Year 5 and 6 – Cycle A

Autumn 1

Electricity					
Lesson Sequence					
Review insulators and conductors. Explore what electricity is and how it is generated.	Use recognised symbols when representing a simple circuit in a diagram.	Explore what a cell is and how it works.	Introduce term voltage. Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit Investigate variations in components functions changing the brightness of bulbs and loudness of buzzers.	Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers. Investigate the impact of changing the position of the on/off switch	Use knowledge of how to change the function of components by changing the position of a switch and voltage/number of cells to design and make their own product e.g. burglar alarm, traffic lights.
Substantive Knowledge					
Electricity is a form of energy resulting from charged particles. **Electrical conductor** – a material that allows electricity to pass through it e.g. copper, iron, steel, silver gold. **Electrical insulator** – does not allow electricity to pass through e.g. rubber, wood, plastic, paper. In order for electricity to flow, a circuit needs: a source of electricity, no gaps in the circuit, conductors.	**Circuit symbols** can be used to draw a simple series circuit including: • Battery (cell) • Wire • Bulb Buzzer • Motor • Switch (on/off)	A **cell** is a device containing electrodes that is used for generating current. A **battery** is a collection of cells. It stores energy until it is needed. **Voltage** is the force that makes the electric current move through the wires. The greater the voltage, the more current will flow. Mains electricity has a voltage of 210-240 volts. A typical cell in school has 1.5 volts. **Current** is a flow of electricity which results from the ordered,	The brightness of a bulb is associated with the voltage. More batteries (or a higher voltage) creates more power to flow through the circuit a bulb would therefore be brighter. More buzzers/bulbs in a circuit means that power is shared by more components in the circuit. Increasing the number of buzzers/bulbs/motors would therefore decrease the power in each (the bulbs would be dimmer).		**Switch** – an electrical component that can make/break an electrical circuit. When a switch is open there is a gap in the circuit and electricity cannot flow around the circuit.

		directional movement of electrically charged particles.		
Disciplinary Knowledge				
Methods: **Classifying** Classifying is when something is grouped or ordered into categories based on properties or criteria. Know that these materials can be classified as conductors or insulators: - Copper tape - Metal paperclip - Plastic paperclip - Rubber **Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. Outputs are achieved when there is a complete circuit. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry.	**Methods:** **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. **Data analysis:** Circuits can be represented as diagrams using symbols for each component Know how to draw a circuit diagram: • Wires are drawn with a straight line using a ruler • Circuit diagrams are drawn as a birds-eye-view • Circuit diagrams are drawn rectangular • Components of the circuit must touch the wire lines to show the circuit has no breaks	**Methods:** **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. Know that a pattern seeking enquiry can be carried out to investigate how increasing the number of cells, increases the voltage. **Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. We measure the amount of electrical energy (voltage) in Volts. A volt metre is used to measure voltage. To attach a voltmeter to a circuit, use wires that touch the circuit. Do not touch the metal parts of wires- use the plastic coating to manoeuvre	**Methods:** **Fair test** A fair test is when one variable is changed and the others remain constant. A variable is a factor that can change. **Apparatus & techniques:** A light meter can be used to measure the brightness of a bulb. The light meter must be held against the bulb. The brightness of a bulb is measure in amps. **Data analysis:** Know that different types of graphs are best suited to presenting different types of information. Know how to select the most appropriate type of graph to display the data you have.	**Methods:** **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking enquiry can be carried out to identify that different components can be used within a circuit for different purposes. **Data analysis:** Know that scientific diagrams e.g. circuit diagrams can aid scientific explanations. **Evidence to develop explanations:** Conclude that a complete circuit creates an output, which can be used for a specific purpose.

Conclude that effective circuits are created with an electricity source and conductors.		A line graph is a graph that is used to display change over time. A series of data points are connected by a straight line. Know how to draw a line graph and that appropriate scales need to be selected for each axis. Know that the axis on a line graph need to be labelled. A line graph can demonstrate the relationship between the increase of cells and voltage		

Year 5 and 6 – Cycle A

Autumn 2

Light					
Lesson Sequence					
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.	Understand that light can be bent when it is slowed down. (Refraction).	Recognise the white light can be split into 7 rainbow colours - the colours of the spectrum merge to make visible light.
Substantive Knowledge					
Light travels in straight lines.	Objects are seen because they give out or reflect light into the eye.	We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes	Shadows have the same shape as the objects that cast them. This is because light travels in straight lines and shadows are formed when an object blocks the light. Shadows get smaller as the object is moved towards the opaque surface.	When light passes through a denser material (such as water) it slows down and therefore appears to 'bend'. This is called **refraction**. The light changes direction as it has been slowed.	White light can be split into 7 rainbow colours - the colours of the spectrum merge to make visible light.
Disciplinary Knowledge					
Methods: **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. In order to prove that light travels in a straight line,	**Methods:** **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking enquiry can be carried out to		**Methods:** **<u>Fair Testing</u>** A fair test is when one variable is changed and the others remain constant. A variable is a factor that can change. An independent variable is a variable that the experimenter can control.	**Methods:** **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking enquiry can be carried out to	**Apparatus & techniques:** A torch is a light source. Prisms can be used to refract light. **Evidence to develop explanations:** To answer a scientific question, you need to identify evidence from

