

KS3 Science

Curriculum Overview

Year 8

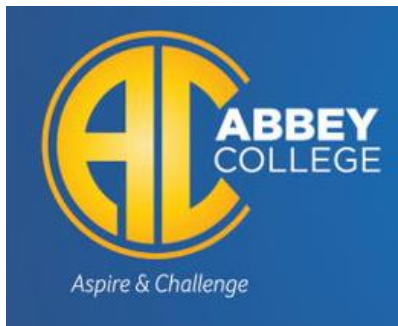
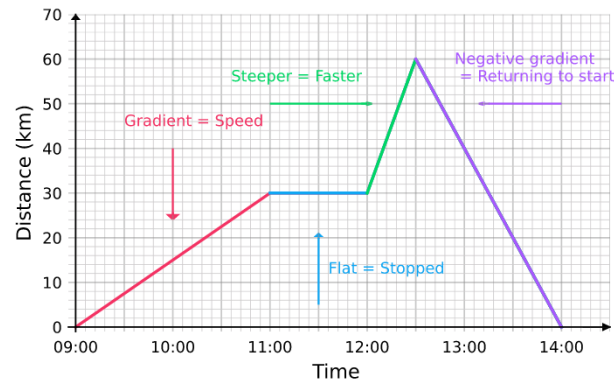
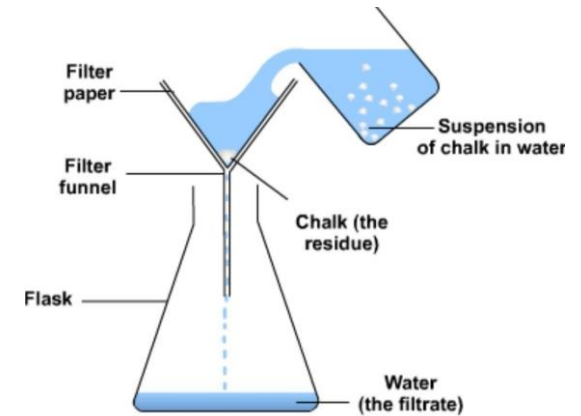


