



### Key Stage 3

#### Programme of Study: Science

Year Group	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
<b>7</b>	<p><b>Topic:</b> Chemical Reactions</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand and develop basic laboratory and practical skills</li> <li>Develop graph skills</li> <li>Use the periodic table effectively to identify elements and understand how some of these elements form the human body</li> <li>Comparison of the properties of metals and non-metals</li> <li>Understand and practically demonstrate factors affecting rate of reaction</li> <li>How indicators can be used to identify pH levels and understand neutralisation reactions</li> </ul> <p><b>Assessment:</b> Year 7 Chemical Reactions test</p>	<p><b>Topic:</b> Variation</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand and give examples of variation within species</li> <li>Differentiate between vertebrates and invertebrates</li> <li>Describe different habitats that organisms live in and the human impact on them</li> <li>Understand how different populations can be sampled</li> <li>Identify and describe adaptations in species</li> <li>Understand predator-prey relationships</li> <li>Understand how parasites affect animals</li> <li>How to use pyramids of biomass</li> <li>Interpret food webs</li> </ul> <p><b>Assessment:</b> Year 7 Variation test</p>	<p><b>Topic:</b> Forces</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand what is meant by speed and be able to calculate it</li> <li>Plan and carry out a practical on the speed of a toy car</li> <li>Use and interpret distance-time graphs</li> <li>Understand different types of forces including gravity</li> <li>Know the difference between mass and weight</li> <li>Understand levers and be able to calculate moments</li> <li>Understand magnetic fields</li> </ul> <p><b>Assessment:</b> Year 7 Forces test</p>	<p><b>Topic:</b> Particles</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand subject terminology including mass, matter and density</li> <li>Understanding of particle theory in solids, liquids and gases</li> <li>Be able to describe changes of state</li> <li>Understand what mixture are and how to separate them</li> <li>Explain what is meant by chromatography and conduct a practical demonstrating the separation of ink</li> <li>Understand all relevant separation techniques including distillation, evaporating and filtering</li> <li>Practical techniques</li> </ul> <p><b>Assessment:</b> Year 7 Particles test</p>	<p><b>Topic:</b> Space</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand causes of day and night and how it changes throughout the year</li> <li>Develop on existing knowledge of gravity</li> <li>Explain how seasons occur</li> <li>Understand what a year is and why this is different on other planets</li> <li>Understand key features of our Solar System</li> <li>Explain what satellites are and what they are used for</li> <li>Describe how an eclipse occurs</li> <li>Mission to Mars project</li> </ul> <p><b>Assessment:</b> Year 7 Space test</p>	<p><b>Topic:</b> Cells &amp; Reproduction</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>Understand features of living organisms</li> <li>Recall key features of plant and animal cells including specialised cells</li> <li>Explain reproduction of flowering plants</li> <li>Discuss organisms and micro-organisms used in agriculture and agricultural sustainability</li> <li>Understand key features of reproduction and pregnancy in animals</li> <li>Describe spread of disease including STIs and discuss immunisation</li> </ul> <p><b>Assessment:</b> Year 7 Cells and Reproduction test</p>

8	<p><b>Topic:</b> Fitness</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Explain the importance of a balanced diet and its effects when not followed</li> <li>• Describe the testing of different foods for various nutrients</li> <li>• Explain the function and structure of the heart</li> <li>• Explain the function and structure of the lungs</li> <li>• Discuss the function of blood and the circulatory system</li> <li>• Explore lifestyles effect on our health including diet, drugs and exercise</li> <li>• Explore ethical discussions based around health and effects on society</li> </ul> <p><b>Assessment:</b> Year 8 Fitness Topic Test</p>	<p><b>Topic:</b> Atoms &amp; Elements</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Recall the structure of an atom</li> <li>• Describe the properties of subatomic particles</li> <li>• Use the periodic table to extract information about the elements</li> <li>• Group materials based on their properties</li> <li>• Apply separation techniques to real-life problems</li> <li>• Compare and contrast exothermic and endothermic reactions</li> <li>• Discuss the application of endothermic and exothermic reactions</li> </ul> <p><b>Assessment:</b> Year 8 Atoms &amp; Elements Topic Test</p>	<p><b>Topic:</b> Electricity &amp; Circuits</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Describe electric current as a flow of charge – for example, electrons</li> <li>• Explain how electricity is generated</li> <li>• Describe the relationship between current, potential difference and resistance</li> <li>• Measure current and potential difference in a circuit</li> <li>• Compare and contrast series and parallel circuits</li> <li>• Understand