

# Science Route Planner

## Introduction to Curriculum Route Planners

Route Planners outline the Key Stages 1-3 curriculum to be taught within each campus of the Bury St Edmunds All-Through Trust. Each Route Planner has been designed to take into account both the new Primary Curriculum and the new GCSE specifications so that pupils' learning progresses seamlessly from ages 4 to 16 and prepares them thoroughly for the modern world and for the values which are fundamental to life in modern Britain.

Route Planners have been created for all core and foundation subjects. They have been written by Curriculum Development Teams, comprising subject leaders from each Trust campus.

The purposes of the Route Planner are to ensure coherence of curriculum across the Trust, to provide a framework for subject leaders to develop Schemes of Work, and to provide parents with information on what children will learn during each year of their education.

Early Years and Reception			
Specific Area	Skills (taken from Development Matters)	Students will be able to...	Cross Curricular opportunities
Understanding the world – <b>The World</b>	<ul style="list-style-type: none"> <li>Know about similarities and differences in relation to places, objects, materials and living things.</li> <li>Talk about features of the immediate environment and how environments might vary.</li> <li>Make observations of animals and plants.</li> <li>Explain why some things occur and talk about changes.</li> </ul>		<ul style="list-style-type: none"> <li>Literacy</li> <li>Communication and language</li> <li>Expressive arts and design</li> <li>Understanding the World (Technology)</li> <li>Maths</li> <li>Personal, Social and Emotional</li> <li>Physical Development</li> </ul> <p><i>N.B. Topics/themes to develop according children's interests</i></p>

Key Stage One			
Skills	Topics to be covered	Students will be able to...	Cross Curricular
Asking simple Questions	<b>Plants(1):</b>	<ul style="list-style-type: none"> <li>identify common wild and garden plants (including deciduous trees).</li> <li>identify and describe basic parts of flowering plants and trees.</li> </ul>	<b>Topic/Theme:</b> Food and farming (Years 1 and 2) <ul style="list-style-type: none"> <li><b>Literacy:</b> traditional tales – Jack and the Beanstalk</li> <li><b>Numeracy:</b> height and measurement</li> <li><b>Art:</b> observational drawing</li> <li><b>Art:</b> printing</li> </ul>
Observing, using simple equipment			
Performing simple tests	<b>Animals, including Humans(1):</b>	<ul style="list-style-type: none"> <li>Identify and name common animals including fish, amphibians, reptiles, birds and mammals.</li> <li>Identify animals as carnivores, herbivores and omnivores.</li> <li>Describe and compare the structure of a variety of common animals.</li> <li>Identify, name, draw and label the basic parts of a human and link which part of the body is associated with each sense.</li> </ul>	<b>Topic/Theme:</b> ‘All about me’ (Year 1) <ul style="list-style-type: none"> <li><b>Literacy:</b> Writing labels for diagrams and captions (information texts)</li> </ul>
Identifying and classifying			
Using observations and ideas to answer questions			
Gathering and recording data			

