

| Evolution and Inheritance                                                                                                                                                  |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| 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 | 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 unlikely to survive E.g. Giraffes used to have shorter necks but they have evolved to have longer necks so that they can reach the top leaves on tall trees. Artificial selection – when human's intervene in evolution by | 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. | 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 selection. This is the process by which organisms change over time as a result of changes in inheritable physical or behavioural traits. The |

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|                                                                                                                                     |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | breeding animals for specific traits.                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | strongest traits survive over generations. |
| <b>Disciplinary Knowledge</b>                                                                                                       |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                            |
| Identifying and classifying<br>Classifying is when something is grouped or ordered into categories based on properties or criteria. | Pattern Seeking<br>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. | Identifying<br>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.<br><br>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. | Identifying<br>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. | Pattern seeking<br>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.<br><br>A table can be used to record results/patterns observed at different stages. Line graphs can be used to plot data collection over time<br><br>The x axis shows the time<br>The y axis represents what is being measured. Plotted points on a line graph need to be joined by straight lines. |                                            |

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|  |  |  |  | Know how to draw a line graph. |  |
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**Year 6**  
**Autumn 2**

| Light                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                              |                                                                                                                                        |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                     |
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| 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 <b>refraction</b> .<br><br>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                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                              |                                                                                                                                        |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                     |
| <b>Methods:</b><br><b>Pattern seeking</b><br>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.<br><br>Variables are anything that can change or be changed.<br><br>In order to prove that light travels in a straight line, | <b>Methods:</b><br><b>Pattern seeking</b><br>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.<br><br>Variables are anything that can change or be changed.<br><br>A pattern seeking enquiry can be carried out to |                                                                                                                                        | <b>Methods:</b><br><b>Fair Testing</b><br>A fair test is when one variable is changed and the others remain constant.<br><br>A variable is a factor that can change.<br><br>An independent variable is a variable that the experimenter can control. | <b>Methods:</b><br><b>Pattern seeking</b><br>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.<br><br>Variables are anything that can change or be changed.<br><br>A pattern seeking enquiry can be carried out to | <b>Apparatus &amp; techniques:</b><br>A torch is a light source.<br><br>Prisms can be used to refract light.<br><br><b>Evidence to develop explanations:</b><br>To answer a scientific question, you need to identify evidence from |

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| <p>children conduct an investigation into how they can get a light beam to reach a target.</p> <p><b>Apparatus &amp; techniques:</b><br/>A torch is a source of light.</p> <p>Mirrors can be used to reflect light.</p> <p><b>Evidence to develop explanations:</b><br/>Know that a conclusion is when you answer a question using what you have found out in your scientific enquiry.</p> | <p>investigate how light reflects</p> <p><b>Apparatus &amp; techniques:</b><br/>A torch is a source of light.</p> <p>Mirrors can be used to reflect light.</p> <p><b>Data analysis:</b><br/>A diagram can be used to show scientific concepts.</p> <p>A diagram is a picture that is labelled.</p> <p>Know how to draw a diagram to show how we see.</p> <p><b>Evidence to develop explanations:</b><br/>To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion.</p> <p>Know that scientific language should be used when explaining findings.</p> <p>To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion.</p> |  | <p>A dependent variable is the variable being tested and measured in the experiment.</p> <p>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.</p> <p><b>Apparatus &amp; techniques:</b><br/>A torch is a source of light.</p> <p>Distance between a light source and an object can be measured using rulers in m/cm/mm.</p> <p>1m = 100cm<br/>1cm = 10mm</p> <p><b>Data analysis:</b><br/>Recording results in a table<br/>To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion.</p> <p><b>Evidence to develop explanations:</b><br/>Know that scientific language should be used when explaining findings.</p> <p>Know that test results can be used to make</p> | <p>investigate how objects appear to change when placed in water due to light refraction.</p> <p><b>Evidence to develop explanations:</b><br/>To answer a scientific question, you need to identify evidence from your scientific enquiry that supports your conclusion.</p> <p>Know that scientific language should be used when explaining findings.</p> <p>Know that scientific evidence is used to support ideas.</p> | <p>your scientific enquiry that supports your conclusion.</p> <p>Know that scientific language should be used when explaining findings.</p> <p>Know that scientific evidence is used to support ideas.</p> |
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|  | <p>Know that scientific language should be used when explaining findings.</p> <p>Know that test results can be used to make predictions to set up further fair tests</p> |  | <p>predictions to set up further fair tests.</p> |  |  |
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## Year 6

