Year 3 and 4 – Cycle A

Autumn 1

Light					
Lesson Sequence					
Understand that light comes from a light source (e.g. the sun). Recognise that they need light in order to see things and that dark is the absence of light.	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.	Introduce the terms opaque, translucent and transparent. Investigate how different materials allow different amounts of light to pass through them.	Recognise that shadows are formed when the light from a light source is blocked by an opaque object.	Find patterns in the way that the size of shadows change.	Investigate how light is reflected from surfaces.
Substantive Knowledge					
Dark is the absence of light. You need to use a light source to see objects. These include **the sun, a torch and a light bulb.**	Understand that the sun can be dangerous to our eyes and there are ways to protect your eyes such as **wearing sunglasses and shades for your eyes.**	**Opaque** is when you cannot see through something, **transparent** is when you can see through something and **translucent** is only when the light can be seen through something.	Opaque objects such as **cups, tables and books** create a shadow when they block the light source. .	Notice that the size of shadows increase the closer the light source depending on the distance of the light source to the object	Children understand that light can be reflected from surfaces such as **the moon, a mirror and water.**
Disciplinary Knowledge					
Methods: **Identifying and classifying** Classifying is when you sort items into groups based on similarities and differences. Items can be sorted into things that are light sources and non-light sources. **Data analysis:** Know that a table is the best way to present the	**Methods:** **Observation over time** Observing over time is when you watch or measure something over a period of time to see how it changes. You can observe the effects of a UV source (the sun) on a UV bead (skin) over time to help understand the importance of protection from the sun.	**Methods:** **Identifying and classifying** Classifying is when you sort items into groups based on similarities and differences. You can make careful observations to help you classify objects. Materials can be sorted into those that are: transparent, translucent and opaque.	**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. A fair test can be used to investigate how the length of a shadow changes depending on the distance the object is from the light source.	**Methods:** **Pattern seeking** Pattern seeking is when you observe variables that cannot be controlled to notice patterns. You can carry out a pattern seeking investigation to see which materials reflect light. You can use your observations from a pattern seeking enquiry to classify materials into reflective and non-reflective. **Apparatus & techniques:** A torch is a light source.	

results when you identify and classify.	**Apparatus & techniques:** UV beads change colour when exposed to a UV light source. A UV torch provides a UV ray which effects the UV beads. You can use time-lapse on an iPad to observe changes over time **Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. A table is a simple way to present data collected through an observation over time. A scientific 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. To answer a scientific question, you should include evidence from your scientific enquiry	Using existing knowledge, you can make a prediction about what the outcome of your scientific enquiry will be. **Data analysis**: Know that a table is the best way to present the results when you identify and classify. A scientific diagram is a picture that is usually labelled.	When carrying out a fair test it is important that you have a scientific question e.g. As the distance from the light source increases, will the height Using existing knowledge, you can make a prediction about what the outcome of your scientific enquiry will be **Apparatus & techniques:** You can measure longer lengths using metre sticks. Centimetres and millimetres are units of measure we use for length. 1cm = 10mm. **Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. A table is a simple way to present data collected in a fair test. A scientific diagram is a picture that is usually labelled. **Evidence to develop explanations:**	**Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. A table is a simple way to present data collected in a pattern seeking 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 Conclude that some materials reflect light from a light source and some materials do not.

			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 as the distance from the light source increases, the shadow size decreases.	

Year 3 and 4 – Cycle A

Autumn 2

Electricity					
Lesson Sequence					
Identify common appliances that run on electricity. Look at the difference between mains and battery powered appliances. Look at how to keep safe around electricity.	Construct a simple series electrical circuit, identifying and naming its basic parts,	Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.	Recognise some common conductors and insulators, and associate metals with being good conductors. Look at everyday uses of conductors and insulators and consider why these materials are used. E.g. plastic around a plug.	Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.	Investigate different types of switches depend on the purpose e.g. light switch, safety switch for lawn mower.
Substantive Knowledge					
Many household devices and appliances run on electricity: e.g. washing machine, television, toaster, and kettle. Some devices run on batteries others need mains power to work.	A **simple series electrical circuit** allows a flow of current through each component. The parts of a circuit can be named, including cells, wires, bulbs, switches and buzzers.	Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.	Recognise some common conductors and insulators, and associate metals with being good conductors. Look at everyday uses of conductors and insulators and consider why these materials are used. E.g plastic around a plug	Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.	Investigate different types of switches depend on the purpose e.g. light switch, safety switch for lawn mower
Disciplinary Knowledge					
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.	**Methods:** **<u>Identify</u>** Identifying means that you find out what something is. You can identify the parts of an electrical circuit. **Apparatus & techniques:**	**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.	**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.	**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.	**Methods:** **<u>Pattern seeking</u>** Children to apply knowledge of switches, conductors and insulators to make switches that are fit for different purposes. **Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are

