



# Medium Term Planning – AC3

## Curriculum: Science

**Excellence.  
No Excuses.**

Year	Topic Detail and Sequence	Pre-requisite Knowledge	Key Vocabulary	Demonstrable Skills
<h1>7</h1>	<p><b>Cells and Organisation</b></p> <ol style="list-style-type: none"> <li>1. Cells</li> <li>2. Observing Cells</li> <li>3. Cell Structure</li> <li>4. Functions of cell structures</li> <li>5. Plant v Animal Cells</li> <li>6. Diffusion in cells</li> <li>7. Unicellular organisms and their adaptations</li> <li>8. Organisation</li> </ol> <p><b>Nutrition and Digestion</b></p> <ol style="list-style-type: none"> <li>9. The healthy diet</li> <li>10. Energy Requirement calculations</li> <li>11. Dangers of an imbalanced diet</li> <li>12. The digestive system</li> <li>13. Enzymes</li> <li>14. Bacteria and digestion</li> <li>15. How plants make food</li> </ol>	<p>Students should know:</p> <p>Living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals</p> <p>Reasons for classifying plants and animals based on specific characteristics.</p> <p>The main parts of the human circulatory system</p> <p>The functions of the heart, blood vessels and blood</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>The ways in which nutrients and water are transported within animals, including humans.</p>	<p><b>Cell</b>  <b>Uni-cellular</b>  <b>Multi-cellular</b>  <b>Tissue</b>  <b>Organ</b>  <b>Diffusion</b>  <b>Structural adaptation</b>  <b>Cell membrane</b>  <b>Nucleus</b>  <b>Vacuole</b>  <b>Mitochondria</b>  <b>Cell wall</b>  <b>Enzymes</b>  <b>Dietary fibre</b>  <b>Carbohydrates</b>  <b>Lipids</b>  <b>Protein</b>  <b>Stomach</b>  <b>Small intestine</b>  <b>Large intestine</b>  <b>Gut bacteria</b></p>	<p>Know that multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes.</p> <p>Know that there are many types of cell. Each has a different structure or feature so it can do a specific job.</p> <p>Explain why multi-cellular organisms need organ systems to keep their cells alive.</p> <p>Suggest what kind of tissue or organism a cell is part of, based on its features.</p> <p>Explain how to use a microscope to identify and compare different types of cells.</p> <p>Explain how uni-cellular organisms are adapted to carry out functions that in multi-cellular organisms are done by different types of cell.</p> <p>Know 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>Know that organs of the digestive system are 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 possible health effects of unbalanced diets from data provided.</p> <p>Calculate food requirements for a healthy diet, using information provided.</p> <p>Describe how organs and tissues involved in digestion are adapted for their role.</p> <p>Describe the events that take place in order to turn a meal into simple food molecules inside a cell.</p>



