a specific effect
- Can communicate structures of circuits using circuit diagrams with recognised symbols
- Can devise ways to measure brightness of bulbs, speed of motors, volume of a buzzer during a fair test
- Can predict results and answer questions by drawing on evidence gathered

For GD

- explore the effect of thickness of a wire in a circuit
- describe the differences between wires usually used for circuits and fuse wires
- describe what would happen if all lights in a home were connected in the same circuit and one broke
- explain current in circuits using simple models and analogies (e.g. piped water, bicycle chain, children and sweets)

Working scientifically skills covered in this top

Asking questions	➢ Asking questions in investigations (see below tests carried out)
Setting up fair tests	➢ Investigate the effect of different voltages on a circuit, including: 1. The brightness of a bulb 2. The loudness of a buzzer
Choosing and using equipment	➢ Use bulbs, buzzers, cells, wires and switches to vary the voltage in a circuit. ➢ Use a light meter (Log box) to measure the brightness of light in Lux (Lx) and the volume of a buzzer (dB).
Observing	➢ Observing bulbs and listening to sound levels.
Measuring	➢ Use of a Log Box, see above.
Recording	➢ Repeated recordings from Log Box, including light (Lux) and sound level (dB)
Identifying and classifying	➢ Identify circuit symbols.
Explaining results	➢ Conclude the effects of voltage on a circuit