You can classify electrical appliances in ones that are mains powered and ones that are battery powered. **Data analysis:** A Venn diagram is a clear way to present findings from an identifying and classifying enquiry. A Venn diagram uses circles to show the relationship between things. Items placed in the cross over between the circles show that they fit into both categories.	Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit.	You can carry out a pattern seeking enquiry to investigate what is needed to ensure the bulb will light in an electrical circuit. You can make predictions about what patterns you might find before carrying out a pattern seeking enquiry **Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. **Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. Know that results from a pattern seeking enquiry can be presented clearly in a table. A diagram is a picture that is usually labelled. You can draw a diagram to show the parts of an electrical circuit. **Evidence to develop explanations:**	**Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. You can use crocodile clips to put materials within a circuit to test if they are conductors or insulators. **Data analysis:** Know that a table is the best way to present the results when you identify and classify. **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 conclusions drawn from scientific enquires can be used to make recommendations such as how to keep safe around electrical equipment in the home.	You can carry out a pattern seeking enquiry to find out that a switch breaks a circuit and therefore the bulb will light/not light when the switch is open/closed. **Apparatus & techniques:** Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. **Data analysis:** You can use crocodile clips to put a switch in a circuit. When you collect data it needs to be presented in a way that is clear and easy to understand. **Evidence to develop explanations:** Know that results from a pattern seeking enquiry can be presented clearly in a table. Know that results from a scientific enquiry can be used to answer a scientific question. Know that results from a scientific enquiry can be used to make recommendations or suggest improvements.	electrical components that make up a circuit. **Data analysis:** You can use crocodile clips to put a switch in a circuit. When you collect data it needs to be presented in a way that is clear and easy to understand. **Evidence to develop explanations:** Know that results from a pattern seeking enquiry can be presented clearly in a table. Know that results from a scientific enquiry can be used to answer a scientific question. Know that results from a scientific enquiry can be used to make recommendations or suggest improvements

		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 you need a complete electrical circuit for the bulb to light. If there is a break in the circuit, the bulb will not light.			

Year 3 and 4 – Cycle A

Spring

Forces and Magnets						
Lesson Sequence						
Understand a force as a push or pull.	Introduce term friction. Compare how things move on different surfaces depending on the amount of friction created.	Investigate pushes and pulls and how they make an object move.	Observe how magnets attract or repel each other. Describe magnets as having two poles.	Children learn that magnets have a north and south pole. They are then to investigate how magnets can attract and repel.	Observe how magnets attract or repel some materials and not others.	Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
Substantive Knowledge						
Some forces need contact with objects and this is **push** and **pull.**	An object will move differently on different surfaces due to **friction (the resistance that one surface or object receives when moving over another).** An object will move more smoothly on the table or corridor floor compared to the carpet or grass.	Some forces need contact with objects and this is **push** and **pull.**	Some forces do not need contact with objects and can act at a distance. This is a **magnetic force.**	Some forces do not need contact with objects and can act at a distance. This is a **magnetic force.** A magnet has two poles. These are the **North Pole** and **South Pole.** The same poles **repel** each other but opposite poles **attract. This is known as a magnetic force.**	Magnets attract or repel each other. Magnets are attracted to **iron, nickel** and **metals that contain iron e.g. steel**. Magnets repel the following materials: **copper, silver** and **gold**	To know that a paper clip, a staple, the iPad locker are all magnetic. To know that tinfoil, door handles and copper coins are not magnetic.
Disciplinary Knowledge						
Methods: **Identifying and classifying**	**Methods:** **Fair test** A fair test is when one variable is changed	**Methods:** **Comparative testing**	**Methods:** **Pattern seeking** Pattern seeking is when you observe	**Methods:** **Fair test** A fair test is when one variable is changed	**Methods:** **Identifying and classifying** Classifying is when	**Methods:** **Fair testing** A fair test is when one variable is

Know that classifying is when you sort items into different groups based on their similarities and differences. Know that to identify and classify you need to observe closely. Know that you can sort activities/actions into push and pull forces. **Data analysis:** A Venn diagram uses circles to show the relationship between things. Where the circles cross over shows that the items sorted fit into both categories.	and the others remain constant. A variable is a factor that can be changed. **Apparatus & techniques:** We can measure mass using electronic scales. Grams and kilograms are units used for measuring mass. 1kg = 1000g We measure force using a Newton metre. Newtons is the unit of measure used for force. You can measure longer lengths using metre sticks. Centimetres and millimetres are units of measure we use for length. 1cm = 10mm. Metres is a unit of measure we use for length. 1m = 100cm	A comparative test is when you test and compare different cases and situations. A comparative test can be used to investigate the distance travelled when using a push forces applied by different parts of the body (foot stamping on bottles/blowing straws). **Data analysis:** A table is a clear way to present data collected when carrying out a comparative test. **Evidence to develop explanations:** To draw verbal conclusion	variables that cannot be controlled to notice patterns. Pattern seeking can be used to investigate whether you need contact with an object to make it move. **Evidence to develop explanations:** Observations from pattern seeking observations can be used to draw conclusions. Conclude that some forces do not need contact with objects and can act at a distance	and the others remain constant. A variable is a factor that can change. You can carry out a fair test to investigate how close a magnetic object needs to be to a magnet in order for it to attract. **Apparatus & techniques:** A magnet is an object that has a magnetic field. A magnet attracts and repels other items. Centimetres and millimetres are units of measure we use for length. 1cm = 10mm. **Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. A table is a simple way to present data. **Evidence to develop explanations:** Know that results from a scientific enquiry	you sort items into groups based on similarities and differences. You can classify materials as magnetic or non-magnetic. **Apparatus & techniques:** A magnet is an object that has a magnetic field. A magnet attracts and repels other items. **Evidence to develop explanations:** Know that a table is the best way to present the results when you identify and classify.	changed and the others remain constant. A variable is a factor that can change. Centimetres and millimetres are units of measure we use for length. 1cm = 10mm. Know that a Venn diagram and bar chart are different ways to present data. A Venn diagram uses circles to show the relationship between things. A bar chart is a chart that has rectangles of different sizes to represent values.