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8	<p><b>Pure and Impure Substances</b></p> <ol style="list-style-type: none"> <li>1. What is a pure substance?</li> <li>2. Mixtures</li> <li>3. Dissolving</li> <li>4. Diffusion</li> <li>5. Filtration</li> <li>6. Evaporation</li> <li>7. Distillation</li> <li>8. Chromatography</li> <li>9. Identifying pure substances</li> </ol> <p><b>Current Electricity</b></p> <ol style="list-style-type: none"> <li>10. Current</li> <li>11. Series and Parallel Circuits</li> <li>12. Branches in circuits</li> <li>13. Rate of flow of charge</li> <li>14. PD</li> <li>15. Resistance (as a ratio)</li> <li>16. Measuring the resistance of different materials</li> </ol> <p><b>Static Electricity</b></p> <ol style="list-style-type: none"> <li>17. Charging objects by the movement of electrons</li> <li>18. Concept of fields as areas in which a forces acts</li> </ol>	<p>Students should know:</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>Identify common appliances that run on electricity</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p>	<p><b>Particle</b></p> <p><b>Particle Density</b></p> <p><b>Evaporate</b></p> <p><b>Solvent</b></p> <p><b>Solute</b></p> <p><b>Dissolve</b></p> <p><b>Solution</b></p> <p><b>Solute</b></p> <p><b>Pure substance</b></p> <p><b>Mixture</b></p> <p><b>Element</b></p> <p><b>Compound</b></p> <p><b>Potential difference</b></p> <p><b>Negatively charged</b></p> <p><b>Electrons</b></p> <p><b>Charged up</b></p> <p><b>Electrostatic force</b></p> <p><b>Current</b></p> <p><b>Series</b></p> <p><b>Parallel</b></p> <p><b>Field</b></p>	<p>Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and</p> <p>Observations where substances change temperature or state can be described in terms of particles gaining or losing energy.</p> <p>Explain unfamiliar observations about gas pressure in terms of particles.</p> <p>Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles.</p> <p>Explain changes in states in terms of changes to the energy of particles.</p> <p>A pure substance consists of only one type of element or compound and has a fixed melting and boiling point.</p> <p>Explain how substances dissolve using the particle model.</p> <p>Use the solubility curve of a solute to explain observations about solutions.</p> <p>Use evidence from chromatography to identify unknown substances in mixtures.</p> <p>Choose the most suitable technique to separate out a mixture of substances</p> <p>Model different electrical quantities</p> <p>Describe how current changes in series and parallel circuits when components are changed.</p> <p>Turn circuit diagrams into real series and parallel circuits, and vice versa.</p> <p>Describe what happens when charged objects are placed near to each other or touching.</p> <p>Use a sketch to describe how an object charged positively or negatively became charged up.</p>



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9	<p>Reproduction</p> <ol style="list-style-type: none"> <li>1. Reproduction in humans</li> <li>2. Male and female reproductive systems</li> <li>3. Menstrual Cycle</li> <li>4. Gametes</li> <li>5. Fertilisation</li> <li>6. Pregnancy and birth</li> <li>7. Impact of lifestyle on pregnancy</li> <li>8. Reproduction in plants</li> <li>9. Flower structure</li> <li>10. Fertilisation and dispersal in plants</li> <li>11. Quantitative investigation of dispersal methods</li> </ol> <p>Health</p> <ol style="list-style-type: none"> <li>12. Drugs and behaviour</li> <li>13. Drugs and health problems</li> <li>14. Drugs and life processes</li> <li>15. Communicable (infectious) diseases</li> <li>16. Viral diseases</li> <li>17. Bacterial diseases</li> <li>18. Fungal diseases</li> <li>19. Protist diseases</li> <li>20. Human defence systems</li> <li>21. Vaccination</li> <li>22. Antibiotics and painkillers</li> <li>23. Discovery and development of drugs</li> <li><b>24. Monoclonal antibodies)</b></li> <li><b>25. Plant disease</b></li> </ol>	<p>Students should know:</p> <p>The differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>The life process of reproduction in some plants and animals.</p>	<p><b>Gamete</b>  <b>Fertilisation</b>  <b>Gestation</b>  <b>Bacteria</b>  <b>Antibiotics</b>  <b>Antibody</b>  <b>Antigen</b>  <b>Vaccine</b>  <b>Transmission</b>  <b>Efficacy</b>  <b>Immunity</b></p>	<p>Explain whether substances are passed from the mother to the foetus or not.</p> <p>Use a diagram to show stages in development of a foetus from the production of sex cells to birth.</p> <p>Describe causes of low fertility in male and female reproductive systems.</p> <p>Identify key events on a diagram of the menstrual cycle.</p> <p>Describe the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.</p> <p>Describe key features of different pathogens and give examples of diseases caused in plants and animals.</p> <p>Describe how the human body fights disease</p> <p>Describe how vaccination, antibiotics and painkillers help the body.</p> <p>Describe the process of drug development.</p>