children conduct an investigation into how they can get a light beam to reach a target. **Apparatus & techniques:** A torch is a source of light. Mirrors can be used to reflect light. **Evidence to develop explanations:** Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry.	investigate how light reflects **Apparatus & techniques:** A torch is a source of light. Mirrors can be used to reflect light. **Data analysis:** A diagram can be used to show scientific concepts. A diagram is a picture that is labelled. Know how to draw a diagram to show how we see. **Evidence to develop explanations:** To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion. Know that scientific language should be used when explaining findings. To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion.		A dependent variable is the variable being tested and measured in the experiment. A fair test can be carried out to investigate how changing the distance of a light source from an opaque object affects the size of the shadow. **Apparatus & techniques:** A torch is a source of light. Distance between a light source and an object can be measured using rulers in m/cm/mm. 1m = 100cm 1cm = 10mm **Data analysis:** Recording results in a table To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion. **Evidence to develop explanations:** Know that scientific language should be used when explaining findings. Know that test results can be used to make	investigate how objects appear to change when placed in water due to light refraction. **Evidence to develop explanations:** To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion. Know that scientific language should be used when explaining findings. Know that scientific evidence is used to support ideas.	your scientific enquiry that supports your conclusion. Know that scientific language should be used when explaining findings. Know that scientific evidence is used to support ideas.

	Know that scientific language should be used when explaining findings. Know that test results can be used to make predictions to set up further fair tests		predictions to set up further fair tests.		

Year 5 and 6 – Cycle A

Spring

Forces						
Lesson Sequence						
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 water resistance between moving surfaces.	Identify the effects of air resistance between moving surfaces.	Identify the effect of friction between moving surfaces	Investigate levers and pulleys and understand that they allow a smaller force to have a greater effect.	Investigate how gears work and how they too allow a smaller force to have a greater effect.
Substantive Knowledge						
A **force** is a push or a pull that causes an object to move faster or slower, stop, change direction or change size or shape. **Gravity** is the name of the force which pulls everything down towards the centre of the Earth.	**Mass** is the amount of matter or substance that makes up an object. **Weigh**t is the measure of the force of gravity.	**Water resistance** is a type of friction between water and another material. E.g. when a boat sails through a body of water, water particles hit the boat making it more difficult for it to move through the water.	**Air resistance** is a type of friction between air and another material. E.g. when an aeroplane flies through the air, air particles hit the aeroplane making it more difficult for it to move through the air.	**Friction** is the action of one surface rubbing against another which slows or speeds up movement. E.g. a smooth surface creates less friction than a rough surface.	**Levers** are machines used to increase force. They allow a smaller force to have a greater effect	**Gears** can be used to allow a smaller force to have a greater effect.
Disciplinary Knowledge						
Methods: **<u>Researching using secondary sources</u>** Research is an investigation or study to find out	**Methods:** **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be	**Methods:** **<u>Comparative testing</u>** A comparative test is when you test and compare	**Methods:** **<u>Comparative testing</u>** A comparative test is when you test and compare	**Methods:** **<u>Comparative testing</u>** A comparative test is when you test and compare different cases and situations.	**Methods:** **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be controlled to notice patterns.	**Methods:** **<u>Pattern seeking</u>** Pattern seeking is when you observe variables that cannot be controlled to notice patterns.

facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. You can uses secondary sources of information to investigate why an unsupported object falls to the ground (Isaac Newton's theory). **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you	controlled to notice patterns. Variables are anything that can change or be changed. Pattern seeking enquires can help explain scientific phenomena e.g. the relationship between weight and mass. We measure the size of a force in newtons using a newton metre. We measure mass in g/kg using electronic scales. 1kg = 1000g. Know that a table is a simple way to present data collected in a pattern seeking investigation. Know how to draw a table as a simple way to present data.	different cases and situations. A variable is a factor that can change. A comparative test can be carried out to investigate effect of water resistance as an object moves through liquid **Apparatus & techniques:** We measure time in s/ms using a stopwatch. 1 minute = 60 seconds We measure mass in kg/g using electronic scales. 1kg – 1000g It is important to repeat measurements to make sure your results are reliable. **Data analysis:** A bar chart is a chart that has	different cases and situations. A variable is a factor that can change. A comparative test can be carried out to investigate the effect of air resistance on an object. **Apparatus & techniques:** We measure time in s/ms using a stopwatch. 1 minute = 60 seconds It is important to repeat finding to make sure your results are reliable. **Data analysis:** Know that a scatter graph is a way to present two sets of data to look for connections. Know how to draw a scatter graph. A scientific diagram can be	A variable is a factor that can change. A comparative test can be carried out to investigate the impact of friction on how a hovercraft moves over different surfaces. **Apparatus & techniques:** We can measure distance using a metre stick to the nearest half cm. 1m = 100cm **Data analysis:** Know that a table is a simple way to present data collected in an investigation. Know how to draw a table as a simple way to present data. A scientific diagram can be used to explain a scientific concept. A diagram is a picture that is usually labelled. **Evidence to develop explanations:** A causal relationship is when one thing is responsible for causing the occurrence of another thing. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.	Variables are anything that can change or be changed. Pattern seeking enquiries can be carried out to find out the effects of different sized pulleys and leavers. **Apparatus & techniques:** We can measure force in Newtons using force metres **Data analysis:** Know that a table is a simple way to present data collected in a pattern seeking investigation. Know how to draw a table as a simple way to present data. A scientific diagram can be used to explain a scientific concept. A diagram is a picture that is usually labelled. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question e.g. 'How does size of the	Variables are anything that can change or be changed. Pattern seeking enquiries can be carried out to find out the effect different sized gears have on the movement of an object **Apparatus & techniques:** We can measure force in Newtons using force metres. **Data analysis:** Know that a table is a simple way to present data collected in a pattern seeking investigation. Know how to draw a table as a simple way to present data **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question e.g. 'How does size of the _____effect the force needed to move the object. To answer a scientific question, you should

should include evidence from your scientific enquiry. Know that scientific evidence has been used to prove the theory of gravity.	**Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. Know that findings from enquires can be reported in different ways e.g. orally, written, results presentation or as a conclusion. A causal relationship is when one thing is responsible for causing the occurrence of another thing. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.	rectangles of different sizes to represent values. This is a way to visually compare data. Know how to draw a bar chart to compare data. **Evidence to develop explanations:** A causal relationship is when one thing is responsible for causing the occurrence of another thing. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.	used to explain a scientific concept. A diagram is a picture that is usually labelled. **Evidence to develop explanations:** A causal relationship is when one thing is responsible for causing the occurrence of another thing. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.		_____effect the force needed to move the object. To answer a scientific question, you should include evidence from your scientific enquiry.	include evidence from your scientific enquiry.

Year 5 and 6 – Cycle A

Summer 1

Living Things and their Habitats					
Lesson Sequence					
Identify the key parts and function of flowering plants. Plant dissection.	Reproduction in plants including sexual and asexual. Identify different types of reproduction in plants.	Describe the life process of reproduction in some animals.	Describe the life process of reproduction in some animals.	Investigate the life cycles of common mammal and birds.	Children to look at the work of David Attenborough and Jane Goodall.
Substantive Knowledge					
Stigma – female part. It is sticky and can catch grains easily. **Style** – female part. Pollen travels down the style to the ovary. **Ovary** – female part. Contains the ovules. **Petal** – brightly coloured and sweetly scented to attract insects. **Pollen tube** – transports male gametes from the pollen down the style to the ovary. **Stem** – transports water to the leaves.	**Reproduction** - when living things create other living things. Animals have babies and plants have seeds which turn into new plants. <u>Reproduction in plants</u> **Sexual reproduction (2 parents)** – when the pollen from one flower joins the egg of a new flower and a seed or seeds are formed. E.g. apple tree **Asexual reproduction (1 parent)** – when a small part of a plant breaks off and starts to grow until it is the same size as the plant it came from. Flowers are not needed. E.g. spider plant	<u>Reproduction in animals</u> For most animals that live on land, offspring are fertilised inside the mother's body. This happens in one of three ways. 1. The young develop inside the female and are born alive (most mammals). 2. Fertilised eggs are laid outside the female's body and develop in the egg getting nourishment from the yolk. In some animals the eggs are held within the female.	A **life cycle** shows how things are born, how they grow and how they reproduce. <u>Insect life cycle</u> Most insects, such as butterflies, emerge from the egg in one state and then go through metamorphosis to become an adult. Some insects hatch from the egg and grow into adults without much change. <u>Amphibian life cycle</u> Amphibians, such as frogs, are laid in eggs in the water then, once hatched, they go through many changes until they become an adult. Parents do not look after their young once the eggs have been laid.	<u>Mammal life cycle</u> Mammals, including humans, develop inside their mothers and live young are born. Young are fed milk and are dependent on their parent for some time, until they are old enough to look after themselves. <u>Bird life cycle</u> Birds are hatched from eggs and are looked after by their parents until they are able to live independently.	<u>David Attenborough</u> Famous for his commitment to the natural environment. He has spent years studying animals and living things. <u>Jane Goodall</u> British scientist famous for work with chimpanzees. She showed that chimps have individual personalities and experience emotions.

