

**CNCS**

**Year 9 Science (GCSE READY)**

**Rationale:** In Year 9, students will build on prior knowledge from Year 7 & 8. They develop and built on their key foundation concepts in Biology, Chemistry and Physics. Students will build upon the required practical learnt in the past years and develop upon on it – apply it to GCSE questions. Students will revisit and be introduced to a range of specific subject terminology, learning how to identify and discuss this appropriately. Furthermore, students will be given opportunities to develop their own personal responses to scientific problems and consider how to apply their knowledge to them.

**A learner in Year 9 will know/ have studied:**

- **In Year 7: *Biology*** B1: Cell Biology, B2 Organisation, B3 Infection and response, B4 Bioenergetics. **Chemistry** C1: Atomic structure and the periodic table, C2: Bonding, structure and properties, C4: Chemical changes, C5: Energy changes; **Physics:** P1: Energy, P2: Electricity, P3: Particle model of matter.
- **In Year 8, *Biology*** B5: Homeostasis and response, B6 Inheritance and variation, B7 Ecology. **Chemistry:** C6: Rates of reaction, C7: Organic Chemistry, C8: Chemical Analysis, C9 Chemistry of the atmosphere, C10 Using resources; **Physics:** P5: Forces, P6: Waves, P7: Magnets and P8 Space Physics
- They will have an awareness of the required practical (RP) skills for each unit and how to carry them out.

**A learner in Year 9 will be able to:**

- Develop GCSE knowledge and practical skills in Chemistry and physics topics.
- Work safety in lab and carry out investigations.
- Question, understand and apply the chemistry/ physics knowledge to real life problems and scenarios.
- They will know the required practical (RP) activities for each unit and how to carry them out.

Term	Outline	Assessment	Home Learning	Key Skills/ End Point
1a	<p><b>C1 Atomic Structure &amp; the Periodic table</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Describe methods of separating mixtures.</li> <li>- Compare the development of the atomic model</li> <li>- Describe the structure of the atom and the charges/mass of subatomic particles.</li> <li>- Compare the developments and the arrangement of elements in the periodic table</li> <li>- Describe the reactions of Group 1, 0 and 7 elements and their reactivity.</li> <li>- Describe the properties of transition metals</li> </ul> <p><b>P1 Energy</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Describe energy transfers and energy stores</li> <li>- Calculate GPE, KE, EPE, SHC and power using equations.</li> <li>- Investigate the SHC of different materials</li> <li>- Explain useful and wasted energy</li> <li>- Investigate the effectiveness of different materials</li> <li>- Compare renewable and non-renewable resources.</li> <li>- Explain how the National Grid operates</li> </ul>	<p><b>Pitstops</b></p> <p>C1 Atomic Structure &amp; the Periodic table (LA &amp; HA)</p> <p>P1.1 Energy (LA &amp; HA)</p> <p>P1.2 Energy (LA &amp; HA)</p> <p>C2 Bonding (LA &amp; HA)</p>	<p>Set once per week via Educake</p>	<p>Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.</p> <p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.</p> <p><b>Skills tested:</b></p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make</p>

	<p><b>C2 Bonding</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Describe how an ionic bonding and properties of ionic compounds.</li> <li>- Describe how covalent bond are made, properties of small covalent structures and giant covalent structures.</li> <li>- Describe the structure and properties of metal / alloys</li> <li>- Compare solids, liquids and gases</li> <li>- Describe the structure and properties of polymers.</li> <li>- Understand how nanoparticles and their properties.</li> </ul>			<p>judgements and draw conclusions; develop and improve experimental procedures.</p> <p>Students are able to recall key knowledge and apply this knowledge to exam questions from different areas.</p>
1b	<p><b>P3 Particle model</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>- Investigate and calculate density of regular and irregular objects</li> <li>- Describe how changes of state affects internal energy</li> <li>- Recap SHC and define/calculate specific latent heat</li> <li>- Describe the gas particles in pressure</li> <li>- Describe how the increasing the pressure of a gas (HT only)</li> </ul>	<p>P3 Particle model of matter (LA &amp; HA)</p> <p><b>AUTUMN ASSESSMENT:</b>  <b>Set 1 &amp; 2 / Set 3 -5</b>  <b>Assessed on C1, C2 and P1, P3 topics</b></p>	<p>Set once per week via Educake</p>	