	<p><b><u>Animals, including Humans(2):</u></b></p> <ul style="list-style-type: none"> <li>• Notice that animals have offspring which grow into adults.</li> <li>• Find out about the basic needs of an animal.</li> <li>• Describe the importance of exercise, diet and hygiene.</li> </ul>	<p><b>Topic/Theme:</b> ‘My body fighting fit’ (Year 2)</p> <ul style="list-style-type: none"> <li>• <b>PSHE:</b> hygiene</li> <li>• <b>PE:</b> circuits</li> <li>• <b>Numeracy:</b> data handling (e.g. charting exercise test results)</li> </ul>
	<p><b><u>Things and their habitats(2):</u></b></p> <ul style="list-style-type: none"> <li>• Compare the differences between things that are alive and those that are not.</li> <li>• Identify that most that most living things live in habitats to which they are suited and describe what a habitat is.</li> <li>• Identify a variety of plants and animals in their habitat.</li> <li>• Use ideas of a simple food chain.</li> </ul>	<p><b>Topic/Theme:</b> ‘Houses’ (Years 1 and 2)</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> Fairy tales</li> <li>• <b>History:</b> Victorians and their lifestyles</li> </ul>
	<p><b><u>Everyday materials(1):</u></b></p> <ul style="list-style-type: none"> <li>• Link objects with the material it is made from.</li> <li>• Identify and name a variety of different materials.</li> <li>• Describe simple properties of a material.</li> <li>• Compare and group materials based on their properties.</li> </ul>	<p><b>Topic/Theme –</b> Great Fire of London</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> descriptive writing, focus use of adverbs, adjectives and verbs.</li> <li>• <b>Geography:</b> recycling</li> <li>• <b>Music:</b> different types of tone</li> </ul>
	<p><b><u>Uses of everyday materials(2):</u></b></p> <ul style="list-style-type: none"> <li>• Identify and compare the suitability of different materials to their use.</li> <li>• Find out how the shapes of objects can be changed by squashing, bending, twisting and stretching.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Literacy:</b> Three little pigs</li> </ul>
	<p><b><u>Seasonal Changes(1):</u></b></p> <ul style="list-style-type: none"> <li>• Observe changes across the four seasons.</li> <li>• Observe and describe the weather associated with each season and how the day varies.</li> </ul>	<p><b>Topic/Theme:</b> A country focus</p> <ul style="list-style-type: none"> <li>• <b>Literacy &amp; ICT:</b> creating weather forecasts</li> </ul>

<b>Key Stage Two (Lower)</b>			
<b>Skills</b>	<b>Topics to be covered</b>	<b>Students will be able to...</b>	<b>Cross Curricular</b>
<p>Asking relevant questions and answer them using different enquiry techniques</p> <p>Set up simple practicals (consider fair tests)</p>	<p><b><u>Plants(3):</u></b></p> <ul style="list-style-type: none"> <li>Identify and describe the functions of different parts of flowering plants.</li> <li>Explore the requirements of plants or life and growth.</li> <li>Investigate how water is transported within plants.</li> <li>Explore the life cycle of plants and the role of flowers within it.</li> </ul>		<p><b>Topic/Theme:</b> The Rainforest</p> <ul style="list-style-type: none"> <li><b>Literacy:</b> information texts</li> <li><b>Numeracy:</b> classifying and sorting, Venn and Carroll</li> </ul>
<p>Make systematic and careful measurements using standard units</p> <p>Gather, record, classify, and present data in a variety of ways</p> <p>Report on findings: displays, written and oral explanations and conclusions</p>	<p><b><u>Animals, including humans(3):</u></b></p> <ul style="list-style-type: none"> <li>Balanced Diets and Nutrition.</li> <li>The role of skeletons and muscles.</li> </ul> <p><b><u>Animals, including humans(4):</u></b></p> <ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system.</li> <li>Describe the different types of teeth in humans and their functions.</li> <li>Construct and interpret a variety of food chains, identifying producers, predator and prey.</li> </ul>		<p><b>Topic/Theme:</b> Healthy Me</p>
<p>Use conclusions to form new predictions</p> <p>Suggest improvements to methods</p> <p>Identify difference, similarities or changes related to simple</p>	<p><b><u>Living things and their habitat(4):</u></b></p> <ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways.</li> <li>Explore and use classification keys to group, identify and name a variety of living things.</li> <li>Recognise that environments change and this can pose dangers to living things.</li> </ul>		<p><b>Topic/Theme:</b> Africa</p> <ul style="list-style-type: none"> <li><b>Literacy:</b> Stories from different cultures e.g. Mufaro's daughter</li> </ul> <p><b>Topic/Theme:</b> Rivers and Seas</p> <ul style="list-style-type: none"> <li><b>Geography:</b> Rivers and seas</li> </ul>
<p>scientific ideas and processes</p> <p>Use scientific evidence to answer questions or to support findings</p>	<p><b><u>Rocks(3):</u></b></p> <ul style="list-style-type: none"> <li>Compare and group different rocks.</li> <li>Describe how fossils are formed.</li> <li>Recognise that soil is made from rocks and organic matter.</li> </ul>		<p><b>Topic/Theme:</b> Mountains and Volcanoes</p> <ul style="list-style-type: none"> <li><b>Literacy:</b> suspense stories linked with Romans</li> <li><b>History:</b> Romans/Pompeii</li> </ul>