Autumn Term

HEALTHY LIFESTYLE



$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$



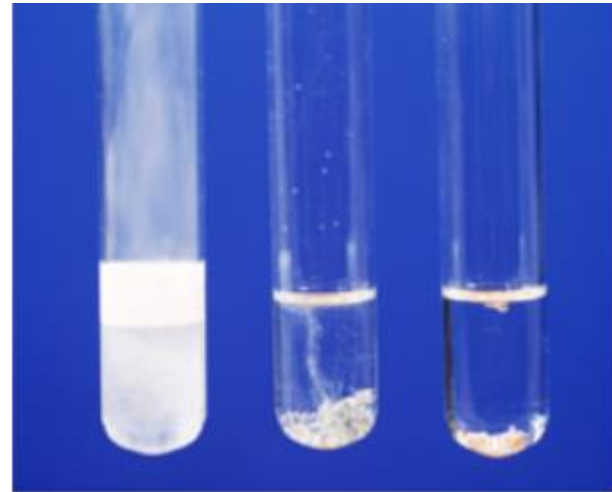
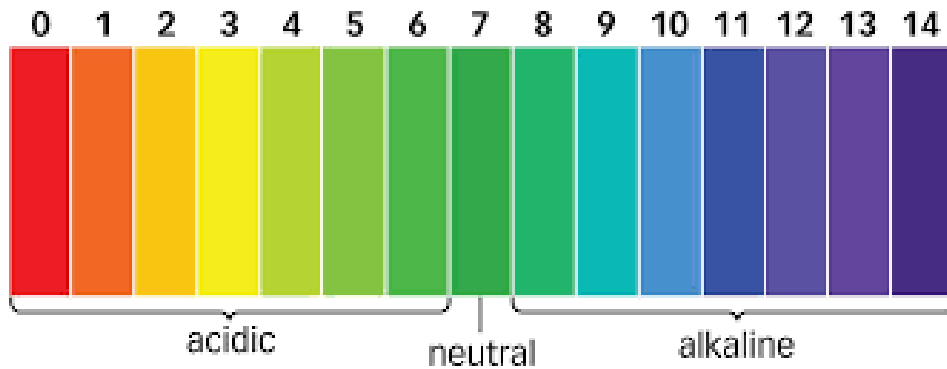
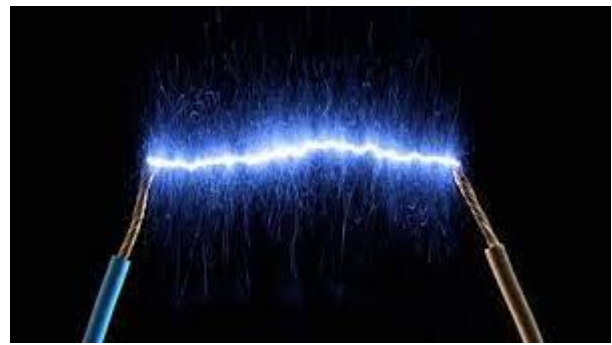
| Topic | Number of lessons | Overview | Key knowledge and skills | Progression and links | Assessment & recording; factual recall checks |
|----------------------|-------------------|---|---|--|--|
| Health and Lifestyle | 11 | <p>Students will learn that the body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water for its cells' energy, growth, and maintenance.</p> <p>Students will further study the organs of the digestive system and how they adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.</p> | <p>Describe the components of a healthy diet and explain the role of each food group in the body.</p> <p>Describe how to tests foods for starch, lipids, sugar and protein and explain why it is important to be able to test these.</p> <p>Describe some of the health issued caused by an unhealthy diet.</p> <p>Describe the structure and function of the main parts of the digestive system and describe the role of enzymes and bacteria in digestion</p> <p>Describe the differences between recreational and medical drugs and their affects on the body.</p> <p>Describe the effects of alcohol and tobacco smoke on health and behavior and their effects on a developing baby.</p> | <p><u>Problem Solving</u> Given a list of symptoms diagnose different nutrient deficiency diseases.</p> <p><u>Numeracy</u> Select data and information about different nutrients and use them to contribute to conclusions.</p> <p>Visually display data through various methods like graphs, diagrams, charts, and plots.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

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| Chemical reactions | 8 | <p>In this topic students will cover some of the biggest ideas in chemistry.</p> <p>Students will learn that during a chemical reaction, bonds are broken (requiring energy) and new bonds are formed (releasing energy)</p> <p>If the energy released is greater than the energy required, the reaction is exothermic – if the reverse, it is endothermic</p> <p>Chemical changes can be describe by a model in which atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.</p> <p>Students will be taught to recognise combustion and thermal decomposition reactions.</p> | <p>Describe what happens to atoms in chemical reactions and compare chemical changes to physical changes</p> <p>Write word equations to represent chemical reactions.</p> <p>State that combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light</p> <p>Evaluate different fuels in terms of the pros and cons of their products of combustion.</p> <p>Identify decomposition reactions from word equations and use a pattern to predict how a set of compounds thermally decompose.</p> <p>Explain conservation of mass in chemical reactions and use this to calculate masses of reactants and products.</p> <p>Determine the characteristics of endothermic and exothermic energy changes.</p> | <p><u>Literacy</u> Identify meaning in scientific text, taking into account potential bias.</p> <p><u>Numeracy</u> Translate information between graphical and numerical form.</p> <p>Visualise and represent 2-D and 3-D forms including 2-D representations of 3-D objects.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

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| Separation techniques | 9 | <p>In this topic students will revisit the idea that when substances change temperature or state that this can be described in terms of particles gaining or losing energy</p> <p>Students will go onto learn that pure substances have a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties.</p> <p>The method chosen to separate a mixture depends upon which physical properties of the individual substances are different.</p> | <p>State what a mixture using particle models and give examples of mixtures and pure substances.</p> <p>Comment on the purity of a substance by interpreting temperature change data.</p> <p>Explain how substances dissolve using the particle model and draw annotated before and after diagrams to represent dissolving.</p> <p>Use the solubility curve of a solute to describe and explain simply observations about solutions.</p> <p>Justify the method chosen to separate a mixture depends on which physical properties of the individual substance are different.</p> <p>State that mixtures may be separated owing to difference in their physical properties. Use this information to compare filtration, distillation, chromatography and evaporation as separation techniques.</p> | <p><u>Literacy</u> Predicting, making inferences, describing relationships and communicating these ideas to a wide range of audiences and a variety of situations.</p> <p><u>Problem solving</u> Selecting the correct separation technique when provided with a mixture to separate.</p> <p><u>Numeracy</u> Make estimates of the results of simple calculations.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