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<h1>10</h1>	<p>Chemical Changes</p> <ol style="list-style-type: none"> <li>1. Reactivity of metals</li> <li>2. Metal oxides</li> <li>3. The reactivity series</li> <li>4. Extraction of metals and reduction</li> <li>5. Oxidation and reduction in terms of electrons (HT only)</li> <li>6. Reactions of acids with metals</li> <li>7. Neutralisation of acids and salt production</li> <li>8. Soluble salts</li> <li>9. The pH scale and neutralisation</li> <li><b>10. Titrations (chemistry only)</b></li> <li>11. Strong and weak acids (HT only)</li> <li>12. The process of electrolysis</li> <li>13. Electrolysis of molten ionic compounds</li> <li>14. Using electrolysis to extract metals</li> <li>15. Electrolysis of aqueous solutions</li> <li>16. Representation of reactions at electrodes as half equations (HT only)</li> </ol> <p>Homeostasis &amp; Response</p> <ol style="list-style-type: none"> <li>17. Homeostasis</li> <li>18. The human nervous system</li> <li><b>19. The brain (biology only)</b></li> <li><b>20. The eye (biology only)</b></li> <li><b>21. Control of body temperature (biology only)</b></li> <li>22. Human endocrine system</li> <li>23. Control of blood glucose concentration</li> <li><b>24. Maintaining water and nitrogen balance in the body (biology only)</b></li> <li>25. Hormones in human reproduction</li> <li>26. Contraception</li> <li>27. The use of hormones to treat infertility (HT only)</li> <li>28. Negative feedback (HT only)</li> <li><b>29. Plant hormones (biology only)</b></li> </ol>	<p>Students should know:</p> <p>That the elements in a group all react in a similar way and sometimes show a pattern in reactivity.</p> <p>Explain how as you go down a group and across a period the elements show patterns in physical properties.</p> <p>Identify the reactants and products in a chemical reaction</p> <p>Describe the properties, reactions and their products of metals.</p> <p>Explain how metals can be placed in a reactivity series.</p> <p>Define acids and alkalis in terms of ions.</p> <p>Describe the pH scale and place common chemicals on there.</p> <p>Name common indicators and state the colours for different pH values.</p> <p>Explain how uni-cellular organisms are adapted to carry out functions that in multi-cellular organisms are done by different types of cell.</p> <p>Know 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>Know that organs of the digestive system are 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><b>Brain</b>  <b>Central nervous system (CNS)</b>  <b>Cerebellum</b>  <b>Cerebral cortex</b>  <b>Enzyme</b>  <b>Glucose</b>  <b>Hypothalamus</b>  <b>Medulla</b>  <b>MRI</b>  <b>Nervous system</b>  <b>Neurone</b>  <b>Neurotransmitter</b>  <b>Receptors</b>  <b>Reflex action</b>  <b>Stimulus</b>  <b>System</b>  <b>Synapse</b>  <b>Anode</b>  <b>Cathode</b>  <b>Electrolysis</b>  <b>Ionic</b>  <b>Metal</b>  <b>Reactivity</b></p>	<p>The reactivity series shows metals in order of reactivity.</p> <p>The reactivity of a metal is related to its tendency to form positive ions.</p> <p>Iron and aluminium are extracted from their ores in various ways.</p> <p>Indicators are used to determine whether a solution is acidic or alkaline.</p> <p>Acids react with metals, bases and carbonates to produce salts. Neutralisation is the reaction between an acid and a base.</p> <p>Electrolysis involves using electricity to break down electrolytes to form elements.</p> <p>The products of electrolysis can be predicted for a given electrolyte.</p> <p>The nervous system enables humans to react to their surroundings and to coordinate their behaviour. It comprises millions of neurones and uses electrical impulses to communicate very quickly.</p> <p>The endocrine system secretes hormones into the bloodstream from glands throughout the body. Hormones produce an effect on specific target organs in the body.</p> <p>Hormones are secreted by glands in the endocrine system. During puberty, hormones create changes in physical and emotional characteristics.</p> <p>Homeostasis is the regulation of internal conditions inside cells or organisms, to create the optimum conditions for biological function.</p> <p>Hormones promote growth within plants. Plant hormones are unequally distributed throughout the stems and roots, which results in parts of the plant growing in a particular direction.</p>



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<p style="text-align: center; font-size: 2em; font-weight: bold;">11</p>	<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>