that magnets can produce their own magnetic field and can induce a current</li> <li>• Know the human impact electricity generation has on the environment and our lives</li> </ul> <p><b>Assessment:</b> Year 8 Electricity &amp; Circuits Topic Test</p>	<p><b>Topic:</b> Reactivity</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Be able to represent given reactions using word equations and balanced symbol equations</li> <li>• Recall the order of the reactivity series</li> <li>• Investigate displacement reactions and record observations</li> <li>• Use Collision theory to explain why reactions occur</li> <li>• Explain the factors that affect how fast a reaction occurs (temperature, concentration/pressure, catalysts and surface area)</li> <li>• Explain how to extract metals from their ores using carbon (such as iron in a blast furnace) or through electrolysis (e.g. aluminium extraction)</li> <li>• To compare and contrast complete and incomplete combustion</li> </ul> <p><b>Assessment:</b> Year 8 Reactivity Topic Test</p>	<p><b>Topic:</b> Energy</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Recall that energy is the ability to do 'work'.</li> <li>• Recall that energy cannot be created or destroyed</li> <li>• Represent energy transfers using diagrams such as Sankey diagrams</li> <li>• Practice using the equations to calculate KE &amp; GPE</li> <li>• Be able to calculate power and associated costs with domestic energy usage</li> <li>• State the components of the EM spectrum</li> <li>• Recall the properties of visible light regarding reflection, refraction and dispersion</li> <li>• Explain how the eye works</li> <li>• Explain what causes sound</li> <li>• Explain how the ear works</li> </ul> <p><b>Assessment:</b> Year 8 Energy Topic Test</p>	<p><b>Topic:</b> Plants &amp; Photosynthesis</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>• Explain the function of parts of a plant</li> <li>• Compare and contrast types of pollination in plants</li> <li>• Describe the conditions needed for photosynthesis and state the word and symbol equation</li> <li>• Investigate the limiting factors of photosynthesis</li> <li>• To describe and explain some adaptations in plants</li> <li>• To discuss how photosynthesising plants changed the composition of the Earth's atmosphere</li> <li>• To discuss the impacts of different farming methods on the environment</li> </ul> <p><b>Assessment:</b> Year 8 Plants &amp; Photosynthesis Topic Test</p>
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	<p><b>Topic:</b> Cell Biology &amp; Organisation</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To compare cell structure of eukaryotes and prokaryotes</li> <li>To explain the sub-cellular structure of animal and plant cells</li> <li>To explain how the structure of a cell relates to its function</li> <li>To explain the importance of cell differentiation</li> <li>To understand the application of microscopy techniques</li> <li>To describe and explain the process of cell division through mitosis</li> <li>To describe the function of stem cells</li> <li>To describe and explain transport in cells through osmosis, diffusion and active transport</li> <li>To recall the principles of organisation and relate them to animal tissues, organs and organ systems with a focus on the digestive system and the circulatory system</li> <li>To describe the relationship between</li> </ul>	<p><b>Topic:</b> Bioenergetics</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To represent photosynthesis using word and symbol equations and be able to discuss the factors affecting the rate of photosynthesis</li> <li>To describe the uses of glucose from photosynthesis</li> <li>To compare and contrast aerobic and anaerobic respiration</li> <li>To investigate the body's response to exercise</li> <li>To explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids</li> <li>To be able to explain what metabolism is</li> </ul>	<p><b>Topic:</b> Atomic Structure &amp; Bonding</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To define atoms, elements and compounds</li> <li>To use the periodic table to extract key information about the first 20 elements</li> <li>To understand the development of the periodic table</li> <li>To write word equations and balanced symbol equations for relevant reactions</li> <li>To define and recognise mixtures and be able to describe appropriate separation techniques</li> <li>To describe the development of the model of the atom</li> <li>To recall the relative electrical charges of</li> </ul>	<p><b>Topic:</b> Chemical Analysis &amp; The Atmosphere</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To distinguish between pure substances and formulations.</li> <li>To conduct chromatography experiments and calculate R<sub>f</sub> values</li> <li>To be able to successfully test for the common gases: hydrogen, oxygen, carbon dioxide and chlorine.</li> <li>To recall the composition of the Earth's atmosphere today and the Earth's early atmosphere and describe how this has evolved over time.</li> <li>To explain how oxygen in the atmosphere has increased over time.</li> <li>To explain how carbon dioxide in the atmosphere has decreased over time.</li> <li>To explain the role of carbon dioxide and methane as greenhouse gases.