Disciplinary Knowledge					
Methods: **Identifying and classifying** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections. **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources can be used to identify the parts of a flowering plant. **Apparatus & techniques:** You can use a magnifying glass to observe closely.	**Methods:** **Identifying and classifying** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources can be used to identify plant types. **Observation over time** Observing over time is when make systematic and careful observation to identify and measure changes in	**Methods:** **Identifying and classifying** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections You can classify animals as viviparous and oviparous. **Researching using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources can be used to investigate gestation periods of different animals **Data analysis:**	**Methods:** **Pattern-seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking investigation can be carried out to compare and contrast life cycles. **Researching using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to research animal life cycles. **Data analysis:**	**Methods:** **Pattern-seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. Compare and contrast life cycles. **Researching using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. **Data analysis:** A Venn diagram uses circles to show the relationship between things. Know how to draw a Venn diagram.	**Methods:** **Researching using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Research into the life of these biologists and the impact of their findings and teachings.

You can use scissors and tweezers to help you dissect something. **Data analysis:** A diagram is a picture that is usually labelled. A scientific diagram might not be to scale e.g. a diagram of a flower might be a different size to the real flowers. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry. Know that scientific language should be used when explaining findings.	**Apparatus & techniques:** You can use an iPad to take photographs to record changes. **Evidence to develop explanations:** Know that findings from enquires can be reported in different ways e.g. orally, written, results presentation or as a conclusion. Know that scientific language should be used when explaining findings. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.	When you collect data it needs to be presented in a way that is clear and easy to understand. A data base is a collection of data that is stored in a logical and structured manner.	A Venn diagram uses circles to show the relationship between things. Know how to draw a Venn diagram. A diagram is a picture that is usually labelled.	A diagram is a picture that is usually labelled.	

Year 5 and 6 – Cycle A

Summer 2

Animals Including Humans					
Lesson Sequence					
Describe the changes as humans develop to old age - find out and compare gestation periods of a range of animals including humans.	Humans develop to old age - Investigate foetal development in humans	Describe the changes as humans develop to old age - Recognise and explore key milestones in baby and child development.	Describe the changes as humans develop to old age - Identify and understand the key changes that happen in the human body during puberty. Recognise those changes that are gender specific.	Describe the changes as humans develop to old age - Identify physical and mental changes that happen from adulthood to old age.	Describe the changes as humans develop to old age - Identify, order and explain the 6 stages in a human life cycle.
Substantive Knowledge					
Human life cycle Newborn > Childhood > Adolescence > Early adulthood> middle adulthood >Late adulthood. **Gestation** – the process in which babies grow inside their mother's body before they are born. This period of time differs between species.	**Foetus -** After eight weeks, the group of cells in the mother's womb develops more human-like features, becoming a foetus. The foetus grows inside its mother's womb for nine months. A foetus is completely reliant on its mother and cannot breathe, eat or drink for itself. It receives its nutrition through the umbilical cord.	**New-born** – baby that has just been born Infancy – a period of rapid change. Toddlers learn to walk and talk. **Childhood** – children learn new things as they grow	**Adolescence** – the body starts to change as it prepares for adulthood. Hormonal changes take place over a few years. This is called **puberty**. **Puberty** is when the body starts to change because of hormones. These changes include: growth in height, more sweat, and hair growth on arms, legs, under arms and on genitals. There is growth in parts of the body including male genitals and breasts	**Early adulthood** – this is when humans are at their fittest and strongest. This is when reproduction usually happens. **Middle adulthood** – changes such as hair loss happen. There are hormonal changes again and the ability to reproduce ceases. This is called the menopause. **Late adulthood** – there is a decline in fitness and strength.	**Human life cycle** **Newborn** – baby that has just been born Infancy – a period of rapid change. Toddlers learn to walk and talk. **Childhood** – children learn new things as they grow**.** **Adolescence** – the body starts to change as it prepares for adulthood. Hormonal changes take place over a few years. This is called **puberty**. **Early adulthood** – this is when humans are at their fittest and strongest. This is when reproduction usually happens. **Middle adulthood** – changes such as hair loss happen. There are hormonal changes again and the ability to

					reproduce ceases. This is called the menopause. **Late adulthood** – there is a decline in fitness and strength.
Disciplinary Knowledge					
Methods: **Pattern-seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking enquiry can be carried out to investigate the relationship between animals size/life-span and gestation period. **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language.	**Methods:** **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to investigate foetal development. **Pattern-seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed.	**Methods:** **Pattern-seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. A pattern seeking investigation can be carried out to make generalisations about changes between birth, infancy and a toddler **Identify/classify** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections. You can identify similarities and differences between the features of a baby, infant and a toddler. **Data analysis:**	**Methods:** **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to research what happens to the body during puberty. **Identify/classify** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections.	**Methods:** **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to research changes through adulthood. **Data analysis:** A flow chart is a diagram that shows the sequence of movements or actions involved in a system.	