	Data analysis: A table is a clear way to present data collected when carrying out a fair test. **Evidence to develop explanations:** Results from fair test can be used to answer a scientific question. Conclude that an object will need a lesser force to move it when there is less friction on the surface it is moving across.			can be used to answer a scientific question. To answer a scientific question, you should include evidence from your scientific enquiry		

Year 3 and 4 – Cycle A

Summer 1

Animals Including Humans					
Lesson Sequence					
Identify that animals, including humans cannot make their own food and need to get nutrition from what they eat.	Identify that animals, including humans, need the right types and amount of nutrition. Look at food groups and how to eat a balanced diet.	Identify that humans and some other animals have skeletons to support/protect their body. Introduce vertebrates and invertebrate	Identify that humans and some other animals have skeletons to support/protect their body. Look at human skeletons - identify bones and their purposes.	Look at joints and how these work to allow movement.	Identify that humans and some other animals have muscles and look at how they help with movement.
Substantive Knowledge					
Animals (including humans) can't make their own food, they get food by growing, hunting or gathering it. **Nutrition** means getting the food needed to grow and be healthy.	The human body needs a **balanced diet** to work properly. You need the right amount of food from the different food groups. **Fruit and vegetables** - Contain fibre which helps us to digest food **Carbohydrates –** give us energy e.g. bread, potatoes, pasta **Proteins** – help our bodies to repair e.g. fish, meat, nuts, seeds, eggs and cheese **Fats** – help store energy for our bodies e.g. butter, cheese, fried foods	Mammals, birds, fish, reptiles, amphibians are **vertebrates** this means they have a skeleton inside their body. **Invertebrates** means they don't have a skeleton inside their bodies. Some examples of these are spiders, snails, jellyfish, crabs, worms.	The skeleton is made of bones. This protects and supports the body. **Skull** – protects the brain **Rib cage** – protects major organs (e.g. heart, lungs) **Humerus, radius, ulna** – bones in your arms **Femur, tibia, fibula** – bones in your legs	Joints are where two or more bones join together. The skeleton can bend at these joints e.g. **knees, elbows.** Know the terms: ball and socket joint, hinge joint and gliding joint.	**Muscles** are attached to the skeleton to help us **move**. They **contract** and **relax** as they move with the bones. Know that **contraction** means to get smaller and **expansion** means to get bigger.

Disciplinary Knowledge					
Methods: **Research** Research is an investigation or study to find out facts in order to reach a conclusion. **Data analysis:** Know that you can present information from research as pictures with labels to make it easier to understand. Know that information texts use scientific language. **Evidence to develop explanations:** Know that scientific evidence has been used to classify how animals, including humans, get their food.	**Methods:** **identify and classify** To identify and classify, you make observations and collect data to find similarities and differences. This help to organise things into groups and make connections. **Apparatus & techniques:** A ruler is a tool used to draw straight lines. Axis are used to label areas of the bar chart to enable the reader to understand what is being shown. **Data analysis:** Know that tally charts are the best way to collate numbers quickly and effectively. Know that bar charts show results clearly so that conclusions can be made. Know that you need to use scientific language when identifying and classifying. **Evidence to develop explanations:**	**Methods:** **Research** Research is an investigation or study to find out facts. **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. **Evidence to develop explanations:** Know that information texts use scientific language. Know that scientific evidence has been used to classify vertebrates and invertebrates, including exoskeletons and hydroskeletons.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. **Apparatus & techniques:** A ruler is a tool used to measure length. Centimetre is a unit of measurement. Meter is a unit of measurement **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand.	**Methods:** **Comparative testing** Comparative testing is a way of making direct comparisons between different things. **Pattern seeking** Pattern seeking is when you carry out a simple test or observe closely to look for patterns in your results. **Data Analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. Know that you can present information from pattern seeking in a table to make it clearer and easier to understand. **Evidence to develop explanations:** To draw a scientific conclusion you need to look at your results and identify patterns.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion **Evidence to develop explanations:** To draw a scientific conclusion you need to look at your results.

	To draw a scientific conclusion you need to look at your results and identify patterns.				

