



# Medium Term Planning – AC4

## Curriculum: Science

***Excellence.  
No Excuses.***

Year	Topic Detail and Sequence	Pre-requisite Knowledge	Key Vocabulary	Demonstrable Skills
7	<p>Gas Exchange</p> <ol style="list-style-type: none"> <li>1. Structure of gas exchange systems in humans</li> <li>2. Functions of gas exchange systems</li> <li>3. Adaptations of structures to carry out functions of gas exchange</li> <li>4. Breathing</li> <li>5. Using the pressure model to explain the movement of gases into and out of the lungs</li> <li>6. Exercise</li> <li>7. Asthma</li> <li>8. Smoking</li> <li>9. Gas exchange in plants</li> </ol> <p>Earth and Atmosphere</p> <ol style="list-style-type: none"> <li>10. The composition of the Earth</li> <li>11. The structure of the Earth</li> <li>12. The rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> <li>13. Earth as a source of limited resources and the efficacy of recycling</li> <li>14. The carbon cycle</li> <li>15. The composition of the atmosphere</li> <li>16. The production of carbon dioxide by human activity and the impact on climate.</li> </ol>	<p>Students should know:</p> <p>How oxygen is used by the body.</p> <p>The factors affecting diffusion</p> <p>compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p> <p>describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>recognise that soils are made from rocks and organic matter.</p>	<p><b>Breathing</b>  <b>Diffusion</b>  <b>Concentration gradient</b>  <b>Diffusion pathway</b>  <b>Pressure</b>  <b>Igneous</b>  <b>Metamorphic</b>  <b>Sedimentary</b>  <b>Resource</b>  <b>Cycle</b></p>	<p>Know that in gas exchange, oxygen and carbon dioxide move between alveoli and the blood.</p> <p>Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body.</p> <p>Breathing occurs through the action of muscles in the ribcage and diaphragm.</p> <p>The amount of oxygen required by body cells determines the rate of breathing.</p> <p>Explain how exercise, smoking and asthma affect the gas exchange system.</p> <p>Explain how the parts of the gas exchange system are adapted to their function.</p> <p>Explain observations about changes to breathing rate and volume.</p> <p>Explain how changes in volume and pressure inside the chest move gases in and out of the lungs.</p> <p>Explain why a rock has a particular property based on how it was formed. Identify the causes of weathering and erosion and describe how they occur.</p> <p>Construct a labelled diagram to identify the processes of the rock cycle.</p> <p>Use a diagram to show how carbon is recycled in the environment and through living things.</p> <p>Describe how human activities affect the carbon cycle.</p> <p>Describe how global warming can impact on climate and local weather patterns.</p>



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8	<p>Relationships in an Ecosystem</p> <ol style="list-style-type: none"> <li>1. Interdependence</li> <li>2. Ecosystems and communities</li> <li>3. Food webs</li> <li>4. Insect pollinated crops</li> <li>5. The bee problem</li> <li>6. Food security</li> <li>7. How organisms affect their environment</li> <li>8. Pollution</li> </ol> <p>Magnetism</p> <ol style="list-style-type: none"> <li>9. Magnetic Poles</li> <li>10. Attraction and repulsion</li> <li>11. Magnetic fields plotting and representation</li> <li>12. Earth's Magnetic Field</li> <li>13. Compasses and Navigation</li> <li>14. The magnetic effect of current</li> <li>15. Electromagnets</li> <li>16. DC Motors</li> </ol> <p>Space Physics</p> <ol style="list-style-type: none"> <li>17. Gravity</li> <li>18. <math>W=mg</math></li> <li>19. Stars and the Sun</li> <li>20. Galaxies</li> <li>21. Seasons</li> <li>22. The Seasons and Earth's Tilt</li> <li>23. Phases of the moon</li> <li>24. The light year</li> </ol>	<p>Students should know:</p> <p>How to identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>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</p> <p>Investigate the way in which water is transported within plants</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance</p> <p>Observe how magnets attract or repel each other and attract some materials and not others ?</p> <p>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</p> <p>Describe magnets as having two poles</p> <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>Describe the movement of the Moon relative to the Earth</p> <p>Describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p><b>Ecosystem</b></p> <p><b>Environment</b></p> <p><b>Population</b></p> <p><b>Magnetic poles</b></p> <p><b>Permanent magnet</b></p> <p><b>Solenoid</b></p> <p><b>Core</b></p> <p><b>Electromagnet</b></p> <p><b>Galaxy</b></p> <p><b>Orbit</b></p> <p><b>Weight</b></p> <p><b>Mass</b></p> <p><b>Gravity</b></p> <p><b>Light year</b></p>	<p>Describe how a species' population changes as its predator or prey population changes.</p> <p>Explain effects of environmental changes and toxic materials on a species' population. Combine food chains to form a food web.</p> <p>Explain issues with human food supplies in terms of insect pollinators</p> <p>Describe the main steps that take place when a plant reproduces successfully.</p> <p>Identify parts of the flower and link their structure to their function.</p> <p>Suggest how a plant carried out seed dispersal based on the features of its fruit or seed.</p> <p>Explain why seed dispersal is important to survival of the parent plant and its offspring.</p> <p>Use the idea of field lines to show how the direction or strength of the field around a magnet varies.</p> <p>Explain observations about navigation using Earth's magnetic field.</p> <p>Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction.</p> <p>The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences</p> <p>Describe the appearance of planets or moons from diagrams showing their position in relation to the Earth and Sun.</p> <p>Explain why places on the Earth experience different daylight hours and amounts of sunlight during the year.</p> <p>Describe how space exploration and observations of stars are affected by the scale of the universe.</p> <p>Explain the choice of particular units for measuring distance</p>



