

[illegible]



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| <b>Link</b>                      | <a href="https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html">https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</a><br>More information <a href="#">here</a> .  |   |  |  |  |  |  |
| <b>Topic</b>                     | <b>Unit title</b>   | <b>Key knowledge/<br/>Content to learn and retain</b>   | <b>Essential skills to acquire (subject &amp; generic)</b>   | <b>Anticipated misconceptions</b>  | <b>Links to previous KS</b>  | <b>Links to future KS</b>  | <b>Opportunity for stretch for high prior attainers</b>  |
| Three                            | <b>Energy Stores</b>  | Stores, Pathways and energy transfers.<br><br>Kinetic, Gravitational and Elastic energy calculations.<br><br>Heat transfer and insulation | <b>Practical Skills:</b> <ul style="list-style-type: none"> <li>Investigating specific heat capacity</li> </ul> <b>Scientific Skills:</b><br>Changing the subject of simple equations with three terms.<br><br>Evaluation of an equation involving multiplication, division, squares and square roots<br><br>Record accurate results in an appropriate format<br><br>Present and interpret data in tabular and graphical form. | Students often speak of “types” of energy. This is fundamentally incorrect.<br><br>Students must talk about energy in the context of stores and pathways | This unit builds directly from year seven study of energy stores and pathways. | Y9 - Power and energy<br><br>Y9 - Energy in living organisms<br><br>Y9 - Atoms and radiation<br><br>Y10 - 6.2 Electricity<br><br>Y11 - 6.6 Waves | Students could be asked to consider more complex energy transfers involving more than two stores.<br><br>Changing the subject of energy equations to calculate theoretical maximum speed |
| <b>SMSC &amp; British Values</b> | <b>British values in science</b><br><br>The impact of non-sustainable resources and the everyday changes that can be made to promote the use of more sustainable resources  |   |  |  |  |  |  |
| <b>Cultural Capital</b>          | The ubiquity of energy means that problems can be framed in a variety of familiar and unfamiliar contexts   |   |  |  |  |  |  |
| <b>Career Link</b>               | <a href="https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1">https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1</a> , <a href="https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf">https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf</a> ,<br><a href="https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html">https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</a><br>More information <a href="#">here</a> . |   |  |  |  |  |  |
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| Four                             | <b>Transport Systems</b>   | <p>Diffusion – the process of diffusion, examples of where it happens</p> <p>Factors affecting the rate of diffusion</p> <p>Exchange surfaces – how our bodies are adapted for efficient diffusion</p> <p>Osmosis – the process of osmosis, examples of where it happens</p> <p>Active transport - the process of active transport , examples of where it happens</p> | <p><b>Practical Skills:</b></p> <ul style="list-style-type: none"><li>Investigate the effect of temperature on the rate of diffusion</li><li>Investigate the effect of concentration on the rate of diffusion</li><li>Investigate the effect of surface on the rate of diffusion</li><li>Investigate the effect of concentration on the rate of osmosis</li></ul> <p><b>Scientific Skills:</b></p> <ul style="list-style-type: none"><li>Record data in tables</li><li>Present data in graphs</li></ul> | <p>Diffusion and osmosis are the same thing.</p> <p>Active transport only occurs when something has to move upwards</p> | KS3 students looked at diffusion and factors which affect the rate of.                  | <p>Y9 - Energy in living organisms</p> <p>Y10 - Infection and Response</p> <p>Y10 - Reflex arc and neurotransmitter movement</p> | <p>Cross subject links to Chemistry</p> <p>High Prior attainers can attempt to draw the osmosis graph without scaffolding</p> |
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| <b>SMSC &amp; British Values</b> | <p><a href="#">British values in science</a></p> <p>Students may discuss medical issues with certain diseases and how that impacts the efficiency of transport systems</p>   |   |   |   |   |  |   |
| <b>Cultural Capital</b>          | <p>Students explore issues with the digestive or respiratory system and how these affect the efficiency of transport systems in animals.</p>   |   |   |   |   |  |   |
| <b>Career Link</b>               | <p><a href="https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1">https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1</a>, <a href="https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf">https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf</a>, <a href="https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html">https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</a></p> <p>More information <a href="#">here</a>.</p> |   |   |   |   |  |   |
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| Five                             | <b>Periodic table</b>  | <p>The arrangement of the periodic table</p> <p>Trends in reactivity of groups</p>  | <p><b>Practical Skills:</b></p> <ul style="list-style-type: none"><li>Demo – Group I metals in water</li></ul> <p><b>Scientific Skills:</b></p>   | <p>Students often mix up the names and data of the scientists responsible for each discovery of the periodic table</p>  | <p>In year 7 students studied the general arrangement of the periodic table and the</p> | <p>Y9 - The periodic table</p> <p>Y9 - Atoms and</p>   | <p>Considering the results of each investigation and how it lead to the development of the</p>                                |