	<p><b><u>States of Matter(4):</u></b></p> <ul style="list-style-type: none"> <li>• Compare and group materials as Solids, Liquids and Gases.</li> <li>• Observe that some materials change state when heated and cooled.</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p><b>Topic/Theme:</b> Chocolate</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> Authors and Letters, Roald Dahl's Charlie and the Chocolate Factory</li> <li>• <b>History:</b> the Aztecs</li> <li>• <b>Geography:</b> Fairtrade</li> </ul>
	<p><b><u>Light(3):</u></b></p> <ul style="list-style-type: none"> <li>• Recognise that light is needed to see things and that dark is the absence of light.</li> <li>• Notice that light is reflected off surfaces.</li> <li>• Recognise that light from the sun can be dangerous and how to protect their eyes.</li> <li>• Recognise that shadows are formed when light is blocked.</li> <li>• Find patterns in the way that the size of shadows change.</li> </ul>	<p><b>Topic/Theme:</b> WW2</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> stories with issues and dilemmas (Carrie's War)</li> </ul>
	<p><b><u>Forces and Magnets(3):</u></b></p> <ul style="list-style-type: none"> <li>• Compare how things move on different surfaces.</li> <li>• Notice that some forces need contact between two objects, but magnets act over a distance.</li> <li>• Observe how magnets attract or repel each other.</li> <li>• Compare and group materials that are magnetic.</li> <li>• Describe magnets as having two poles.</li> <li>• Predict whether two magnets will attract or repel each other.</li> </ul>	<p><b>Topic/Theme:</b> Robots</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> Iron Man</li> </ul>
	<p><b><u>Sound(4):</u></b></p> <ul style="list-style-type: none"> <li>• Identify how sounds are made, associating it with vibrations.</li> <li>• Recognise that the vibrations travel through a medium to the ear.</li> <li>• Find patterns with the pitch and the features of the object.</li> <li>• Find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>• Recognise that sounds get fainter as distance increases.</li> </ul>	<ul style="list-style-type: none"> <li>• Music</li> </ul>

	<p><b><u>Electricity(4):</u></b></p> <ul style="list-style-type: none"> <li>• Identify common appliances run on electricity.</li> <li>• Construct a simple series electrical circuit and name the parts (bulb, wire, switches, cells and buzzers).</li> <li>• Predict whether a lamp will light based on the circuit being complete or not/ switch being open or closed.</li> <li>• Recognise some common conductors and insulators.</li> </ul>	
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<b>Key Stage Two (Upper)</b>			
Skills	Topics to be covered	Students will be able to...	Cross Curricular
Plan different types of tests to include control variables  Take measurements with accuracy and precision (including repeats)  Record data in tables and a variety of graphs  Use results to make further predictions  Report on findings, draw conclusions and decide if	<p><b><u>Living things and the Environment (5)</u></b></p> <ul style="list-style-type: none"> <li>• Describe the differences in the life cycles of a mammal, amphibian, an insect and bird.</li> <li>• Describe the Life Process of reproduction in plants and animals.</li> </ul>		<p><u>Topic: Life Cycles</u></p> <ul style="list-style-type: none"> <li>• Art: drawing of flowers and identify main parts</li> <li>• Literacy: poems to Summarise life processes or life cycle of a ling organism of their choice</li> </ul>
	<p><b><u>Animals including Humans (5)</u></b></p> <ul style="list-style-type: none"> <li>• Describe the changes as humans develop to old age.</li> </ul>		<ul style="list-style-type: none"> <li>• PSHE: human development and changes</li> <li>• ICT &amp; Craft: use models and stop frame animation to show change over time</li> </ul>
	<p><b><u>Living things and their habitat (6)</u></b></p> <ul style="list-style-type: none"> <li>• Classify organisms into groups according to characteristics.</li> <li>• Give reasons for classifying plants and animals.</li> </ul>		<p><u>Topic: Classification and Food Chains</u></p> <ul style="list-style-type: none"> <li>• Numeracy: using a key to identify organism</li> <li>• Tally chart and Bar graphs could be used.</li> </ul>