Year 3 and 4 – Cycle A

Summer 2

Plants					
Lesson Sequence					
Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant - carry out investigation to observe these requirements showing what happens if they are not all fulfilled.	Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant - review results from investigation.	Investigate the way in which water is transported within plants.	Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	Explore methods of seed dispersal.
Substantive Knowledge					
Parts of a plants The main parts of a plant are: flowers, leaves, stem and roots. **Flowers** – have colour and smell to attract insects **Leaves** – change carbon dioxide and water into food for the plant and oxygen. **Stem** – this holds the plant up and carries water to the rest of the plant. **Roots** – hold the plant in the ground and soak up water and minerals from the soil.	**Parts of a flower** A flower's job is to create seeds so that new plants can be grown. **Anther** –part that makes pollen. **Filament** –holds up the anther. **Ovule** – a small egg **Stigma** – takes in the pollen **Style** –Pollen travels down the style to the ovary. **Ovary** – contains the eggs **Petal** – brightly coloured and sweetly scented to attract insects.	**What plants need to grow** Air, light, water, nutrients from the soil, room to grow.	**Life cycle of flowering plants** **Germination** – the seed starts to grow. **Growing** – the plant grows bigger and forms a flower. **Pollination** – pollen from the anther lands on the stigma and travels down the style. **Fertilisation** – the pollen joins with an ovule and a seeds starts to form. **Seed dispersal** – the fully formed seeds are moved away from the parent plant.	**Water transportation** Roots absorb water from the soil. The stem transports water to the leaves.	**Seed dispersal** Seeds can be dispersed by: **Wind** – seeds are blown by the wind. **Animals** – seeds are eaten by animals and then excreted. Seeds also hook onto an animal's fur and are then transported. **Explosion** – dry seed pods split open and shoot out the seeds. **Water** – seeds fall into the water and move with the current

Disciplinary Knowledge					
Methods: **Identifying** Identifying means that you find out what something is. You can identify the main parts of a flowering plant. To do this you need to observe them closely. **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. Secondary sources can help you to identify parts of a flowering plant. **Data analysis:** A scientific diagram is a picture that is usually labelled.	**Methods:** **Identifying** Identifying means that you find out what something is. You can identify the main parts of a flowering plant. To do this you can dissect them and then observe each part closely. **Apparatus & techniques:** Tweezers can be used to dissect an object. They help you to pick up very small parts.	**Methods:** **Fair testing** A fair test is when one variable is changed and the others remain constant. A variable is a factor that can change. You can set up a fair test to investigate how plants grow when one of the variables is removed. **Observation over time** Observing over time is when you watch or measure something over a period of time to see how it changes. You can observe how a plant grows over time, recording your observations at set time intervals. **Apparatus & techniques:** You can take photographs on an iPad to record changes over time **Data analysis:** When you collect data it needs to be presented in	**Methods:** **Observation over time** Observing over time is when you watch or measure something over a period of time to see how it changes. You can observe the changes to a sunflower seed after it has been planted. **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. Secondary sources of information can be used to find out about germination, growing, pollination, fertilization and seed dispersal in a flowering plant. **Apparatus & techniques:** You can access secondary sources of information on an ipad.	**Methods:** **Observation over time** Observing over time is when you watch or measure something over a period of time to see how it changes. **Evidence to develop explanations:** You can carry out an observation over time to see how water is transported from the soil, to the stem, to the leaves of a plant. Know that findings from enquires can be reported in different ways e.g. orally, written, results presentation or as a conclusion. Know that a scientific write up can include: a question, prediction, method, results and conclusion.	**Data analysis**: Model making is a clear way to represent scientific ideas.

		a way that is clear and easy to understand. You can record observations in a table. Photographs can be used as a method of recording changes over time. These need to be in time order to show the changes. **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 in order to grow and be healthy, plants need: air, light, water, nutrients from soil and room to grow.	**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. A powerpoint is a clear way to present information collected when using secondary sources.		

Year 3 and 4 – Cycle B

Autumn 1

<table>
<tr><th colspan="6">Animals Including Humans</th></tr>
<tr><th colspan="6">Lesson Sequence</th></tr>
<tr><td>Describe the simple functions of the basic parts of the digestive system in humans - teeth, oesophagus, stomach, small/large intestines, and rectum.</td><td>Describe the simple functions of the basic parts of the digestive system in humans.</td><td>Identify the different types of teeth in humans and their simple functions - incisors, canines, pre-molars, molars, wisdom.</td><td>Identify the different types of teeth in humans and their simple functions - investigation to show how to keep teeth healthy.</td><td>Investigate animal teeth and how the types of teeth can tell you about their diet.</td><td>Construct and interpret a variety of food chains, identifying producers, predators and prey</td></tr>
<tr><th colspan="6">Substantive Knowledge</th></tr>
<tr><td colspan="2">Digestion is the way the body breaks down the food we eat into smaller parts that can be used to give the body the nutrients it needs.