</li> </ul>	<p><b>Topic:</b> Energy &amp; Electricity</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To calculate the changes in energy involved when a system is changed by: heating, work done by forces, work done when a current flows</li> <li>Use, kinetic energy = <math>0.5 \times \text{mass} \times \text{speed}^2</math></li> <li>Use, elastic potential energy = <math>0.5 \times \text{spring constant} \times \text{extension}^2</math></li> <li>Use, <math>g \cdot p \cdot e = \text{mass} \times \text{gravitational field strength} \times \text{height}</math></li> <li>Use, change in thermal energy = <math>\text{mass} \times \text{specific heat capacity} \times \text{temperature change}</math></li> <li>Use Power = Energy Transferred/ Time and,</li> </ul>	<p><b>Topic:</b> Particle model of matter</p> <p><b>Key Knowledge:</b></p> <ul style="list-style-type: none"> <li>To calculate the density of materials using Density = Mass/ Volume</li> <li>to recognise/draw simple diagrams to model the difference between solids, liquids and gases</li> <li>To describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved</li> <li>To recall that the increase in temperature depends on the mass of the substance heated, the type of material and the energy input to the system</li> <li>To use Change in thermal</li> </ul>
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	<p>health and disease using given communicable and non-communicable diseases as examples</p> <ul style="list-style-type: none"> <li>To recall the principles of organisation and relate them to plant tissues, organs and organ systems.</li> </ul>		<p>subatomic particles</p> <ul style="list-style-type: none"> <li>To recall the size and mass of atoms and the relative atomic mass of given elements</li> <li>To be able to draw the electronic structure of the first 20 elements</li> <li>To recall the chemical and physical properties of metals and non-metals</li> <li>To explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number</li> <li>To explain the patterns of physical &amp; chemical properties of group 1, group 7 &amp; group 0 elements.</li> <li>To compare and contrast ionic, covalent and metallic bonding. To be</li> </ul>	<ul style="list-style-type: none"> <li>To evaluate the evidence regarding human activities which contribute to an increase in greenhouse gases in the atmosphere</li> <li>To discuss the effects of global climate change</li> <li>To describe what a carbon footprint is and explain how to reduce it</li> <li>to describe and explain the problems caused by increased amounts of common atmospheric pollutants in the air</li> </ul>	<p>Power = Work Done/ Time</p> <ul style="list-style-type: none"> <li>Be able to calculate energy efficiency</li> <li>To describe the main energy sources available and evaluate their reliability</li> <li>To know the standard circuit symbols and interpret circuit diagrams</li> <li>To understand the relationship between current, resistance and potential difference</li> <li>To understand the application of various resistors</li> <li>To construct series and parallel circuits and compare and contrast both</li> <li>To measure current, resistance and potential difference in</li> </ul>	<p>Energy = Mass x Specific Heat Capacity x Temperature Change</p> <ul style="list-style-type: none"> <li>To understand changes of state with regards to specific latent heat</li> <li>To use Energy for a change of state = mass x specific latent heat</li> <li>to interpret heating and cooling graphs that include changes of state</li> <li>to distinguish between specific heat capacity and specific latent heat</li> <li>To explain how the motion of the molecules in a gas is related to both its temperature and its pressure</li> <li>To explain qualitatively the relation between the temperature of a gas and its</li> </ul>
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			<p>able to represent each type of bonding with appropriate diagrams.</p> <ul style="list-style-type: none"> <li>• To explain how bonding determines structures which give rise to the various properties of different substances.</li> <li>• To describe the properties of ionic compounds, small molecules, polymers, giant covalent structures and metals.</li> <li>• To compare and contrast the allotropes of carbon (graphite, diamond, graphene and fullerenes)</li> </ul>		<p>series and parallel circuits</p> <ul style="list-style-type: none"> <li>• to explain the difference between direct and alternating potential difference</li> <li>• To describe the domestic uses and safety features involved with mains electricity</li> <li>• When discussing energy transfers be able to use <math>\text{Power} = \text{Potential Difference} \times \text{Current}</math></li> <li>• to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices</li> <li>• to explain why the National Grid system is</li> </ul>	<p>pressure at constant volume</p>
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	<b>Assessment:</b> Year 9 Cell Biology & Organisation Test	<b>Assessment:</b> Year 9 Bioenergetics Test	<b>Assessment:</b> Year 9 Atomic Structure & Bonding Test	<b>Assessment:</b> Year 9 Chemical Analysis & The Atmosphere Test	an efficient way to transfer energy  <b>Assessment:</b> Year 9 Energy & Electricity Test	<b>Assessment:</b> Year 9 Particle model of matter Test
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