Secondary sources of information can be used to research animal gestation periods. **Data analysis:** Know that a table is a simple way to present data collected in an investigation. Know how to draw a table as a simple way to present data **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry. A causal relationship is when one thing is responsible for causing the occurrence of another thing.	A pattern seeking investigation can be carried out to make generalisations about the pattern of foetal growth. **Data analysis:** A line graph is a graph that is used to display change over time. A series of data points are connected by a straight line. Know how to draw a line graph to show foetal growth. **Evidence to develop explanations:** Understand that information about foetal development is taken from an average and that many babies may be above or below this.	A Venn diagram uses circles to show the relationship between things. Know how to draw a Venn diagram to show the similarities and differences between babies, infants and toddlers. **Evidence to develop explanations:** To answer a scientific question, you should include evidence from your scientific enquiry. Conclude that a baby can move but can't walk or talk, in infancy they begin to crawl and say some words and a toddler learns to walk and talk.	You can identify the similarities and differences between males and females. Know that a table is a simple way to present data collected in an investigation. Know how to draw a table as a simple way to present data **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry. Conclude that: - Both males and females get pubic hair and spots. - Males develop testicles, Adams apple and a penis. Females develop breasts.		

Year 5 and 6 – Cycle B

Autumn 1

Animals Including Humans					
Lesson Sequence					
Identify the components of blood and describe their functions. Name and describe the different blood vessels and their functions.	Explore the structure and function of the human heart.	Identify and name the main parts of the human circulatory system	Describe the ways in which nutrients and water are transported within animals, including humans.	Recognise the impact of diet, exercise and lifestyle on the way our bodies function.	Identify how drugs and alcohol impact on the way the human body functions
Substantive Knowledge					
Blood Blood is made up of liquid and solids. The liquid part is water and protein (plasma). The solid part includes white blood cells, red blood cells and platelets. Plasma carries the solid parts of the blood through the body. Red blood cells carry oxygen through the body. White blood cells fight infection. Platelets help you top stop bleeding when you get hurt. The main vessels are arteries, veins and capillaries. Arteries take blood away from the heart and veins in take blood in.	**The Heart & Circulatory System** The circulatory system includes the heart, lungs veins, capillaries and arteries that run through the body. Children can name: - Left and right ventricles - Left and right atrium - Valves - Aorta - Pulmonary artery	**Animals** Some animals have different circulatory systems to humans. · A human has a four chamber heart. · A fish has a two chamber heart. · Reptiles and amphibians have three chamber hearts.	**Exercise** Exercise is very important to maintain a healthy heart. The average resting heart beat per minute is 60 (bpm). Some athletes have resting heart beats between 30—40 bpm. **Diet** Healthy diets can look different for different types of people depending on their individual needs; weight lifters and ballerinas have very different diets. Pulse can be used to measure heart rate because every time the heart contracts, a surge of blood is sent through all arteries.	**Drugs** Drugs are substances that have an effect on the body when it enters the system. There are legal and illegal drugs. Drugs, alcohol and smoking can impede the body's ability to focus and function normally.

Disciplinary Knowledge					
Methods: **<u>Research using secondary sources</u>** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to research the make-up of blood.					**<u>Methods:</u>** **<u>Observation over time</u>** Observing over time is when make systematic and careful observation to identify and measure changes over a period of time. Regular observations/ measurements need to be made at set intervals. External factors may affect results. You need to control the variables to limit the impact of external factors. Stopwatches can be used to accurately measure time. Time can be measured in minutes/seconds. 1 minute = 60 seconds. **Apparatus & techniques:** To measure your heart rate/ pulse, place your index and third fingers on your neck to the side of your windpipe. To check your pulse at your wrist, place two fingers between the bone and the tendon over your radial artery — which is

					located on the thumb side of your wrist. **Data analysis:** Line graphs can be used to plot data collection over time. The x axis shows the time The y axis represents what is being measured. Plotted points on a line graph need to be joined by straight lines. Know how to draw a line graph. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry. Know that results from scientific enquires might have different degrees of trust as external factors may impact on results.