2a	<p><b><u>C4 Chemical changes</u></b></p> <ul style="list-style-type: none"> <li>- Describe how metal oxides are formed and when metals react with acids</li> <li>- Describe how the reactivity series are arranged</li> <li>- Describe when acid reacts with alkali (neutralisation)</li> <li>- Investigate how to produce soluble salt</li> <li>- Describe the pH scale and <i>strong/weak acids (HT only)</i></li> <li>- Carry out titrations using strong acids/alkalis</li> <li>- Describe electrolysis with molten and aqueous solution</li> </ul>	<p>P4 Atomic Structure (LA &amp; HA)</p> <p>C4 Chemical changes (LA &amp; HA)  C4 Chemical changes (LA &amp; HA)  P4 Atomic structure (LA &amp; HA)</p>	<p>Set once per week via Educake</p>	<p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply their knowledge gained through the course to evaluate data provided.</p> <p><b>Skills tested:</b></p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>
2b	<p><b><u>P4 Atomic Structure</u></b></p> <p>Student will be able to:</p> <ul style="list-style-type: none"> <li>- Investigate and calculate density of regular and irregular objects</li> <li>- Describe how changes of state affects internal energy</li> <li>- Recap SHC and define/calculate specific latent heat</li> </ul>	<p><b>SPRING ASSESSMENT:</b></p> <p><b>Set 1 &amp; 2 / Set 3 -5</b></p> <p><b>Assessed on C1, C2, C4 P1, P3, P4</b></p>	<p>Set once per week via Educake</p>	
3a	<p><b><u>B2 Organisation</u></b></p> <p>Students will</p> <ul style="list-style-type: none"> <li>- describe how cells make up tissues, which make up organs, which make up organ systems, describe the structure and function of the digestive system and describe the structure and function of three digestive.</li> </ul>		<p>Set once per week via Educake</p>	<p>Students will interpret and then describe and explain what graphs show with reference to the data collected for a range of contexts.</p> <p>Students are able to analyse information given to them, and apply</p>

	<ul style="list-style-type: none"> <li>- use food tests to identify what molecules are found in foods (Required Practical) and investigate the effect of pH or concentration on enzyme action (Required Practical)</li> <li>- describe the structure of the lungs, how they are adapted for gas exchange, the mechanism of breathing</li> <li>- describe the structure of the heart and associated blood vessels, compare the of structure and function of arteries, veins and capillaries, describe the four components of blood and their functions and state the causes and treatment of diseases of the heart, including CHD and faulty valves</li> <li>- describe how diseases interact with each other, how lifestyle can contribute to development of diseases, including diet, exercise, genetics, smoking and alcohol and state the difference between benign and malignant tumours and how cancer spreads around the body</li> <li>- describe the structure of a leaf and the function of the tissues present and the process of transpiration by evaporation of water from the leaf</li> </ul> <p><b>B4 Bioenergetics</b></p> <p>Students will</p> <ul style="list-style-type: none"> <li>• State the word and symbol equation for photosynthesis and how plants absorb the energy needed for this process (LINKS to B2) and describe that photosynthesis is an endothermic reaction and state that plants produce glucose during photosynthesis and the 5 ways plants use this glucose</li> <li>• State the limiting factors of photosynthesis and how and why they affect rate of photosynthesis (Required Practical)</li> <li>• State the word and symbol equation for aerobic respiration and the word equation for anaerobic respiration in animals and in plants/yeast</li> <li>• State that respiration is an exothermic reaction and the uses of energy released from respiration</li> <li>• Describe the effects on the body of anaerobic respiration and the uses of products from anaerobic respiration in industry</li> <li>• Describe the effect of exercise on heart rate and breathing rate</li> </ul>	<p>Pit stops</p> <p>B2.1 Organisation (HA/ LA)  B2.2 Organisation (HA/ LA)  B4 Bioenergetics (HA/ LA)  B3 Infection &amp; Response (HA/ LA)  B1.1 Cell Biology (HA/ LA)  B1.2 Cell Biology (HA/ LA)</p> <p><b>SUMMER ASSESSMENT:</b>  <b>Set 1 &amp; 2 / Set 3 -5</b>  <b>Assessed on B1, B2, B3, B4</b></p>		<p>their knowledge gained through the course to evaluate data provided.</p> <p><b>Skills tested:</b></p> <p>AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.</p> <p>AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.</p> <p>AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.</p>
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	Define metabolism, give examples of metabolic reactions and factors affecting a person's metabolic rate			
3b	<p><b><u>B3 Infection and response</u></b></p> <p>Students will</p> <ul style="list-style-type: none"> <li>• Define what a pathogen is and give examples of each type of pathogen and how they cause disease/spread/are treated</li> <li>• Describe how humans defend themselves against disease; before pathogens enter the bloodstream and after and how vaccination protects against disease and prevents spread of disease</li> <li>• State that antibiotics can be used to treat bacterial infections but not viruses (LINKS TO B1 and B6), describe where specific drugs originated from and that many drugs we use come from plants and state the stages in drug trialling to test for toxicity, efficacy and dosage</li> <li>• Describe how monoclonal antibodies are produced and their uses</li> <li>• Causes and effects of plant disease/deficiencies and how they can be detected (LINKS to B7)</li> <li>• Ways in which plants defend themselves from disease and predators (LINKS to B7)</li> </ul> <p><b><u>B1 Cells and transport</u></b></p> <p>Students will</p> <ul style="list-style-type: none"> <li>• compare different types of cells and microscopes and use a light microscope to view cells (Required Practical)</li> <li>• describe the importance of cells becoming specialised through differentiation and the how this helps their function and describe how to prepare a sterile culture of bacteria (Required Practical) (LINKS TO B3)</li> <li>• describe the stages of mitosis and where it fits in the process of the cell cycle, sources of stem cells and their uses</li> <li>• describe the processes of diffusion, osmosis and active transport and examples of each type of transport in animals and plants and describe the effect of concentration of solution on osmosis in plant tissues (Required Practical)</li> </ul>			

