

# 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.

Year 1-2		
Skills	Topics to be covered      Students will be able to...	Cross Curricular
<p>Asking simple Questions</p> <p>Observing, using simple equipment</p> <p>Performing simple tests</p> <p>Identifying and classifying</p>	<p><b><u>Plants(1):</u></b></p> <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> <p><b><u>Plants(2):</u></b></p> <ul style="list-style-type: none"> <li>• Observe and describe how seeds and bulbs grow into mature plants.</li> <li>• Find out and describe how plants need water, sunlight and a suitable temperature to grow.</li> </ul>	<p><b>Topic/Theme:</b> Food and farming (Years 1 and 2)</p> <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>
<p>Using observations and ideas to answer questions</p> <p>Gathering and recording data</p>	<p><b><u>Animals, including Humans(1):</u></b></p> <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>	<p><b>Topic/Theme:</b> ‘All about me’ (Year 1)</p> <ul style="list-style-type: none"> <li>• <b>Literacy:</b> Writing labels for diagrams and captions (information texts)</li> </ul>
	<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>

**Years 3-4**

Skills	Topics to be covered	Students will be able to...	Cross Curricular
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<p>Asking relevant questions and answer them using different enquiry techniques</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>Set up simple practicals (consider fair tests)</p> <p>Make systematic and careful measurements using standard units</p> <p>Gather, record, classify, and present data in a variety of ways</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>Report on findings: displays, written and oral explanations and conclusions</p> <p>Use conclusions to form new predictions Suggest improvements to methods</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>Identify difference, similarities or changes related to simple</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>scientific ideas and processes Use scientific evidence to answer questions or to support findings</p>	<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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Year Group	Area of Study/ Key Skills	Content/Topics addressed	Assessment Objectives	Additional Comment
Year 5	<p><b>Across Years 5 &amp; 6 of KS2, pupils are required to gain the following skills:</b></p> <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><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> <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> </ul>	<p>Topics are supported through the rising stars scheme of work</p> <p><b>Healthy Living (5)</b></p> <ul style="list-style-type: none"> <li>• A Healthy Diet</li> <li>• Exercise</li> <li>• Drugs</li> <li>• Transport</li> </ul> <p><b>Life cycles (5)</b></p> <ul style="list-style-type: none"> <li>• Mrs GREN</li> <li>• Plant structure and function</li> <li>• Flower Structure</li> <li>• Germination</li> <li>• Pollination</li> <li>• Plant life cycle</li> <li>• Animal Life cycle</li> </ul>	<p><i>Assessment of content objectives to take place through end of topic tests and end of year exams (where a % score can be used to assign grades/show whether the students is making expected progress) alongside skills assessment (below). Content knowledge can also be checked when students write predictions, conclusions and evaluations.</i></p> <p>Asks questions &amp; offer own ideas for scientific enquiry &amp; with support, improves question to clarify scientific purpose.</p> <p>With help, sets up a fair test including what to change, measure/observe &amp; what to keep the same. With support, considers whether to take repeat readings.</p>	