|                                  |  | one, seven and zero.                          | <ul style="list-style-type: none"><li>Using data to make predictions.</li><li>The use of timelines</li><li>Extended writing</li><li>Reading for comprehension</li></ul>  |  | dalton model of the atom   | radiation<br><br>Y9 - Energy changes<br><br>Y10 - 5.3 Quantitative Chemistry<br><br>Y10 - 5.4 Chemical changes<br><br>Y10 - Rates of reaction<br><br>Y11 - Chemical analysis | periodic table  |
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| <b>SMSC &amp; British Values</b> | <a href="#">British values in science</a><br><br>The contribution of Scientists to scientific understanding.   |   |  |  |  |  |   |
| <b>Cultural Capital</b>          | The historical importance of the various figures that have contributed to the development of the periodic table  |   |  |  |  |  |   |
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| Six                              | <b>Power and Energy</b>  | Renewable and non-renewable resources.        | <b>Practical Skills:</b> <ul style="list-style-type: none"><li>Demo/ modelling gravitational, kinetic and elastic potential energy</li></ul> <b>Scientific Skills:</b><br>Changing the subject of simple equations with three terms.<br><br>Evaluation of an equation involving multiplication, division, squares and square roots | Students often frame renewable and non-renewable in terms of “able to be used again” rather than in terms of the finite or infinite pool of resources. | This unit builds directly from year seven study of energy stores and pathways. | Y9 - Energy in living organisms<br><br>Y9 - Atoms and radiation<br><br>Y10 - 6.2 Electricity<br><br>Y11 - 6.6 Waves  | Students could be asked to use data on efficiency and cost to evaluate appliances |

|                                  |   |   | Record accurate results in an appropriate format<br><br>Present and interpret data in tabular and graphical form.  |   |  |                                       |   |
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| <b>SMSC &amp; British Values</b> | <a href="#">British values in science</a><br>Cost of living crisis - students to relate information of appliances to understanding how these link to cost   |   |  |   |  |                                       |   |
| <b>Cultural Capital</b>          | Cost of living crisis - students to relate information of appliances to understanding how these link to cost  |   |  |   |  |                                       |   |
| <b>Career Link</b>               | <a href="https://www.bbc.co.uk/bitesize/tags/zjb8f4/jobs-that-use-science/1">https://www.bbc.co.uk/bitesize/tags/zjb8f4/jobs-that-use-science/1</a> , <a href="https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf">https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf</a> ,<br><a href="https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html">https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</a><br>More information <a href="#">here</a> . |   |  |   |  |                                       |   |
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| Seven                            | <b>Energy in living organisms</b>   | Photosynthesis reaction – including equations<br><br>Rate of photosynthesis – including limiting factors<br><br>Use of glucose in plants and factors affecting the rate of photosynthesis<br><br>Aerobic and anaerobic respiration, including word and symbol equations<br><br>The effects of exercise on the rate of respiration, with reference to heart and breathing rate<br><br>Bodily metabolism- | <b>Practical Skills:</b> <ul style="list-style-type: none"> <li>Investigate the effect of light intensity on the rate of photosynthesis</li> </ul> <b>Scientific Skills:</b> <ul style="list-style-type: none"> <li>Drawing graphs</li> <li>Analysing graphs</li> <li>Writing and balancing chemical equations</li> <li>Drawing and extrapolating lines of best fit</li> </ul> | That plants breathe<br><br>Students may struggle to link the factors that affect the rate of photosynthesis to the factors that affect the rate of an enzyme controlled<br><br>Confusion between the term respiration and the act of breathing, which should be referred to with the term ventilation | The year three program of study includes learning that plants and make their own food, although students will not have used the term photosynthesis<br><br>Students were introduced to the idea of photosynthesis in year eight when they look at plants as the foundation of the most food chains | Y10 -Homeostasis<br><br>Y11 - Ecology | Students could consider how The optimal conditions for photosynthesis might differ for plants that live in different environments and how this could be achieved biologically<br><br>Students could link photosynthesis and respiration as part of a wider nutrient cycle |



|                                  | More information <a href="#">here</a> .  |   |   |   |   |   |   |
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| Nine                             | <b>Energy changes in chemical reactions</b>  | Endothermic and Exothermic Reactions<br><br>Reaction pathways<br><br>Bond Energy and bond energy calculations | <b>Practical Skills:</b> <ul style="list-style-type: none"> <li>Investigate endo and exothermic reactions</li> </ul> <b>Scientific Skills:</b><br>Interpreting data presented in both graphical and tabular form.<br><br>Using laboratory equipment and glassware<br><br>Recording accurate data<br><br>Calculating a mean<br><br>Changing the subject of an equation<br><br>Using data to evaluate and compare | Mislabelling of the activation energy and overall energy change on reaction profile diagrams.<br><br>Students often miscalculate bond energies by doing products - reactants rather than reactants - products | This unit builds directly from the energetics unit, studied in year 8; extending students prior knowledge of endothermic and exothermic reactions to explore why this is the case | Students at A-Level will study energetics in more detail, looking calorimetry, Hess' Law and more complex enthalpy calculations | Students may be challenged to find a missing bond enthalpy if given the overall energy change for a reaction. |
| <b>SMSC &amp; British Values</b> | <a href="#">British values in science</a><br>Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios  |   |   |   |   |   |   |
| <b>Cultural Capital</b>          | Mathematical problems can be put into real world contexts to explore a variety of concepts and scenarios   |   |   |   |   |   |   |
| <b>Career Link</b>               | <a href="https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1">https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1</a> , <a href="https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf">https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf</a> , <a href="https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html">https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</a><br>More information <a href="#">here</a> . |   |   |   |   |   |   |
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| Ten                              | <b>Forces and their</b>  | Scalar and vector   | <b>Practical Skills:</b>  | Students often state that an object will be still if there is no  | This unit builds directly from the study of forces  | Forces and mechanics forms a unit at A-   | Resolving forces in situations where they   |