The main parts of the digestive system are – mouth, teeth, tongue, pharynx, oesophagus, stomach, gall bladder, pancreas, large intestine, small intestine,

1. Food is put into the mouth where it is chewed.Food is swallowed and passes through the pharynx and oesophagus to the stomach.
2. In the stomach food is broken into smaller pieces and mixed with stomach acid.
3. The mixture passes into the small intestine where nutrients are absorbed into the blood stream.
4. The food that is left passes through the large intestine.
5. Waste leaves the body through the rectum</td><td colspan="2">Types of teeth
Molars/pre molars – back teeth used for crushing and grinding Canines – long pointed teeth used for ripping
Incisors – sharp front teeth used for cutting</td><td>Carnivores – eat meat. They have teeth that are shaped to slice and rip. E.g. large sharp canines.
Herbivores – eat plants. They have teeth that are shaped to squash and grind plants e.g. bumpy molars.
Omnivores – eat meet and plants. They have both teeth that are shaped to slice and rip (e.g. canines) and teeth that are shaped to squash and grind (e.g. bumpy molars).</td><td>Food chain – a diagram that shows the transfer of energy from the energy source to the producer to the consumer.

Energy – the property that gives humans strength.
Producer – usually a green plant or algae that makes its own food.
Consumer – a living thing which gets their food by eating plants or other animals.
Predators – animals that eat other animals
Prey – animals that are eaten by other animals.</td></tr>
<tr><th colspan="6">Disciplinary Knowledge</th></tr>
</table>

Methods: **<u>Identify and classify</u>** To identify and classify you make observations and investigations to organise things into groups or categories. Know that you need to use scientific language when identifying and classifying. **<u>Research</u>** Research is an investigation to establish facts about something. Know that information texts use scientific language. **Data analysis:** Know that a diagram is the best way to display the workings of something. A diagram is a simple drawing that shows the appearance or workings of something. **Evidence to develop explanations:** Know that scientific evidence has been used to classify the parts of the digestive system. Know that an experiment will demonstrate and consolidate known facts.	**Methods:** **<u>Identify and classify</u>** To identify and classify you make observations and investigations to organise things into groups or categories. **<u>Research</u>** Research is an investigation to establish facts about something. 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. **<u>Observation over time</u>** 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. You need to control the variables to limit the impact of external factors. **Apparatus & techniques:** You can measure the volume of a liquid using a measuring jug. The volume of a liquid is measured in millilitres and litres. 1litre = 1000ml **Data analysis:** Know that you need to use scientific language when recording results. **Evidence to develop explanations:**	**Methods:** **<u>Identifying and classifying</u>** To identify and classify you make observations and investigations to organise things into groups or categories. Know that you need to use scientific language when identifying and classifying. **<u>Research</u>** Research is an investigation to establish facts about something. Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. Secondary sources do not give original information. It interprets information from primary sources. Know that information texts use scientific language. **Data analysis:** Know that a diagram is the best way to display the workings of something.	**Methods:** **<u>Identifying and classifying</u>** To identify and classify you make observations and investigations to organise things into groups or categories. Know that you need to use scientific language when identifying and classifying. **<u>Research</u>** Research is an investigation to establish facts about something. 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. **Data analysis:** Know that a diagram is the best way to display the workings of something. A diagram is a simple labelled drawing.

	Know that results from an observation over time can be collected and presented in a table. To draw scientific conclusion you need to look at your results and identify patterns.	A diagram is a simple labelled drawing. **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 herbivores can be recognised based on their types of teeth. Conclude that different teeth have different purposes both in humans and animals.	**Evidence to develop explanations:** Know that scientific evidence has been used to classify different species.

Year 3 and 4 – Cycle B

Autumn 2

States of Matter					
Lesson Sequence					
Compare and group materials together, according to whether they are solids or liquids - define the properties of a solid and liquid.	Investigate gasses - what is a gas, what are the properties of a gas?	Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). introduce children to how to use a thermometer.	Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) - look at how some changes of state are reversible and some are irreversible.	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature - carry out investigation to demonstrate different stages of the water cycle.
Substantive Knowledge					
Solid: They keep their shape unless force is applied. They take up the same amount of space and **do not** spread out or flow (e.g. wood, metal, chocolate, rice) **Liquid:** They can change shape but **do not** change their volume. They take the shape of the container they are in. Can be poured (e.g. water, orange juice, honey)	**Gas:** They spread out to completely fill the shape they are in. They **do not** keep their shape and can be squashed (e.g. air, helium, water vapour)	Some materials **change state** when they are heated or cooled. When **water (liquid)** is *heated* it changes to **water vapour (gas)**. When it is *cooled* it changes to **ice (solid).** When solid chocolate is heated, it melts and when it is cooled it changes back to a solid. Water changes to a gas at 100°C **(Celsius)** Water changes to a solid at 0°C.	Some changes of state are **reversible** (can change back to its original state) and some are **irreversible** (can't change back to its original state).	Water on Earth is **constantly moving**. It is recycled over and over again. This recycling process is called the **water cycle**. **Evaporation -** The sun **heats up** water on land, in rivers, lakes and seas and turns it into water vapour. The water vapour rises into the air. **Condensation -** Water vapour in the air **cools** down and changes back into tiny drops of liquid water, forming clouds.	
Disciplinary Knowledge					
Methods: **Identify and classify** To identify and classify, you make observations	**Methods:** **Research** Research is an investigation or study to	**Methods:** **Observation over time** Observing over time is when you make	**Observation over time** Observing over time is when you make systematic and careful	**Methods:** **Identifying/classifying** To identify and classify, you make observations and measurements to find similarities and differences. This	