<p>results can be trusted</p> <p>Identify evidence that can support or refute ideas</p>	<p><b><u>Animals including humans (5)</u></b></p> <ul style="list-style-type: none"> <li>Identify the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood.</li> <li>Recognise the impact of diet, exercise, drugs and lifestyle on the ways their body functions.</li> <li>Describe the ways in which nutrients and water are transported within animals(humans).</li> </ul>	<p><b><u>Topic: Healthy Living</u></b></p> <ul style="list-style-type: none"> <li>Literacy: write a story to describe the journey of Billy the red blood cell.</li> <li>Numeracy: measure pulse before and after exercise. Graph results and analyse – describe pattern.</li> <li>Draw a bar chart ( extension - pie chart to show area of diet /exercise in the class)</li> </ul>
	<p><b><u>Evolution and Inheritance (6)</u></b></p> <ul style="list-style-type: none"> <li>Recognise that living things have changes over time and that fossils provide information about living things millions of years ago.</li> <li>Recognise that living things produce offspring of the same kind, but offspring vary and are not identical to parents.</li> <li>Identify how animals and plants are adapted to suit their environment which may lead to evolution.</li> </ul>	<p><b><u>Topic – Adaptation</u></b></p> <ul style="list-style-type: none"> <li>Literacy: research Darwin and write a report to summarise main ideas about evolution.</li> <li>Numeracy: draw a timeline to show evolution of the horse (or any example) to scale.</li> <li>Art/Craft: make a model of animal/creature that is adapted to environment.</li> <li>Geography: fossilisation and Rocks.</li> </ul>
	<p><b><u>Properties and Changes of Materials (5)</u></b></p> <ul style="list-style-type: none"> <li>Compare and group everyday materials by their properties (hardness, solubility, transparency, conductivity, and magnetism).</li> <li>Give reasons for the uses of materials based on their properties based on evidence (from tests).</li> <li>Compare and group materials as Solids, Liquids and Gases.</li> <li>Observe that some materials change state when heated and cooled.</li> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p><b><u>Topic – Materials</u></b></p> <ul style="list-style-type: none"> <li>Numeracy: measure temperature of substance/water. Use of negative numbers; tabulate results and draw line graph; analyse data and interpret data.</li> <li>Literacy/Art: draw a comic strip to show the journey a water molecule makes though the water cycle.</li> <li>Geography topic learning objectives covered here.</li> </ul>

	<p><b><u>Properties and Changes of Materials (6)</u></b></p> <ul style="list-style-type: none"> <li>• Know that some materials dissolve to from a solution and how to recover the substance.</li> <li>• Use knowledge of solids, liquids and gases to decide how to separate mixtures.</li> <li>• Demonstrate that dissolving, mixing and changes in state are reversible.</li> <li>• Explain that some changes results in new substance being made and this is not reversible.</li> </ul>	<p><b><u>Topic – Materials (2)</u></b></p> <ul style="list-style-type: none"> <li>• Literacy: write a set of instructions to describe how to separate and recover a substance</li> <li>• Numeracy: measure how much of a solute dissolves in a measured solvent</li> </ul>
	<p><b><u>Earth and Space(5)</u></b></p> <ul style="list-style-type: none"> <li>• Describe the movement of the Earth and other planets relative to the sun in the solar system.</li> <li>• Describe the movement of the Moon relative to the Earth.</li> <li>• Describe the Sun, Earth and Moon as spherical bodies.</li> <li>• Use the idea of the Earth’s rotation to explain day and night and it’s apparent movement across the sky.</li> </ul>	<p><b><u>Topic – Earth and Space</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy: draw or build a scale model of the solar system</li> <li>• Literacy: write Mnemonic poem to remember the order of the planets</li> <li>• Numeracy: measure time using a sundial or stick</li> <li>• History/B&amp;V: what did we used to believe about the planets and the Sun?</li> </ul>
	<p><b><u>Sound(5):</u></b></p> <ul style="list-style-type: none"> <li>• Identify how sounds are made, associating it with vibrations.</li> <li>• Recognise that the vibrations travel through a medium to the ear.</li> <li>• Find patterns with the pitch and the features of the object.</li> <li>• Find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>• Recognise that sounds get fainter as distance increases.</li> </ul>	<p><b><u>Topic – Sound</u></b></p> <ul style="list-style-type: none"> <li>• Music: make a musical instrument</li> </ul>
	<p><b><u>Forces(6)</u></b></p> <ul style="list-style-type: none"> <li>• Explain that objects fall towards the Earth because of gravity.</li> <li>• Identify the effects of air resistance, water resistance and friction.</li> <li>• Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>	<p><b><u>Topic – Forces</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy: measure Force in Newtons and apply this to calculating gravitational force (extension)</li> <li>• Literacy: write a story about a world without friction or what it would be like if you visited another planet in terms of gravity</li> </ul>