## Spring

| Living Things and their Habitats                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                          |                                             |
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| 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.                                                                                                                                                                                                                                                                                                                                                                 | Classifying animals into vertebrate and invertebrate.                                                                                                                                                                                                                                                                                                                                                                     | Classifying plants into 4 categories: flowering, ferns, conifers and mosses.                                                                                                                                                                                                                                               | Introduce children to microorganisms. Investigate bacteria.                                                                                                                                                                                              | Children to investigate protista 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 menara. Menara and Protista are both single cell organisms - Protista are more complex Animal Kingdom 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, | Plant Kingdom 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 fertilised. Conifers – seeds are housed inside woody protective structures called cones. Ferns – have | Microorganisms A.K.A: microbes A micro-organism is a very tiny living thing that can only be seen with a microscope<br><br>There are 3 main groups of micro-organisms: menara, 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 organisms |                                             |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>shark, pike Mammal – e.g. dolphin, whale, human</p> <p>Reptile – e.g. snake, crocodile, turtle</p> <p>Amphibian – e.g. toad, salamander, frog</p> <p>Invertebrate – animals without a backbone</p> <p>Worms – e.g. earthworm, leech</p> <p>Arthropods – e.g. spiders, ants, butterfly</p> <p>Molluscs – e.g. snail, squid, octopus</p> <p>Flatworm – e.g. flat worm, tape worm</p> <p>Echinodermata – e.g. starfish, sea urchin</p>                                                                | <p>neither seeds nor flowers, but reproduce via miniature cells called spores. Mosses – do not produce seeds or carry flowers. They reproduce by releasing spores. Mosses do not have true stems, leaves or roots.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| Disciplinary knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Identify/ Classify</p> <p>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.</p> <p>A classification key is a set of yes and no questions that help you to identify something based on common characteristics.</p> <p>Know how to draw a classification key.</p> | <p>Identify/ Classify</p> <p>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</p> <p>Pattern seeking is when you observe variables that cannot be controlled to notice patterns. Variables are anything that can change or be changed.</p> <p>Know that an exploded diagram shows how separate parts fit together. Know how to draw an exploded diagram.</p> | <p>Identify/ classify</p> <p>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.</p>      | <p>Observation over time</p> <p>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.</p> <p>To observe something in detail that is very small you can use a microscope.</p> | <p>Research using secondary sources</p> <p>Research is an investigation or study to find out facts in order to reach a conclusion.</p> <p>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.</p> |

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| <p>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.</p> <p>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. Secondary sources of information can be used to research the Linnaean classification system</p> |  |  | <p>Know how to select the most appropriate type of graph to display the data you have.</p> |  |
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Year 6  
Summer