and measurements to find similarities and differences. This help to organise things into groups and make connections. **Data analysis:** Know that you need to use scientific language when identifying and classifying. Know that a table is the best way to present the results when you identify and classify. **Evidence to develop explanations:** To draw a scientific conclusion you need to look at your results and identify patterns.	find out facts in order to reach a conclusion. Know that information texts use scientific language. **Apparatus & techniques:** A measuring jug is used to measure the volume of liquid. A milliliter is a unit of volume. 1 litre = 1000ml Scales measure the weight of something. Grams is a unit of measure for weight. 1kg = 1000g **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. Evidence to develop explanations: Know that scientific evidence has been used to classify solids, liquids and gasses.	systematic and careful observation to identify and measure changes in materials over a period of time. **Apparatus & techniques:** A thermometer is an instrument that measures temperature. The degree Celsius is a unit of temperature. A stopwatch measures the amount of time that has passed. **Data analysis:** Know that results from an observation over time can be collected and presented in a table. Know that you need to use scientific language when reporting results **Evidence to develop explanations:** To draw a scientific conclusion you need to look at your results and identify patterns. To answer a scientific question, you should include evidence from your scientific enquiry. .	observation to identify and measure changes in materials over a period of time. **Apparatus & techniques:** A thermometer is an instrument that measures temperature. The degree Celsius is a unit of temperature. A stopwatch measures the amount of time that has passed. Time can be measured in: hours, minutes, seconds and milliseconds. **Data analysis:** Know that results from an observation over time can be collected and presented in a table. A line graph is a graph that shows changes over time Evidence to develop explanations: To draw a scientific conclusion you need to look at your results and identify patterns.	help to organise things into groups and make connections. Know that you need to use scientific language when identifying and classifying. **Apparatus & techniques:** A ruler is a tool used to measure length. A centimetre is a unit of measurement. 1cm = 10mm **Evidence to develop explanations:** A measuring jug is used to measure the volume of liquid. To draw a scientific conclusion you need to look at your results and identify patterns

Year 3 and 4 – Cycle B

Spring

Rocks and Soil					
Lesson Sequence					
Introduce the idea that the earth is made up of many layers including rocks and soil. Introduce sedimentary, metamorphic and igneous rocks and look at how these are formed.	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.	Introduce terms permeable and impermeable and carry out investigations to find which rocks can be classified.	Look at common rocks and classify into the three different types. Look at common uses of these rocks and why the type of rock is suitable for its use.	Describe in simple terms how fossils are formed when things that have lived are trapped within rocks. *Link to Mary Anning as a famous fossil hunter.*	Look at how soil forms the top layer of the Earth. Recognise that soils are made from rocks and organic matter. Look at the types of soil and their properties. (Sandy, clay, loam).
Substantive Knowledge					
Children can identify the 3 different types of rock and know how they are formed. **Sedimentary:** rock made from layers of sediment that have formed through pressure. **Igneous:** formed when molten lava cools and solidifies. **Metamorphic:** When sedimentary rock is changed due to heat and pressure.	Children can identify the three types of rocks from their appearance: **Sedimentary** – small grains, layers, soft **Igneous** – shiny, crystals, air bubbles **Metamorphic** – layers,, crystals, hard	**Permeable** is when a material absorbs liquid. **Impermeable** is when a material does not absorb a liquid.	Children can identify the following rocks and classify them into either sedimentary, igneous or metamorphic: **Sedimentary:** sandstone, chalk, limestone **Igneous:** granite, basalt **Metamorphic:** slate, marble	Understand how **fossils** are formed over millions of years: 1. An animal dies and the soft parts of the body rot away. 2. The remains get buried under layers of sediment. 3. The sediment around the bones are pressurised into sedimentary rock. 4. The bones start to be dissolved by water (as sedimentary rock is permeable) 5. Materials in the water replace the bones, making a rock replica of the bones.	Soil makes up the top layer of the Earth's crust and is made from rocks and organic matter.