	<p><b><u>Light (6)</u></b></p> <ul style="list-style-type: none"> <li>• Recognise that light travels in straight lines.</li> <li>• Explain that objects are seen because objects give out or reflect light into the eye.</li> <li>• Explain that light travels from light sources to the eyes or from light sources to objects and then the eyes.</li> <li>• Explain why shadows have the same shape as the object that cast them.</li> </ul>	<p><b><u>Topic – Light</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy: measure light reflecting, do they notice a pattern?</li> <li>• Literacy: write a persuasive letter for why bright/reflective clothing should be worn.</li> </ul>
	<p><b><u>Electricity (6)</u></b></p> <ul style="list-style-type: none"> <li>• Associate brightness of a lamp/volume of buzzer with the number and voltage of cells used in a circuit.</li> <li>• Compare and give reasons for variations in how components function (brightness of bulbs/loudness of buzzer and switches).</li> <li>• Use symbols when representing a simple circuit diagram.</li> </ul>	<p><b><u>Topic – Electricity</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy: record data and draw a graph; analyse results</li> </ul>

<b>Key Stage Three</b>		
<b>Skills</b>	<b>Topics to be covered</b>	<b>Cross Curricular</b>
<p>Pay attention to accuracy, precision, repeatability.</p> <p>Understand that theories develop due to new evidence and that scientists share ideas by publishing results</p> <p>Evaluate risks</p> <p>Ask questions and develop enquiry based on observations</p> <p>Make predictions</p> <p>Select, plan and carry out appropriate investigations to test predictions – including independent, dependant and control variables.</p> <p>Record observations and evaluate the reliability of methods and suggest improvements</p> <p>Apply sampling techniques</p> <p>Present data in tables and graphs</p> <p>Analyse results to identify patterns and draw conclusions with reasoned explanations</p> <p>Evaluate data and identify sources of error</p>	<p><b><u>Biology</u></b></p> <p><b><u>Structure and Function of Living Organisms</u></b></p> <p><b><i>Cells and organisation</i></b></p> <ul style="list-style-type: none"> <li>- Cells as a fundamental unit of living organisms including how to observe and record them.</li> <li>- The functions of the cell membrane, cell wall, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</li> <li>- The similarities and differences between plant and animal cells</li> <li>- The role of diffusion between in the movement of materials in and between cells</li> <li>- The structural adaptations of some unicellular organisms</li> <li>- The organisation of multicellular organisms.</li> </ul> <p><b><u>Nutrition and Digestion</u></b></p> <ul style="list-style-type: none"> <li>- The content and reasoning behind healthy diet</li> <li>- Calculation of energy requirements</li> <li>- The consequence of imbalance (obesity, starvation and deficiency)</li> <li>- The tissues and organs of the digestive system – how does the digestive system digest food (including enzymes as biological catalysts)</li> <li>- The importance of bacteria in the digestive system</li> <li>- Plants make carbohydrates in their leaves and take in water and minerals through the roots</li> </ul> <p><b><u>Gas Exchange Systems</u></b></p> <ul style="list-style-type: none"> <li>- The structure and function of the lungs to show where gas exchange takes place (how are lungs adapted?)</li> <li>- The mechanism of breathing and measuring lung volume</li> <li>- The impact of exercise, asthma and smoking on gas exchange.</li> <li>- The role of leaf stomata in plants</li> </ul> <p><b><u>The Skeletal and Muscular Systems</u></b></p> <ul style="list-style-type: none"> <li>- The function and structure of the human skeleton</li> <li>- The interaction between the skeleton and muscles including the measurement of force exerted.</li> </ul>	<p><b><u>Year 7 Topic – Cells</u></b></p> <ul style="list-style-type: none"> <li>• Art/Craft – Make a model of animal and plant cell; draw diagrams from microscopes</li> <li>• Literacy – choose a cell and write about it's function and how it is adapted to this.</li> </ul> <p><b><u>Year 8 Topic – Nutrition</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy – Enzyme activity of Catalase experiments: rates of reaction</li> <li>• Calculate % and fractions from healthy diet data</li> <li>• Literacy – Comic strip: Journey through the digestive system</li> </ul> <p><b><u>Year 8 Topic – Respiration and gas exchange (to include skeletal system)</u></b></p> <ul style="list-style-type: none"> <li>• Numeracy - Measure lung capacity</li> </ul>