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| Motion and pressure | 8 | <p>In this topic students will learn that the speed of an object is measured as the distance it covers in a unit of time and that this changes over the course of a journey.</p> <p>Students will also learn that pressure in a fluid acts in all directions – it increases with depth and due to the increased weight of fluid and results in an upthrust.</p> <p>This will lead to students learning about why some objects float on fluids.</p> <p>Students will also describe stresses on solid objects and how they can be used to explain observations where objects scratch, sink into, or break surfaces.</p> | <p>Use the speed equation to explain unfamiliar situations. Use this knowledge to describe and explain how a moving object appears to a stationary observer and to a moving observer</p> <p>Choose equipment to obtain data for speed calculations, justifying their choice based on accuracy and precision</p> <p>Draw and analyse distance-time graphs for a range of journeys</p> <p>Calculate fluid pressure in a range of situations and use these calculations to explain why liquid pressure changes with depths</p> <p>Explain why an object will float or sink in terms of forces or density</p> <p>Compare stress in different situations, explaining the differences in pressure using scientific knowledge</p> <p>Apply the concept of moments to everyday situations and use calculations to explain situations involving moments.</p> | <p><u>Numeracy</u> Predict quantitatively the effect of changing area and/or force on stress in a range of situations.</p> <p><u>Problem solving</u> Suggest relevant testable questions and design an experiment to answer this question.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

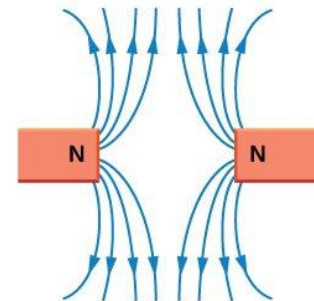
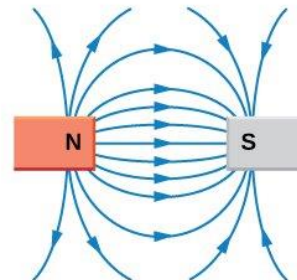
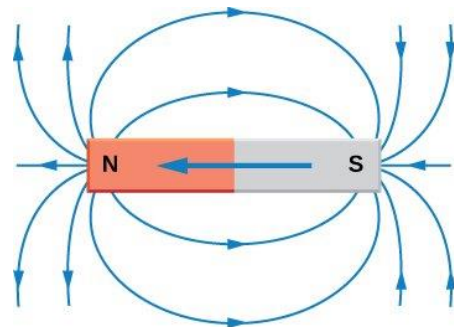
Spring Term