Disciplinary Knowledge					
Methods: **Identify and Classify** Classifying is when you sort items into groups based on similarities and differences. Identifying means that you find out what something is. Observing means to look closely. **Data analysis:** Know that you can present information as pictures with labels to make it easier to understand. **Evidence to develop explanations:** Know that scientific evidence has been used to classify different types of rocks and how they are formed.	**Methods:** **Identify and Classify** Classifying is when you sort items into groups based on similarities and differences. Identifying means that you find out what something is. Observing means to look closely. **Apparatus & techniques:** A ruler is a tool used to draw straight lines. **Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. A table is a simple way to present data. Evidence to develop explanations: Know that evidence can be used to draw conclusions to classify rocks from their appearance.	**Methods:** **Research** Research is an investigation or study to find out facts in order to reach a conclusion. **Comparative Testing** A comparative test is when you test and compare different cases and situations. **Apparatus & techniques:** A ruler is a tool used to draw straight lines. **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. A table is a simple way to present data. **Evidence to develop explanations:** Know that evidence can be used to draw conclusions to classify rocks from their appearance. To draw a scientific conclusion you need to look at your results and identify patterns.	**Methods:** **Identify and Classify** Classifying is when you sort items into groups based on similarities and differences. Identifying means that you find out what something is. Observing means to look closely. **Comparative Testing** A comparative test is when you test and compare different cases and situations. Using existing knowledge, you can make a prediction about what the outcome of your scientific enquiry will be **Apparatus & techniques:** A ruler is a tool used to draw straight lines. Know that you can present information from research in a table to make it clearer and easier to understand. **Data analysis:** A table is a simple way to present data.	**Methods:** **Identifying and Classifying** Identifying means that you find out what something is. Observing means to look closely. Classifying is when you sort items into groups based on similarities and differences. **Data analysis:** A diagram is a picture that is usually labelled. **Evidence to develop explanations:** Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry.	**Methods:** **Comparative Testing** A comparative test is when you test and compare different cases and situations. A scientific enquiry is carried out to answer a scientific question. **Observation over time** Observing over time is when you make systematic and careful observation to identify and measure changes in materials over a period of time. **Apparatus & techniques:** Regular observations/ measurements need to be made at set intervals You can measure the volume of a liquid using a measuring cylinder. The volume of a liquid is measured in milliliters and litres. 1litre = 1000ml You can measure the amount of a solid in teaspoons.

			Evidence to develop explanations: Know that evidence can be used to draw conclusions to classify rocks from their appearance. 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 conclusions drawn from scientific enquires can be used to make recommendations.		**Data analysis:** When you collect data it needs to be presented in a way that is clear and easy to understand. You can use time-lapse on an iPad to observe changes over time. **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 you can gather, record and present data in a variety of ways to help answer a question. Know that findings from enquires can be reported in different ways e.g. orally, written, results presentation or as a conclusion. Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry.

Year 3 and 4 – Cycle B

Summer 1

Living Things and Their Habitats					
Lesson Sequence					
Recognise the characteristics of a living thing - movement, respiration, sensitivity, growth, reproduction, excretion, nutrition (MRS GREN). Children to tour local area and collect examples of living and non-living things.	Recognise that living things can be grouped in a variety of ways. Vertebrate/invertebrate. Explore different types of vertebrates. Fish/ amphibian/ reptile/ mammal/ bird. Children to group animals into vertebrates and invertebrates using their knowledge of the definitions. Split them into land and sea.	Children to investigate different types of invertebrate.	Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Children to use a classification key to classify animals in our local environment.	Recognise that environments can change and that this can sometimes pose dangers to living things - investigate natural changes e.g. seasons.	Recognise that environments can change and that this can sometimes pose dangers to living things - investigate human changes and how these can be both positive and negative (e.g. protecting endangered species/ deforestation).
Substantive Knowledge					
Something is living if it has the following characteristics: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition (MRS GREN).	Animals can be categorised as **vertebrate** (back bone) and **invertebrate** (no back bone). **Vertebrate** – animals with a back bone Bird – e.g. penguin, owl, ostrich Fish – e.g. tuna, shark, pike	**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	A classification key is a tool that uses yes and no questions. Physical characteristics are the features and traits of an organism's body.	<u>How environments change</u> Habitats can change throughout the year (seasons) and this can have an effect on the plants and animals living there	<u>Human changes to the environment</u> Humans can have positive effects on the environment, e.g. nature reserves, but instead often damage it. Man-made Threats to the Environment Air-pollution from cars, e.g. carbon monoxide, and the burning of fossil fuels.

	Mammal – e.g. dolphin, whale, human Reptile – e.g. snake, crocodile, turtle Amphibian – e.g. toad, salamander, frog Vertebrates can live on both land and in the sea.				• Water pollution through industrial waste and farm fertilisers that can pollute rivers and streams. • Deforestation – cutting down large areas of forest to clear space for building and farming • Global warming Rubbish—Plastic and household waste ends up on the streets, in the sea or in rubbish dumps, destroying habitats and wildlife.
Disciplinary Knowledge					
Methods: **<u>Identify and classify</u>** An observation is when something is closely observed or monitored. Classifying is when something is grouped or ordered into categories based on properties or criteria. **Data analysis:** Presenting data in a Venn diagram shows the similarities and differences between organisms.	**Methods:** **<u>Classifying</u>** Classifying is when something is grouped or ordered into categories based on properties or criteria. **<u>Research using secondary sources</u>** Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. **Data analysis:** Know that a table is a way to present the results when you identify and classify.	**Methods:** **<u>Classifying</u>** Classifying is when something is grouped or ordered into categories based on properties or criteria. **<u>Research using secondary sources</u>** Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. **Data analysis:** Know that a table is a way to present the	**Methods:** **<u>Identifying/ 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:** A classification key is a series of questions that determine an organisms physical characteristics.	**Methods:** **<u>Research using secondary sources</u>** Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources. **<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.	**Methods:** **<u>Research using secondary sources</u>** Secondary sources are works such as textbooks, encyclopedia and scientific books. They describe, discuss and evaluate primary sources **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. **Evidence to develop explanations:** Know that findings from enquires can be reported in different ways e.g. orally,

		results when you identify and classify. **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.		A timeline shows the chronological order of a period of time. **Data analysis:** Information can be presented on a timeline to show how things were at different intervals of time **Evidence to develop exaplantions:** 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.	written, results presentation or as a conclusion.