<p>Identify and use SI units and IUPAC nomenclature</p> <p>Use simple equations and basic statistical techniques</p>	<ul style="list-style-type: none"> <li>- The function of muscles and how muscles work antagonistically.</li> </ul> <p><b>Reproduction</b></p> <ul style="list-style-type: none"> <li>- The structure and function of female and male reproductive systems.</li> <li>- The menstrual cycle</li> <li>- Gametes, fertilisation, gestation and birth (including maternal lifestyle on foetus)</li> <li>- Reproduction in plants, including flower structure, pollination, fertilisation, seed and fruit production and dispersal.</li> <li>- Quantitative investigation into dispersal mechanisms</li> </ul> <p><b>Health</b></p> <ul style="list-style-type: none"> <li>- The effects of recreational drugs on behaviour, health and life processes</li> </ul> <p><b><u>Materials Cycles and Energy</u></b></p> <p><b>Photosynthesis</b></p> <ul style="list-style-type: none"> <li>- The reactants in, and products of photosynthesis to include word summary.</li> <li>- The dependence of all life on Earth on green plants and how photosynthesis is the key to this.</li> <li>- <b>(B4 is the year 9 biology module in which students will continue these ideas in more depth.)</b></li> </ul> <p><b>Cellular respiration</b></p> <ul style="list-style-type: none"> <li>- Aerobic and anaerobic respiration in living organisms – making comparisons between the two</li> <li>- Word equation for aerobic and anaerobic respiration</li> <li>- The process of anaerobic respiration in humans and microorganisms including fermentation</li> </ul> <p><b><u>Interactions and Interdependencies</u></b></p> <p><b>Relationships in an ecosystem</b></p> <ul style="list-style-type: none"> <li>- Interdependence of organisms – including food chains and webs and insect pollinated crops</li> <li>- The importance of insects in terms of food security</li> <li>- How organisms are affected by their environment including bioaccumulation</li> </ul> <p><b><u>Genetics and Evolution</u></b></p>	<p><u>Year 7 Topic – Reproduction</u></p> <ul style="list-style-type: none"> <li>• Numeracy – Seed dispersal investigation</li> <li>• Literacy – Produce an information leaflet for an expectant mother</li> <li>• PSHE – Sex education</li> </ul> <p><u>Year 8 Topic – Respiration and gas exchange</u></p> <ul style="list-style-type: none"> <li>• PSHE - Drugs</li> </ul> <p><u>Year 7 – Energy Transfers</u></p> <ul style="list-style-type: none"> <li>• <i>Then taught in year 9 (module B4)</i></li> </ul> <p><u>Year 8 Topic – Respiration and Gas Exchange</u></p> <ul style="list-style-type: none"> <li>• Numeracy – Measure gas released by yeast during fermentation and compare to aerobic conditions</li> <li>• Literacy – Write conclusions to experiment</li> </ul> <p><u>Year 7 Topic – Energy Transfers</u></p> <ul style="list-style-type: none"> <li>• Academy Trust Action day</li> <li>• Numeracy – Calculate % bioaccumulation</li> </ul> <p><u>Year 7 Topic</u></p>
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	<ul style="list-style-type: none"> <li>Inheritance, Chromosomes, DNA and Genes</li> </ul> <p><b>Chemistry</b></p> <p><b><u>The Particulate nature of Matter</u></b></p> <p><b>States of Matter</b></p> <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> <p><b>Atoms, elements and compounds</b></p> <ul style="list-style-type: none"> <li>a simple (Dalton) atomic model</li> <li>differences between atoms, elements and compounds</li> <li>chemical symbols and formulae for elements and compounds</li> <li>conservation of mass, changes of state and chemical reactions.</li> </ul> <p><b>Pure and impure substances</b></p> <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> <p><b><u>Reactions</u></b></p> <p><b>Chemical Reactions</b></p> <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> </ul>	<ul style="list-style-type: none"> <li><u>Academy Trust Action day – June</u></li> <li>Literacy – Research the work of Watson and Crick</li> </ul> <p><u>Year 8 Topic – Elements and Compounds</u></p> <p><u>NB.</u> Topic on Atom Structure to be covered by CUS in Year 9 (Module C4)</p> <ul style="list-style-type: none"> <li>Numeracy – Draw graph to show relationship between Magnesium and Magnesium Oxide</li> <li>Literacy – Poem/ Comic strip to describe diffusion and Brownian motion</li> </ul> <p><u>Year 7 Topic – Chemical reactions</u></p> <p><u>Year 7 Topic – Acids and Alkalis</u></p> <ul style="list-style-type: none"> <li>Numeracy – Time for candle to extinguish dependant on beaker size and draw conclusions</li> </ul>
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- the pH scale for measuring acidity/alkalinity; and indicators
- reactions of acids with metals to produce a salt plus hydrogen
- reactions of acids with alkalis to produce a salt plus water
- what catalysts do.
- the chemical properties of metal and non-metal oxides with respect to acidity.