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9	<p>Ecology</p> <ol style="list-style-type: none"> <li>1. Adaptations, interdependence and competition</li> <li>2. Communities</li> <li>3. Abiotic factors</li> <li>4. Biotic factors</li> <li>5. Adaptations</li> <li>6. Levels of organisation</li> <li>7. How materials are cycled</li> <li><b>8. Decomposition (biology only)</b></li> <li><b>9. Impact of environmental change (biology only) (HT only)</b></li> <li>10. Biodiversity</li> <li>11. Waste management</li> <li>12. Land use</li> <li>13. Deforestation</li> <li>14. Global warming</li> <li>15. Maintaining biodiversity</li> <li><b>16. Trophic levels in an ecosystem (biology only)</b></li> <li><b>17. Food production (biology only)</b></li> </ol> <p>Chemical Analysis</p> <ol style="list-style-type: none"> <li>18. Pure substances</li> <li>19. Formulations</li> <li>20. Chromatography</li> <li>21. Test for hydrogen</li> <li>22. Test for oxygen</li> <li>23. Test for carbon dioxide</li> <li>24. Test for chlorine</li> <li><b>25. Identification of ions by chemical and spectroscopic means (chemistry only)</b></li> </ol>	<p>Students should know:</p> <p>Describe how a species' population changes as its predator or prey population changes.</p> <p>Explain effects of environmental changes and toxic materials on a species' population. Combine food chains to form a food web.</p> <p>Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas).</p> <p>Observations where substances change temperature or state can be described in terms of particles gaining or losing energy</p> <p>A pure substance consists of only one type of element or compound and has a fixed melting and boiling point.</p> <p>Mixtures may be separated due to differences in their physical properties.</p> <p>The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</p> <p>Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain.</p>	<p><b>Ecosystem</b>  <b>Community</b>  <b>Interdependence</b>  <b>Population</b>  <b>Producer</b>  <b>Formulation</b>  <b>Mixture</b>  <b>Pure/Impure</b>  <b>Solvent</b>  <b>Mobile phase</b>  <b>Stationary phase</b></p>	<p>Define the key terms such as community or ecosystem</p> <p>State and explain how different biotic and abiotic factors impact an ecosystem</p> <p>Explain the different cycles</p> <p>State factors that reduce biodiversity and explain why.</p> <p>Define a pure substances in chemistry and formulations.</p> <p>Describe how to carry out chromatography including calculation of Rf value.</p> <p>State the gas tests and their positive results.</p> <p>Use arrange of ion tests to identify unknown compounds.</p>



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10	<p>Rate of Reaction/P.S.</p> <ol style="list-style-type: none"> <li>Calculating rates of reactions</li> <li>Factors which affect the rates of chemical reactions</li> <li>Collision theory and activation energy</li> <li>Catalysts</li> <li>Reversible reactions</li> <li>Energy changes and reversible reactions</li> <li>Equilibrium</li> <li>The effect of changing conditions on equilibrium (HT only)</li> <li>The effect of changing concentration (HT only)</li> <li>The effect of temperature changes on equilibrium (HT only)</li> <li>The effect of pressure changes on equilibrium (HT only)</li> <li>Rate of photosynthesis</li> <li>Uses of glucose from photosynthesis</li> </ol> <p>Quantitative Chemistry</p> <ol style="list-style-type: none"> <li>Conservation of mass and balanced chemical equations</li> <li>Relative formula mass</li> <li>Mass changes when a reactant or product is a gas</li> <li>Chemical measurements</li> <li>Moles (HT only)</li> <li>Amounts of substances in equations (HT only)</li> <li>Using moles to balance equations (HT only)</li> <li>Limiting reactants (HT only)</li> <li><b>22. Concentration of solutions</b></li> <li><b>23. Yield and atom economy of chemical reactions (chemistry only)</b></li> <li><b>24. Using concentrations of solutions in mol/dm<sup>3</sup> (chemistry only) (HT only)</b></li> <li><b>25. Use of amount of substance in relation to volumes of gases (chemistry only) (HT only)</b></li> </ol>	<p>Metals and non-metals react with oxygen to form oxides which are either bases or acids.</p> <p>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>Describe an oxidation, displacement, or metal-acid reaction with a word equation.</p> <p>Use particle diagrams to represent oxidation, displacement and metal-acid reactions.</p> <p>Identify an unknown element from its physical and chemical properties.</p> <p>Place an unfamiliar metal into the reactivity series based on information about its reactions.</p> <p>Describe the respiration and photosynthesis reactions and explain their importance to living organisms</p>	<p><b>Product</b></p> <p><b>Reactant</b></p> <p><b>Rate</b></p> <p><b>Collision</b></p> <p><b>Activation Energy</b></p> <p><b>Catalyst</b></p> <p><b>Reaction Profile</b></p> <p><b>Equilibrium</b></p> <p><b>Glucose</b></p> <p><b>Conserve</b></p> <p><b>Relative Atomic Mass</b></p> <p><b>Relative Formula Mass</b></p> <p><b>Moles</b></p> <p><b>Amount</b></p> <p><b>Yield</b></p> <p><b>Concentration</b></p>	<p>Define rate of reaction</p> <p>Explain how different factors affect rate in terms of collisions.</p> <p>Describe catalysts and how they work</p> <p>Examine reversible reactions and predict the effect of changing conditions on equilibrium.</p> <p>Look at factors that affect the rate of photosynthesis.</p> <p>Explain how plants use glucose produced by photosynthesis.</p> <p>Balance simple equations</p> <p>Calculate Mr given formulae.</p> <p>Calculate percentage composition by mass.</p> <p>Calculate concentrations in terms of mass and moles.</p> <p>Calculate yield.</p>