Magnesium
and acid

Zinc and
acid

Iron and
acid

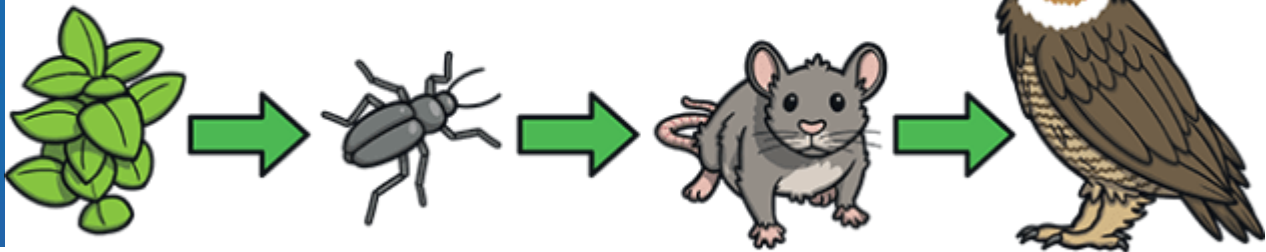
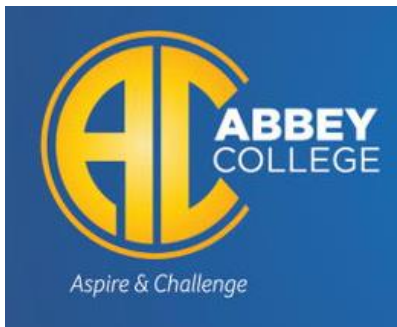
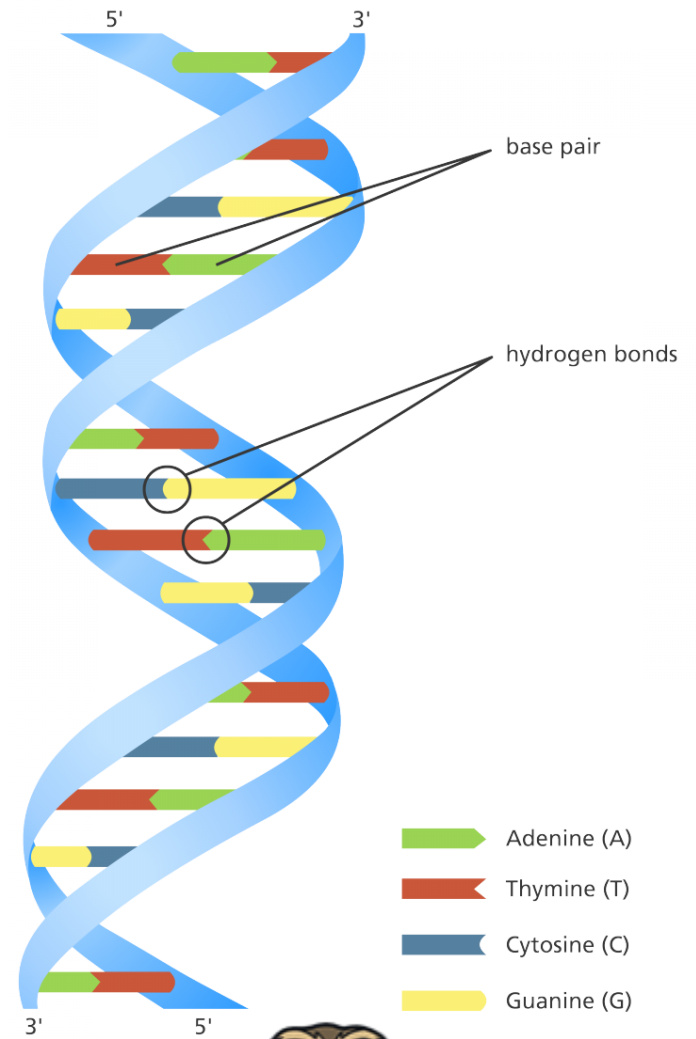
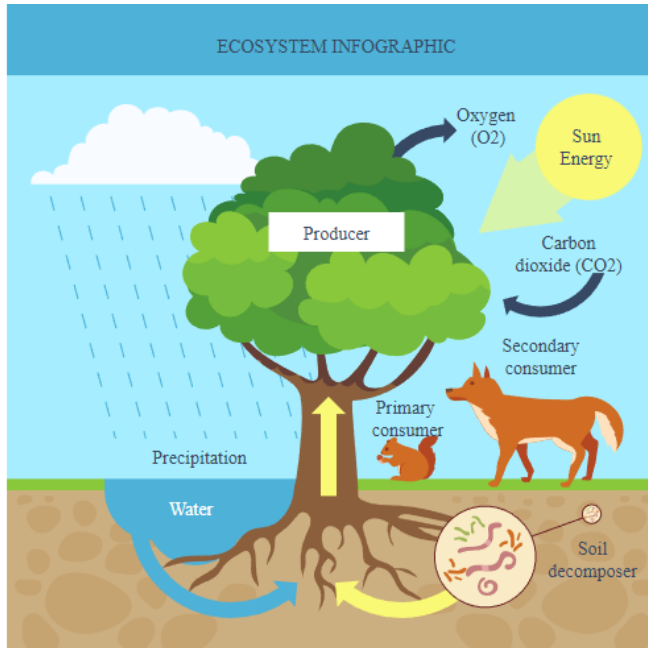