Year 5 and 6 – Cycle B

Autumn 2

Evolution					
Lesson Sequence					
Investigate how 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.	Recognise that living things have changed over time. Identify how animals have adapted to suit their environment in different ways.	Understand the term natural selection and investigate how traits give them a survival advantage. E.g. giraffe necks. Look at how humans have impacted on natural selection through artificial selection	Look at work by Charles Darwin on finches' beaks.	Identify that adaptation by animals and plants to their environment may lead to evolution. Look at work of Darwin.
Substantive Knowledge					
Fossils provide information about living things from the past. Fossils are the impressions of the remains of prehistoric animals or plants embedded in rock and preserved.	**Inheritance** – the characteristic traits that are genetically passed to offspring from their parents. E.g. hair colour, eye colour, height. Offspring share 50% of their DNA with each parent.	**Adaptation** – living things change over time and adapt to the surroundings in which they live to increase survival and chances of reproduction. Different varieties of the same species live in different places around the world. Panda bears, polar bears and brown bears live in different environments and have adapted over time to increase their chances of survival and reproduction.	**Natural selection** is the idea that species change over time in order to survive in their environment and reproduce. As offspring are born, they have the advantageous genetic characteristics passed on from their parents. Over time, this is how species adapt. Living things that are unable to adapt to the changes in the environment are unlike to survive E.g. Giraffes used to have shorter necks but they have evolved to have longer necks so that they	**Darwin's finches** – Darwin observed that there were many forms of finches that had different beak sizes and shapes. Each type of finch had a different food source which he noted as the reason for the adaptation.	**Evolution** describes the gradual changes that happen in the same species, living in the same location, over a long time. Scientists have proof that living things are continuously evolving – even today! **Evolution** does not describe people changing their bodies by exercise or dyeing their hair. Evolution happens over a much longer time and can only happen between parents and offspring through inheritance. **Charles Darwin** – theory of evolution by **natural**

			can reach the top leaves on tall trees. **Artificial selection** – when human's intervene in evolution by breeding animals for specific traits		**selection**. This is the process by which organisms change over time as a result of changes in inheritable physical or behavioural traits. The strongest traits survive over generations.
Disciplinary Knowledge					
Methods: **Identifying and classifying** Classifying is when something is grouped or ordered into categories based on properties or criteria. **Pattern Seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. You can carry out a pattern seeking enquiry to see how dominant characteristics are passed on through genes. **Evidence to develop explanations:** Scientists use fossils to develop explanations about animals that are	**Methods:** **Pattern Seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. You can carry out a pattern seeking enquiry to see how dominant characteristics are passed on through genes.	**Methods:** **Identifying** To identify, you make observations and measurements to find similarities and differences. This helps to organise things into groups and make connections. You can identify how animals have adapted over time to survive within their environment. Scientists have studied the characteristics of different varieties of animals, such as bears. They have analysed the geographical locations of different bears and drawn conclusions about why that specific variation has survived within that specific environment.	**Methods:** **Identifying** To identify, you make observations and measurements to find similarities and differences. This helps to organise things into groups and make connections. You can identify how animals have adapted over time to survive within their environment.	**Methods:** **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. We can mimic an observation of change across generations and note the patterns which occur. A table can be used to record results/patterns observed at different stages. Line graphs can be used to plot data collection over time. The x axis shows the time The y axis represents what is being measured.	

now extinct, such as dinosaurs.				Plotted points on a line graph need to be joined by straight lines. Know how to draw a line graph.	

Year 5 and 6 – Cycle B

Spring 1

Space					
Lesson Sequence					
Describe the Earth and sun as spherical bodies. Use the idea of the Earth's rotation to explain night and day.	Use the idea of the Earth's rotation to explain night and day and the apparent movement of the sun across the sky - shadow investigation.	Describe the movement of the Earth relative to the sun.	Look at the planets in our solar system and how they orbit around the sun.	Describe the moon as a spherical boy. Describe the movement of the moon relevant to the Earth.	Look at the phases of the moon. Understand that the moon is not a source of light and that we can see it because it reflects light from the sun.
Substantive Knowledge					
Planet Earth Earth is a spherical body. It takes 24 hours for Earth to complete one full rotation on its axis.	**Day and night** It is daytime on the side of the earth that is facing the sun and night time on the side of the earth that is facing away from the sun. As the earth rotates on its axis, shadows that are formed change in size and direction	**The Sun** The Sun is a star at the centre of our solar system. The Earth takes 364¼ days to orbit the sun. An **orbit** is the path taken by a body circling around another body. **Seasons** • 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,	**Planets** There are 8 planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The solar system consists of the sun and everything that orbits around it.	**The Moon** The Moon is a spherical body. The Moon orbits the Earth. It orbits in an anti-clockwise direction and takes 28 days to complete it.	**The Moon** The Moon has different phases depending on where it is in its orbit. The phases of the moon are: New Moon, waxing crescent, half moon, waxing gibbous, full Moon, waning gibbous, half moon, and waning crescent.

		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.			
Disciplinary Knowledge					
Methods: **Research** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. **Evidence to develop explanations:** Know that scientific evidence has been used to prove that the Earth and sun are spherical bodies.	**Methods:** **Observations over time** Observing over time is when make systematic and careful observation to identify and measure changes in materials over a period of time. Regular observations/ measurements need to be made at set intervals. **Apparatus & techniques:** A ruler is a tool used to measure length and centimeters (cm) and millimeters (mm) are units of measure. 1cm = 10mm **Data analysis:** Know that results from an observation over time can be collected and presented in a table.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. **Evidence to develop explanations:** To answer a scientific question, you should include evidence from your research.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. **Identifying and classifying** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language **Evidence to develop explanations:** Know that scientific evidence has been used to prove that the moon is a spherical bodies.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. **Identifying and classifying** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections.