**Energetics**

- energy changes on changes of state (qualitative)
- exothermic and endothermic chemical reactions (qualitative).

**Materials**

**The Periodic Table -**

To be completed at County Upper as part of the C4 Module

**Reactivity of Metals**

- the order of metals and carbon in the reactivity series
- the use of carbon in obtaining metals from metal oxides
- properties of ceramics, polymers and composites (qualitative).

**Properties of Materials**

- the composition of the Earth
- the structure of the Earth
- the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
- Earth as a source of limited resources and the efficacy of recycling
- the carbon cycle
- the composition of the atmosphere
- the production of carbon dioxide by human activity and the impact on climate.

**Physics**

**Energy**

- Balance equations (HAB)

Year 7 Topic – Chemical reactions

Year 8 Topic – Elements and compounds

NB. Energy changes to be further expanded on in P1 module in year 9 at CUS  
Numeracy – Measure temperature Changes and interpret graph

Year 7 Topic - Chemical Reactions

Year 8 Topic – Rocks

Year 8 Topic – Energy Transfers

- Literacy – Journey to the centre of the Earth
- Numeracy - % composition of the atmosphere; interpret graphical data on population and climate
- Geography – Rock Cycle, atmosphere and Earth structure; population studies

**Calculation of fuels uses and costs in the domestics context**

- comparing energy values of different foods (from labels) (kJ)
- comparing power ratings of appliances in watts (W, kW)
- comparing amounts of energy transferred (J, kJ, kW hour)
- domestic fuel bills, fuel use and costs
- fuels and energy resources.

**Energy Changes and Transfers**

- simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged
- heating and thermal equilibrium: temperature difference between two 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
- other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.

**Changes in Systems**

- energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change
- comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions
- using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.

**Motion and Forces**

**Describing Motion**

- speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)
- the representation of a journey on a distance-time graph
- relative motion: trains and cars passing one another.