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| Acids and alkalis | 5 | <p>In this topic students will learn what is meant by an acid and an alkali.</p> <p>Students will learn to describe acids and alkalis using the pH scale and learn that whilst some acids and alkalis are dangerous many are common chemicals we use every day.</p> <p>Students will learn that the properties of acids and alkalis they observe during their chemical reactions can make them useful products.</p> <p>Students will learn that when acids and alkalis react they produce salts and the salts' names are derived from the acid and alkalis used.</p> | <p>Compare chemical reactions to physical change and deduce whether an observed or described change is a physical change or a chemical reaction.</p> <p>Compare different particles found in acids and alkalis</p> <p>Explain what concentrated and dilute mean, in terms of the numbers of particles present.</p> <p>Offer suitable safety precautions when given a hazard symbol, and give a reason for the suggestion.</p> <p>Compare the use of a variety of indicators and pH probe to measure acidity and alkalinity</p> <p>Predict the names of salts formed when acids react with metals or bases and write word equations to represent the reactions.</p> <p>Describe and explain the steps involved in making a salt in a neutralisation reaction.</p> | <p><u>Problem Solving</u> Devise an experiment to compare how well indigestion remedies work.</p> <p>Estimate the pH value of an acid based on information about its reactions.</p> <p><u>Numeracy</u> Interpret a graph of pH changes during a neutralisation reaction.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

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| Acids and metals | 7 | <p>In this topic students build on the knowledge of acids and alkalis to explain that metals and non metals react with oxygen to form oxides, which are either bases or acids</p> <p>Furthermore, students will learn that metals can be arranged as a reactivity series in order of how readily they react with other substances.</p> <p>Some metals react with acids to produce salts and hydrogen</p> <p>Finally students will describe an oxidation, displacement and metal-acid reaction with a word equation.</p> | <p>Compare the reactions of different metals with:</p> <ul style="list-style-type: none"> Dilute acids Oxygen Water <p>Use this to explain the reactivity of metals.</p> <p>Suggest how temperature changes may be linked with difference in reactivity between metals with acid.</p> <p>Justify the use of specific metals for different applications, using data provided.</p> <p>Link a metal's reactions with its place in the reactivity series.</p> <p>Deduce a rule from data about which reactions will occur or not, based on the reactivity series</p> <p>Explain predictions about displacement reactions.</p> <p>Devise a model to explain displacement reactions.</p> | <p><u>Problem Solving</u> Write a suitable hypothesis and plan in detail which variables to control and how to control them.</p> <p>Suggest the identity of unknown metals, given information about their reactions.</p> <p><u>Literacy</u> Use largely correct form in a range of writing styles and text, and include information relevant to the audiences whilst using scientific terms confidently and correctly in writing.</p> | <ul style="list-style-type: none"> 5 questions a day; recall activity in most lessons. Close the gap questions Self and peer feedback on tasks completed Formative assessment during the unit Summative assessment at the end of the unit |

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| Electricity and magnetism | 10 | <p>In this topic students will grasp the big ideas in electronics.</p> <p>Students will model potential difference as an electrical push from the battery and that in series and parallel circuits potential difference acts in different ways</p> <p>Students will be introduced to current as the flow of electrons and learn how current flows in parallel and series circuits.</p> <p>Students will learn about the concept of resistance in electrical circuits and what causes the resistance</p> <p>Students will also be introduced to the basics of electromagnetism and learn how to make a basic electromagnet.</p> | <p>Explain in terms of electrons why something becomes charged and predict how charged objects will interact.</p> <p>Suggest ways to reduce the risk of getting electrostatic shocks.</p> <p>Define:</p> <ul style="list-style-type: none"> • Current • Potential difference • Resistance <p>Explain why potential difference is measured in parallel and set up and measure potential difference across various components in a circuit.</p> <p>Explain why potential difference and current varies in series and parallel circuits. Explain the pattern in potential difference and current readings for series and parallel circuits, drawing conclusions.</p> <p>Explain the causes of resistance and the factors that effect the resistance of a resistor.</p> <p>Explain how magnets can be used in everyday situations.</p> <p>Suggest improvements to an experiment to observe field lines around a magnet.</p> <p>Explain how an electromagnet works and predict the effects of changes on the strength of different electromagnets.</p> | <p><u>Problem solving</u> Use a model to explain how current flows in a circuit and predict the current in different circuits.</p> <p>Predict the effect of changing the resistance of a circuit component on the overall resistance of the circuit.</p> <p>Measure current accurately in a number of places in a circuit and explain the pattern in current readings for series and parallel circuits, drawing conclusions.</p> <p><u>Numeracy</u> Solve simple algebraic equations.</p> <p>Change the subject of an equation and substitute numerical values into algebraic equations using appropriate units for physical quantities.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

