



# SCIENCE COMPOSITE KNOWLEDGE COVERAGE

## KEY STAGE 3

### Intent:

To explore the world around us, observe phenomena, develop scientific vocabulary, be curious and ask questions about what we see, answer scientific questions creatively and form conclusions from our evidence gathered.

|        |   | Cycle A (2024-2025)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Cycle B (2025-2026)                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Cycle C (2026-2027)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Running throughout each cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Autumn | 1 | <b>Chemistry</b><br><b>The Particulate nature of Matter &amp; Energetics</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i><br><br><b>The particulate nature of matter</b> <ul style="list-style-type: none"> <li>the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li> <li>changes of state in terms of the particle model</li> </ul> <b>Energetics</b> <ul style="list-style-type: none"> <li>energy changes on changes of state (qualitative)</li> <li>exothermic and endothermic chemical reactions (qualitative)</li> </ul> | <b>Chemistry</b><br><b>Pure &amp; Impure Substances</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i> <ul style="list-style-type: none"> <li>the concept of a pure substance</li> <li>mixtures, including dissolving</li> <li>diffusion in terms of the particle model</li> <li>simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography</li> <li>the identification of pure substances</li> </ul> | <b>Chemistry</b><br><b>Chemical reactions</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i> <ul style="list-style-type: none"> <li>chemical reactions as the rearrangement of atoms</li> <li>representing chemical reactions using formulae and using equations</li> <li>combustion, thermal decomposition, oxidation and displacement reactions</li> <li>defining acids and alkalis in terms of neutralisation reactions</li> <li>the pH scale for measuring acidity/alkalinity; and indicators</li> <li>reactions of acids with metals to produce a salt plus hydrogen</li> <li>reactions of acids with alkalis to produce a salt plus water</li> <li>what catalysts do</li> </ul> | <b>Working scientifically</b><br>Through the content across all three disciplines and detailed in the implementation structure for weekly focus.<br><br><b>Pupils will be taught:</b><br><br><b>Scientific attitudes</b> <ul style="list-style-type: none"> <li>pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility</li> <li>understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review</li> <li>evaluate risks</li> </ul> <b>Experimental skills and investigations</b> <ul style="list-style-type: none"> <li>ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience</li> <li>make predictions using scientific knowledge and understanding</li> <li>select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables</li> <li>use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</li> <li>make and record observations and measurements using a range of methods for different investigations;</li> </ul> |
|        | 2 | <b>Waves – Sound waves</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i> <ul style="list-style-type: none"> <li>frequencies of sound waves, measured</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Biology</b><br><b>Structure &amp; functions of living organisms – Nutrition and Digestion</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i>                                                                                                                                                                                                                                                                                                | <b>Physics</b><br><b>Waves – Light waves</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|        |   | <p>in hertz (Hz); echoes, reflection and absorption of sound</p> <ul style="list-style-type: none"> <li>• sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>• sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>• the auditory range of humans and animals</li> </ul> | <ul style="list-style-type: none"> <li>• the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li> <li>• calculations of energy requirements in a healthy daily diet</li> <li>• the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</li> <li>• the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>• the importance of bacteria in the human digestive system</li> <li>• plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots</li> </ul> | <ul style="list-style-type: none"> <li>• the similarities and differences between light waves and waves in matter</li> <li>• light waves travelling through a vacuum; speed of light</li> <li>• the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> <li>• use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>• light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras</li> <li>• colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> </ul> | <p>and evaluate the reliability of methods and suggest possible improvements</p> <ul style="list-style-type: none"> <li>• apply sampling techniques</li> </ul> <p><b>Measurement</b></p> <ul style="list-style-type: none"> <li>• understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature</li> <li>• use and derive simple equations and carry out appropriate calculations</li> <li>• undertake basic data analysis including simple statistical techniques</li> </ul> <p><b>Analysis and evaluation</b></p> <ul style="list-style-type: none"> <li>• apply mathematical concepts and calculate results</li> <li>• present observations and data using appropriate methods, including tables and graphs</li> <li>• interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> </ul> |
| Spring | 1 | <p><b>Chemistry<br/>Earth &amp; atmosphere</b></p> <p><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></p> <ul style="list-style-type: none"> <li>• the composition of the Earth</li> <li>• the structure of the Earth</li> <li>• the rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> </ul>                                                            | <p><b>Chemistry<br/>Materials</b></p> <p><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></p> <ul style="list-style-type: none"> <li>• the order of metals and carbon in the reactivity series</li> <li>• the use of carbon in obtaining metals from metal oxides</li> <li>• properties of ceramics, polymers and composites (qualitative)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                               | <p><b>Chemistry<br/>Earth &amp; atmosphere</b></p> <p><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></p> <ul style="list-style-type: none"> <li>• Earth as a source of limited resources and the efficacy of recycling</li> <li>• the composition of the atmosphere</li> <li>• the production of carbon dioxide by human activity and the impact on climate</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• present reasoned explanations, including explaining data in relation to predictions and hypotheses</li> <li>• evaluate data, showing awareness of potential sources of random and systematic error</li> <li>• identify further questions arising from their results</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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| 2 | <p><b>Physics<br/>Energy</b></p> <p><b><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></b></p> <p><b><i>Calculation of fuel uses and costs in the domestic context</i></b></p> <ul style="list-style-type: none"> <li>• comparing energy values of different foods (from labels) (kJ)</li> <li>• comparing power ratings of appliances in watts (W, kW)</li> <li>• comparing amounts of energy transferred (J, kJ, kW hour)</li> <li>• domestic fuel bills, fuel use and costs</li> <li>• fuels and energy resources</li> </ul> <p><b><i>Energy changes and transfers</i></b></p> <ul style="list-style-type: none"> <li>• simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged</li> <li>• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators</li> <li>• other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels</li> </ul> | <p><b>Physics - Matter</b></p> <p><b><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></b></p> <p><b><i>Physical changes</i></b></p> <ul style="list-style-type: none"> <li>• conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving</li> <li>• similarities and differences, including density differences, between solids, liquids and gases</li> <li>• Brownian motion in gases</li> <li>• diffusion in liquids and gases driven by differences in concentration</li> <li>• the difference between chemical and physical changes</li> </ul> <p><b><i>Particle model</i></b></p> <ul style="list-style-type: none"> <li>• the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition</li> <li>• atoms and molecules as particles</li> </ul> | <p><b>Biology</b></p> <p><b>Structure &amp; functions of living organisms – Reproduction &amp; Genetics &amp; Evolution</b></p> <p><b><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i></b></p> <p><b><i>Reproduction</i></b></p> <ul style="list-style-type: none"> <li>• reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta</li> <li>• reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms</li> </ul> <p><b><i>Genetics and evolution: Inheritance, chromosomes, DNA and genes</i></b></p> <ul style="list-style-type: none"> <li>• heredity as the process by which genetic information is transmitted from one generation to the next</li> <li>• a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model</li> <li>• differences between species</li> <li>• the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</li> </ul> |  |
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| Summer | 1 | <b>Biology</b><br><b>Structure &amp; functions of living organisms</b> – The Skeletal and Muscular Systems<br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i> <ul style="list-style-type: none"> <li>the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</li> <li>biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</li> <li>the function of muscles and examples of antagonistic muscles</li> </ul> | <b>Biology</b><br><b>Material Cycles &amp; energy</b> – Photosynthesis<br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i> <ul style="list-style-type: none"> <li>the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>the adaptations of leaves for photosynthesis</li> </ul> | <b>Chemistry</b><br><b>The Particulate nature of Matter &amp; Energetics</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i><br><br><i>The particulate nature of matter</i> <ul style="list-style-type: none"> <li>the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li> <li>changes of state in terms of the particle model</li> </ul> <i>Energetics</i> <ul style="list-style-type: none"> <li>energy changes on changes of state (qualitative)</li> <li>exothermic and endothermic chemical reactions (qualitative)</li> </ul> |  |
|        | 2 | <b>Physics</b><br><b>Motion &amp; Forces</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Physics</b><br><b>Electricity &amp; Electromagnetism</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Physics</b><br><b>Motion &amp; Forces</b><br><br><i>National Curriculum coverage to be taught at differentiated Developmental steps.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |

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|  | <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>forces as pushes or pulls, arising from the interaction between 2 objects</li> <li>using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</li> <li>moment as the turning effect of a force</li> <li>forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</li> <li>forces measured in newtons, measurements of stretch or compression as force is changed</li> <li>force-extension linear relation; Hooke's Law as a special case</li> <li>work done and energy changes on deformation non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity</li> </ul> <p><b>Forces and motion</b></p> <ul style="list-style-type: none"> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size</li> </ul> <p><b>Balanced forces</b></p> <ul style="list-style-type: none"> <li>opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</li> </ul> | <p><b>Current electricity</b></p> <ul style="list-style-type: none"> <li>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</li> <li>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</li> <li>differences in resistance between conducting and insulating components (quantitative)</li> </ul> <p><b>Static electricity</b></p> <ul style="list-style-type: none"> <li>separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects</li> <li>the idea of electric field, forces acting across the space between objects not in contact</li> </ul> <p><b>Magnetism</b></p> <ul style="list-style-type: none"> <li>magnetic poles, attraction and repulsion</li> <li>magnetic fields by plotting with compass, representation by field lines</li> <li>Earth's magnetism, compass and navigation</li> <li>the magnetic effect of a current, electromagnets, DC motors (principles only)</li> </ul> | <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>forces as pushes or pulls, arising from the interaction between 2 objects</li> <li>using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</li> <li>moment as the turning effect of a force</li> <li>forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</li> <li>forces measured in newtons, measurements of stretch or compression as force is changed</li> <li>force-extension linear relation; Hooke's Law as a special case</li> <li>work done and energy changes on deformation non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity</li> </ul> <p><b>Forces and motion</b></p> <ul style="list-style-type: none"> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size</li> </ul> <p><b>Balanced forces</b></p> <p>opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</p> |  |
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