Year 3 and 4 – Cycle B

Summer 2

Sound					
Lesson Sequence					
Identify how sounds are made, associating some of them with something vibrating	Recognise that vibrations from sounds travel through a medium to the ear. Look at how sounds travel through the ear.	Find patterns between the pitch of a sound and features of the object that produced it.	Find patterns between the volume of a sound and the strength of the vibrations that produced it.	Investigate how to muffle a sound. (Use sound metres to take measurements).	Recognise that sounds get fainter as the distance from the sound source increases
Substantive Knowledge					
Recognise that **vibrations** from **sounds** travel through a medium to the ear.	**How sounds travel through the ear:** 1. A wave of vibrations enter the ear and travel to the **eardrum**. 2. The eardrum vibrates and sends the vibrations to the three tiny bones in the ear (**malleus, incus and stapes**). 3. The bones amplify the vibration and send it to the **cochlea**. 4. The cochlea is filled with fluid and tiny hairs that bump into each other and an electrical impulse is created. 5. The impulse sends a message to the brain via the **auditory nerve** and is understood as sounds. **Parts of the ear:** **Anvil, stirrup and hammer –** the three small bones in the ear.	**Pitch of a sound** The pitch of a sound is how high or low it is. The shorter the object the higher the pitch. The longer the object the lower the pitch. With stringed instruments, the tighter the string the higher the pitch of the sound.	**Volume of a sound** The louder the sound, the bigger the vibration. The size of the vibration is called the amplitude. Quieter sounds have a smaller amplitude and louder sounds have a bigger amplitude.		The closer you are to the source of a sound, the louder the sound will be. The further away you are from the source of a sound, the quieter the sound will be

	Cochlea – in the inner ear, translates vibrations to electrical signals. **Ear drum –** a thin sheet of skin- like tissue stretch ed tight (like a drum) between the ear canal and the middle ea			
Disciplinary Knowledge				
Methods: **Identifying/ 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. **Comparative test** A scientific enquiry is carried out to answer a scientific question **Data analysis:** Know that a table is the best way to present the results when you identify and classify. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question.	**Methods:** **Comparative test** A comparative test is when you test and compare different cases and situations. A variable is a factor that can change. **Research using secondary sources** Secondary sources are works such as textbooks, encyclopaedia and scientific books. They describe, discuss and evaluate primary sources. **Apparatus & techniques:** A ruler is a tool used to measure length. A centimetre is a unit of measurement. 1cm = 10mm **Data analysis:**	**Methods:** **Comparative/fair test** A comparative test is when you test and compare different cases and situations. A scientific enquiry is carried out to answer a scientific question **Pattern seeking** You can make predictions about what patterns you might find before carrying out a pattern seeking enquiry. **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. **Evidence to develop explanations:** Know that a conclusion is when you answer a question using what you have found out in scientific enquiry.	**Methods:** **Pattern seeking** Pattern seeking enquiries can help explain the relationship between volume and distance of sound source. You can make predictions about what patterns you might find before carrying out a pattern seeking enquiry. **Comparative/fair test** A fair test is when one variable is hanged and the others stay the same. A comparative test is when you test and compare different cases and situations. A scientific enquiry is carried out to answer a scientific question. Using existing knowledge, you can make a prediction about what the outcome of your scientific enquiry will be **Apparatus & techniques:** A tuning fork makes a sound at a consistent pitch when you set it vibrating. Force is the strength of a physical action or movement A sound meter measures the volume of sound in decibels.	**Methods:** **Pattern seeking** Pattern seeking enquiries can help explain the relationship between volume and distance of sound source. You can make predictions about what patterns you might find before carrying out a pattern seeking enquiry. **Comparative/fair test** A fair test is when one variable is hanged and the others stay the same. A comparative test is when you test and compare different cases and situations. **Apparatus & techniques:** A sound meter measures the volume of sound in decibels. A meter ruler is used to measure distance.

	Know that you need to use scientific language when reporting results. Modelling can be used to explain/show scientific ideas and concepts. Know that a conclusion is when you answer a question using what you have found out in scientific enquiry. **Evidence to develop explanations:** Know that results from a scientific enquiry can be used to answer a scientific question		**Data analysis:** A diagram is a picture that is usually labelled. Know that you need to use scientific language when reporting results. A bar chart is a graph that presents categorical data. Know that you need to use scientific language when reporting results. Know that you can present information from research in a table to make it clearer and easier to understand **Evidence to develop explanations:** To answer a scientific question, you should include evidence from your scientific enquiry. Know that you can gather, record and present data in a variety of ways to help answer questions. To draw a scientific conclusion you need to look at your results and identify patterns.	A meter is a unit of measurement. 100cm = 1m **Data analysis:** Know that you can present information from research in a table to make it clearer and easier to understand. A line graph is a graph that shows changes over time. Evidence to develop explanations: Know that you can gather, record and present data in a variety of ways to help answer questions. To draw a scientific conclusion you need to look at your results and identify patterns