	A line graph is a graph that shows changes over time. Scientific language is used when presenting your results **Evidence to develop explanations:** To draw a scientific conclusion you need to look at your results and identify patterns. To answer a scientific questions you should include evidence from your scientific enquiry.		groups and make connections. **Data analysis:** Results from identifying and classifying can be collected and presented in a database. **Evidence to develop explanations:** To answer a scientific question, you should include evidence from your research		**Data analysis:** Results from identifying and classifying can be collected and presented in a table. **Evidence to develop explanations**: Know that scientific evidence has been used to prove that the moon has different phases.

Year 5 and 6 – Cycle B

Spring 2

Materials					
Lesson Sequence					
Compare and group together everyday materials on the basis of their properties, including their hardness, transparency, conductivity (electrical and thermal), and response to magnets.	Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	Know that some materials will **dissolve** in liquid to form a solution. Investigate how to recover a substance from a solution using sieving, filtering or evaporation.	Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	Demonstrate that dissolving and mixing are changes of state and are reversible changes.	Investigate /observe how some changes result in the formation of new materials, and that this kind of change irreversible, including changes associated with burning and the action of acid on bicarbonate of soda.
Substantive Knowledge					
Hardness – how hard or soft a material is. **Permeable** – a material that allows liquids or gasses to pass through. Transparent – a material that allows light to pass through. **Opaque** – a material you cannot see through **Translucent** – a material that allows light but not detailed shapes to pass through. **Electrical conductor** – allows electricity to pass through easily. **Electrical insulator** – does not allow electricity to pass through easily.	**Thermal conductor** – allows heat to travel through it easily. **Thermal insulator** – does not allow heat to travel through easily.	**Dissolve** – when a solid mixes with a liquid and a solution is formed. **Soluble** – a substance that will dissolve in a liquid. **Insoluble** – a substance that will not dissolve in a liquid. **Mixture** - is a substance made by combining two or more different materials.	**Sieving –** you can separate smaller particles from larger particles using a sieve. Smaller particles will fall through the holes. **Filtering** – insoluble/undissolved particles can be removed from a liquid by passing it through filter paper. **Evaporation** – when a liquid changes to a gas after being heated.		**Reversible -** changes that are not permanent. Dissolving, mixing, melting, freezing are reversible changes. E.g. water turning to ice or steam, chocolate melting and cooling. **Irreversible -** Changes that are permanent and cannot be undone. Result in the making of a new material. E.g. baking a cake, toasting bread. Some changes result in the formation of new material and this kind of change is usually irreversible. E.g. wood burning, vinegar mixed with bicarbonate of soda

Magnetic – a material that is attracted to a magnet. Uses of everyday materials: Windows – made from glass because it is hard and transparent. Oven gloves – made from a thermal insulator to keep heat from burning our hands. Plugs – have a plastic case because plastic is an electrical insulator so stops electricity from passing through to our bodies.				(produces carbon dioxide bubbles).
Disciplinary Knowledge				
Methods: **<u>Identifying and classifying</u>** Classifying is when something is grouped or ordered into categories based on properties or criteria. **Apparatus & techniques:** A magnet is an object that has a magnetic field. A magnet attracts and repels other items. **Data analysis:** Know that a table is a simple way to present data collected in an investigation.	**Methods:** **<u>Observation over time</u>** Observing over time is making systematic and careful observation to identify and measure changes in materials over a period of time. Regular observations/ measurements need to be made at set intervals. External factors may affect results. Variables are anything that can change or be changed.	**Methods:** **<u>Identifying and classifying</u>** To identify and classify, you make observations and measurements to find similarities and differences. This help to organise things into groups and make connections. **Data analysis:** Know that a table is a simple way to present data collected in an investigation. **Evidence to develop explanations:**	**Methods:** **<u>Identifying and classifying</u>** Classifying is when something is grouped or ordered into categories based on properties or criteria. **Apparatus & techniques**: A sieve has a wire mesh that can be used to separate larger particles from smaller particles. Filter paper is a permeable paper that allows liquid to pass through. It can be used to separate fine solid particles from liquids. To use filter paper you fold it and put it inside a funnel. A funnel has a wide opening at the top and a tube at the bottom. It is used to guide liquid into a small opening. **Data analysis:** A diagram is a picture that is usually labelled.	**Data analysis:** A diagram is a picture that is usually labelled. A diagram is a picture that is usually labelled. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. Know that scientific language should be used when explaining findings

Evidence to develop explanations: Know that scientific language should be used when explaining findings.	You need to control the variables to limit the impact of external factors. **Apparatus & techniques:** A thermometer is an instrument that measures temperature. Degree Celsius is a unit of measure for temperature. You need to read the scale to see what the temperature is. **Data analysis:** Know how to draw a table as a simple way to present data collected in an investigation. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry. Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry.	Know that results from a scientific enquiry can be used to answer a scientific question.	You can use an iPad to take photographs to record changes. **Evidence to develop explanations:** Know that findings from enquires can be reported in different ways e.g. orally, written, results presentation or as a conclusion. Know that scientific language should be used when explaining findings	

	To draw a scientific conclusion you need to look at your results and identify patterns Know that conclusions drawn from scientific enquires can be used to make recommendations.			