Summer Term



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|---|-------------------|---|--|---|--|
| Adaptations, inheritance and extinction | 10 | <p>In this topic students will learn that natural selection is a theory that explain how species evolve and why extinction occurs</p> <p>Students will learn that biodiversity is vital to maintaining populations and that within a species, variation helps against environmental changes.</p> <p>Students will discover that inherited characteristics are the result of genetic information in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction.</p> | <p>Explain how variation gives rise to different species.</p> <p>Explain the causes of continuous and discontinuous variation.</p> <p>Predict implications of a change in the environment on a population.</p> <p>Explain how competition or long-term environmental change led to evolutionary adaptation or extinction and the role variation has in species success.</p> <p>Understand that DNA codes for the characteristics of an organism and explain how a change in DNA may affect an organism and its future offspring.</p> <p>Explain why gametes have 23 chromosomes, but normal body cells contain 46 chromosomes</p> <p>Explain how natural selection leads to evolution and outline the evidence to support this theory.</p> <p>Explain the importance of peer review to scientists</p> <p>Explain how Darwin used the evidence from finches to develop his theory of natural selection and evolution.</p> <p>Define extinction and give examples of factors that might lead to the extinction of an organism.</p> | <p><u>Problem Solving</u> Record and categorise observations of variations between different species of animals to suggest species boundaries.</p> <p><u>Literacy</u> Critique a claim that a particular characteristic is inherited or environmental.</p> <p>Create an evolutionary family tree, and present reasoned arguments to justify the structure of the tree.</p> <p>Interpret evidence provided in a range of scientific texts to explain the most likely theory for dinosaur extinction.</p> <p><u>Numeracy</u> Record results in a table, and identify and plot an appropriate graph to show variation within a species</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |

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| Ecosystem processes | 11 | <p>In this topic students will be introduced to the detail of the two most common chemical reactions in living organisms; photosynthesis and respiration.</p> <p>Students will learn that plants and algae do not eat, but use energy from light together with carbon dioxide and water to make glucose through photosynthesis. Students will learn that plants are adapted to obtain the resources for photosynthesis and to store the products also.</p> <p>Students will learn that respiration is a series of chemical reactions that breaks down glucose to provide energy and form new molecules inside cells. Students will observe that most living things use aerobic respiration but switch to anaerobic respiration, which provides energy, when oxygen is unavailable.</p> <p>Students will put these ideas together to show how energy flows through an ecosystem.</p> | <p>State the word and symbol equations for photosynthesis.</p> <p>Describe and explain how a plant obtains the reactants for photosynthesis</p> <p>Explain how the structures of the leaf make it well adapted for photosynthesis</p> <p>Explain the importance of photosynthesis in the food chain</p> <p>Describe and explain deficiency symptoms in plants.</p> <p>Explain how proteins are made for plant growth.</p> <p>Define using word and symbol equations aerobic and anaerobic respiration in animals and explain the differences between the two types of respiration.</p> <p>Explain, in detail, how the reactants for respiration get into the cells.</p> <p>Construct a series of food chains and use them to assemble a food web.</p> <p>Evaluate the impact of human impact on disruption to food chains.</p> | <p><u>Problem Solving</u> Make observations of stomata from the underside of the leaf, and record as a labelled diagram with annotations.</p> <p>Plan an investigation to explain the effect of exercise on respiration rates.</p> <p><u>Numeracy</u> Record measurements in a table, and calculate arithmetic means of results, giving answers to the correct number of significant figures</p> <p>Evaluate data collected, showing awareness of potential sources of random and systematic errors.</p> | <ul style="list-style-type: none"> • 5 questions a day; recall activity in most lessons. • Close the gap questions • Self and peer feedback on tasks completed • Formative assessment during the unit • Summative assessment at the end of the unit |