| Electricity                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                         |                                                                                                                                                                                                     |
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| Lesson Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                         |                                                                                                                                                                                                     |
| Review insulators and conductors.<br>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.<br>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit<br>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.<br>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                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                         |                                                                                                                                                                                                     |
| <p><b>Electricity</b> is a form of energy resulting from charged particles.</p> <p><b>Electrical conductor</b> – a material that allows electricity to pass through it e.g. copper, iron, steel, silver gold.</p> <p><b>Electrical insulator</b> – does not allow electricity to pass through e.g. rubber, wood, plastic, paper.</p> <p>In order for electricity to flow, a circuit needs: a source of electricity, no gaps in the circuit, conductors.</p> | <p><b>Circuit symbols</b> can be used to draw a simple series circuit including:</p> <ul style="list-style-type: none"> <li>Battery (cell)</li> <li>Wire</li> <li>Bulb</li> <li>Buzzer</li> <li>Motor</li> <li>Switch (on/off)</li> </ul> | <p>A <b>cell</b> is a device containing electrodes that is used for generating current.</p> <p>A <b>battery</b> is a collection of cells. It stores energy until it is needed.</p> <p><b>Voltage</b> is the force that makes the electric current move through the wires. The greater the voltage, the more current will flow.</p> <p>Mains electricity has a voltage of 210-240 volts. A typical cell in school has 1.5 volts.</p> <p><b>Current</b> is a flow of electricity which results from the ordered,</p> | <p>The brightness of a bulb is associated with the voltage.</p> <p>More batteries (or a higher voltage) creates more power to flow through the circuit a bulb would therefore be brighter.</p> <p>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).</p> | <p><b>Switch</b> – 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.</p>           |                                                                                                                                                                                                     |

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| Disciplinary Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>Methods:</b><br/><b><u>Classifying</u></b><br/>Classifying is when something is grouped or ordered into categories based on properties or criteria.</p> <p>Know that these materials can be classified as conductors or insulators:</p> <ul style="list-style-type: none"> <li>- Copper tape</li> <li>- Metal paperclip</li> <li>- Plastic paperclip</li> <li>- Rubber</li> </ul> <p><b>Apparatus &amp; techniques:</b><br/>Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit. Outputs are achieved when there is a complete circuit.</p> <p><b>Evidence to develop explanations:</b><br/>Know that results from a scientific enquiry can be used to answer a scientific question.</p> <p>To answer a scientific question, you should include evidence from your scientific enquiry.</p> | <p><b>Methods:</b><br/><b><u>Pattern seeking</u></b><br/>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.</p> <p>Variables are anything that can change or be changed.</p> <p><b>Data analysis:</b><br/>Circuits can be represented as diagrams using symbols for each component</p> <p>Know how to draw a circuit diagram:</p> <ul style="list-style-type: none"> <li>• Wires are drawn with a straight line using a ruler</li> <li>• Circuit diagrams are drawn as a birds-eye-view</li> <li>• Circuit diagrams are drawn rectangular</li> <li>• Components of the circuit must touch the wire lines to show the circuit has no breaks</li> </ul> | <p><b>Methods:</b><br/><b><u>Pattern seeking</u></b><br/>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.</p> <p>Variables are anything that can change or be changed.</p> <p>Know that a pattern seeking enquiry can be carried out to investigate how increasing the number of cells, increases the voltage.</p> <p><b>Apparatus &amp; techniques:</b><br/>Wires, batteries, bulbs, buzzers and motors are electrical components that make up a circuit.</p> <p>We measure the amount of electrical energy (voltage) in Volts.</p> <p>A volt metre is used to measure voltage.</p> <p>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</p> | <p><b>Methods:</b><br/><b><u>Fair test</u></b><br/>A fair test is when one variable is changed and the others remain constant.</p> <p>A variable is a factor that can change.</p> <p><b>Apparatus &amp; techniques:</b><br/>A light meter can be used to measure the brightness of a bulb.</p> <p>The light meter must be held against the bulb.</p> <p>The brightness of a bulb is measure in amps.</p> <p><b>Data analysis:</b><br/>Know that different types of graphs are best suited to presenting different types of information.</p> <p>Know how to select the most appropriate type of graph to display the data you have.</p> | <p><b>Methods:</b><br/><b><u>Pattern seeking</u></b><br/>Pattern seeking is when you observe variables that cannot be controlled to notice patterns.</p> <p>Variables are anything that can change or be changed.</p> <p>A pattern seeking enquiry can be carried out to identify that different components can be used within a circuit for different purposes.</p> <p><b>Data analysis:</b><br/>Know that scientific diagrams e.g. circuit diagrams can aid scientific explanations.</p> <p><b>Evidence to develop explanations:</b><br/>Conclude that a complete circuit creates an output, which can be used for a specific purpose.</p> |