Year 5 and 6 – Cycle B

Summer

Living Things and Their Habitats				
Lesson Sequence				
Look at the work of Carl Linnaeus and how he developed the system of classification.	Children are to find out about the 5 Kingdoms used to classify living things. Classify animals into vertebrate and invertebrate.	Classifying plants into 4 categories: flowering, ferns, conifers and mosses.	Introduce children to microorganisms. Investigate bacteria.	Introduce children to Organisms. Investigate bacteria. Children to investigate prolista and fungi.
Substantive Knowledge				
A classification key is a tool that uses yes and no questions to group living things based on their characteristics. Carl Linnaeus developed a system to classify living things (plants and animals) so they could be easily identified.	Work on classification has developed since Linnaeus and we now categorise living things into 5 kingdoms: animal, plant, protista, fungi and menera. Menera and Protista are both single cell organisms - Protista are more complex <u>Animal Kingdom</u> Animals can be categorised as **vertebrates** and **invertebrates**. These groups can then be subdivided. **Vertebrate** – animals with a back bone Bird – e.g. penguin, owl, ostrich Fish – e.g. tuna, shark, pike Mammal – e.g. dolphin, whale, human Reptile – e.g. snake, crocodile, turtle	<u>Plant Kingdom</u> **Photosynthesis** – the process where a green plant turns water and carbon dioxide into food when exposed to light. Plants can be classified into 4 main groups: flowering, conifers, ferns and mosses. **Flowering plants** – produce flowers which can develop fruits and seeds after being pollinated and fertillised. **Conifers** – seeds are housed inside woody protective structures called cones. **Ferns** – have neither seeds nor flowers, but reproduce via miniature cells called spores. **Mosses** – do not produce seeds or carry flowers.	**<u>Microorganisms A.K.A: microbes</u>** A **micro-organism** is a very tiny living thing that can only be seen with a microscope. There are 3 main groups of micro-organisms: menera, protista and fungi. **Kingdom Fungi** – yeast, mould and mushrooms. These are found everywhere. They cannot produce their own food like plants.	**Micro-organisms: Bacteria and Viruses** Bacteria are found almost everywhere on Earth and are vital to the planet's ecosystems Some bacteria are good and some are harmful Viruses infect a host and multiply within the living cells of another organism

	Amphibian – e.g. toad, salamander, frog **Invertebrate** – animals without a backbone Worms – e.g. earthworm, leech Arthropods – e.g. spiders, ants, butterfly Molluscs – e.g. snail, squid, octopus Flatworm – e.g. flat worm, tape worm Echinodermata – e.g. starfish, sea urchin.	They reproduce by releasing spores. Mosses do not have true stems, leaves or roots		
Disciplinary Knowledge				
Methods: **Identify/ Classify** Classifying is when something is grouped or ordered into categories based on properties or criteria. Know that you can classify animals, humans, plants and bacteria. Know that each of these can be further classified based on their identifiable key features. **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion.	**Methods:** **Identify/ Classify** Classifying is when something is grouped or ordered into categories based on properties or criteria. Know that you can classify animals as vertebrates and invertebrates. **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed. **Data analysis:**	**Methods:** **Identify/ classify** Classifying is when something is grouped or ordered into categories based on properties or criteria. Know that you can identify features in different classifications of plants.	**Methods:** **Observation over time** Observing over time is when make systematic and careful observation to identify and measure changes over a period of time. Regular observations/ measurements need to be made at set intervals. External factors may affect results. You need to control the variables to limit the impact of external factors. Know that you can observe slices of bread over time to investigate the growth of mould.	**Methods:** **Research using secondary sources** Research is an investigation or study to find out facts in order to reach a conclusion. Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Know that secondary sources of information can be used to research the differences between bacteria and viruses.

Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. Know that information texts use scientific language. Secondary sources of information can be used to research the Linnaean classification system. **Data analysis:** A classification key is a set of yes and no questions that help you to identify something based on common characteristics. Know how to draw a classification key. **Evidence to develop explanations:** Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry. Know that scientific language should be used when explaining findings.	Know that an exploded diagram shows how separate parts fit together. Know how to draw an exploded diagram.		**Apparatus & techniques:** A grid can be used to increase accuracy and reliability of measuring mould growth. To observe something in detail that is very small you can use a microscope. **Evidence to develop explanations:** Know that different types of graphs are best suited to presenting different types of information. Know how to select the most appropriate type of graph to display the data you have.	