Year 7 – Energy Transfers

Year 8 – Respiration and Gas exchange

- Numeracy – calculation of energy transferred and power. (This is revisited in P1 in year 9 at CUS\_

*NB. Taught in Year 9 at CUS in Module P1*

Year 7 – Energy Transfers

Year 7 Chemical Reactions

Year 7 - Electricity

Year 8 – Respiration and gas exchange

Year 8 – Solar system and beyond

Year 7 Topic – Chemical reactions

Year 7 Energy Transfers

Year 7 Topic – Force and Motion

Year 8 Topic - Electromagnets

- Numeracy – Hookes law experiment: Graph results and interpolate; Calculate energy changes taking place

Year 7 Topic – Forces and Motion

- Numeracy – Speed calculations
- Literacy – Write a story to describe the journey taken if a graph is given
- Numeracy – Use of Newtonmeters and data interpretation

	<p><b>Forces</b></p> <ul style="list-style-type: none"> <li>• forces as pushes or pulls, arising from the interaction between two objects</li> <li>• using force arrows in diagrams, adding forces in one 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</li> <li>• 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>Pressure in fluids</b></p> <ul style="list-style-type: none"> <li>• atmospheric pressure, decreases with increase of height as weight of air above decreases with height</li> <li>• pressure in liquids, increasing with depth; upthrust effects, floating and sinking</li> <li>• pressure measured by ratio of force over area – acting normal to any surface.</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>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><u>Waves</u></p> <p><b>Observed Waves</b></p> <ul style="list-style-type: none"> <li>• waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.</li> </ul> <p><b>Sound Waves</b></p>	<p><u>Year 8 Topic – Solar system and beyond</u> <u>Year 7 – Forces and Motion</u></p> <ul style="list-style-type: none"> <li>• <u>Numeracy – Ratio</u></li> </ul> <p><u>To be taught at CUS in Year 9 (module P1)</u></p> <p><u>Year 8 Topic – Light and Sound</u></p> <ul style="list-style-type: none"> <li>• Numeracy – Compare frequency and wavelength with amplitude</li> <li>• Literacy – Write an explanation to explain why loud sounds are dangerous</li> </ul>
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- frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound
- sound needs a medium to travel, the speed of sound in air, in water, in solids
- sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
- auditory range of humans and animals.

**Energy in Waves**

- pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.

**Light Waves**

- the similarities and differences between light waves and waves in matter
- light waves travelling through a vacuum; speed of light
- the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface
- 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
- light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras
- colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

**Electricity and Electromagnetism**

**Current Electricity**

- electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
- potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
- differences in resistance between conducting and insulating components (quantitative).

**Static Electricity**

- separation of positive or negative charges when objects are rubbed together: transfer of

Taught at CUS in Year 9 (module P1)

- Numeracy – find the angle of incidence and reflection

**Year 7 Topic - Electricity**

- Literacy – Write a story to explain what happens in a parallel circuit
- Numeracy – Quantify resistance and relate to voltage and current

*Idea revisited at CUS in Year 9*



	<p>electrons, forces between charged objects</p> <ul style="list-style-type: none"> <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, D.C. motors (principles only).</li> </ul> <p><u>Matter</u></p> <p><b>Physical Changes</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>Particle Model</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>Energy in Matter</b></p> <ul style="list-style-type: none"> <li>changes with temperature in motion and spacing of particles</li> <li>internal energy stored in materials.</li> </ul> <p><u>Space Physics</u></p> <ul style="list-style-type: none"> <li>gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10</math> N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</li> </ul>	<p><u>Year 8 Topic – Magnets and Electromagnets</u></p> <ul style="list-style-type: none"> <li>Numeracy – Direction</li> </ul> <p><u>Year 8 Topic – Elements and Compounds</u> <u>Year 7 Topic – Chemical reactions</u></p> <p><u>Year 8 Topic– Elements and Compounds</u> Also taught in Year 9 at CUS (module P1) <u>Year 7 Topic – Chemical reactions</u> <u>(diffusion)</u></p> <p><u>Year 7 Topic – The solar system and beyond</u></p> <ul style="list-style-type: none"> <li>Numeracy – Calculate Force of Gravity on different planets</li> <li>Literacy – Imaginary planet: Create a factfile</li> </ul>
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|  | <ul style="list-style-type: none"><li>• our Sun as a star, other stars in our galaxy, other galaxies</li><li>• the seasons and the Earth's tilt, day length at different times of year, in different hemispheres</li><li>• the light year as a unit of astronomical distance</li></ul> |  |
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