	<ul style="list-style-type: none"> <li>Give reasons for classifying plants and animals</li> </ul> <p><b>Animals including humans (5)</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>Evolution and Inheritance (6)</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>Properties and Changes of Materials (5)</b></p>	<p><b>Classification and Food Chains (6)</b></p> <ul style="list-style-type: none"> <li>Plant Kingdom</li> <li>Animal Kingdom</li> <li>Keys</li> <li>Food chains</li> <li>Food Webs</li> <li>Interdependance</li> </ul> <p><b>Evolution and Inheritance (6)</b></p> <ul style="list-style-type: none"> <li>Adaptation</li> <li>Natural Selection</li> <li>Evolution</li> </ul> <p><b>Materials (5)</b></p> <ul style="list-style-type: none"> <li>Bunsen burner</li> <li>Solids, Liquids and Gases</li> <li>Changing state</li> <li>Testing Materials</li> <li>Using Materials</li> </ul> <p><b>Materials (6)</b></p> <ul style="list-style-type: none"> <li>Solubility</li> <li>Separation</li> <li>Reversible/ irreversible</li> </ul> <p><b>Sound (5)</b></p>	<p>Predicts outcomes and where appropriate, suggests reasons for their predictions.</p> <p>Makes a series of relevant observations. With support, takes accurate readings on measuring equipment, repeating them where necessary.</p> <p>Makes a series of relevant observations. With support, takes accurate readings on measuring equipment, repeating them where necessary.</p> <p>Can calculate the mean with support.</p> <p>Begins to select appropriate ways to present evidence. Creates own bar charts and tables, including those for repeat readings.</p> <p>Creates a line graph with support.</p> <p>With support, describes relationships identified between variables.</p> <p>Gives reasons for findings, and with support relates patterns in results to scientific knowledge.</p> <p>Identifies how much to trust results and with help, suggests how to make improvements.</p>	
Year 6	<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> </ul>	<ul style="list-style-type: none"> <li>Making Vibrations</li> <li>Sound through different mediums</li> <li>Volume</li> <li>Sound Proofing</li> <li>Pitch</li> </ul> <p><b>Earth and Space (5)</b></p>	<p>Asks questions &amp; offers own ideas for scientific enquiry which have clear scientific purpose.</p> <p>Sets up a fair test and plans the detail in other types of enquiry. With support, considers whether plans will yield enough evidence for</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>Properties and Changes of Materials (6)</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>Earth and Space(5)</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>Sound(5):</b></p> <ul style="list-style-type: none"> <li>• Identify how sounds are made,</li> </ul>	<ul style="list-style-type: none"> <li>• The Earth, sun and moon shape, size and distance</li> <li>• Day and Night</li> <li>• The Moon</li> <li>• The Planets</li> </ul> <p><b>Electricity (6)</b></p> <ul style="list-style-type: none"> <li>• Circuit Diagrams</li> <li>• Conductors and Insulators</li> <li>• Bright Bulbs</li> <li>• Varying Conditions</li> </ul> <p><b>Forces (6)</b></p> <ul style="list-style-type: none"> <li>• Pushes and Pulls</li> <li>• Gravity</li> <li>• Friction</li> <li>• Air and Water resistance</li> <li>• Balanced and Unbalanced forces</li> <li>• Levers</li> <li>• Pulleys and Gears</li> </ul> <p><b>Light (6)</b></p> <ul style="list-style-type: none"> <li>• Straight Lines</li> <li>• Reflections</li> <li>• Shadows</li> </ul>	<p>the task.</p> <p>Predicts outcomes to show the expected pattern in results. Justifies their predictions using scientific knowledge at or beyond expectations when prompted.</p> <p>Makes a series of relevant observations. Takes accurate reading on measuring equipment, repeating where necessary.</p> <p>Records information in a table with support.</p> <p>Can calculate mean.</p> <p>Selects suitable ways to present evidence. Draws up line graph independently.</p> <p>Describes relationships identified between variables.</p> <p>Relates patterns in results to scientific knowledge where appropriate.</p> <p>Identifies how much to trust results and suggests how to make improvements. Considers spread of repeated measurements.</p>	
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	<p>associating it with vibrations</p> <ul style="list-style-type: none"> <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><u>Forces(6)</u></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><u>Light (6)</u></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><u>Electricity (6)</u></p> <ul style="list-style-type: none"> <li>• Associate brightness of a lamp/volume of buzzer with the number and voltage of</li> </ul>			
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	<p>cells used in a circuit</p> <ul style="list-style-type: none"> <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>			
Year 7	<p><b>Across Years 7 &amp; 8 of KS3, pupils are required to gain the following skills:</b></p> <p><b>Biology Structure and Function of Living</b></p> <p><b>Organisms</b> <b>Cells and organisation</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>Nutrition and Digestion</b></p> <ul style="list-style-type: none"> <li>- The content and reasoning behind healthy diet</li> <li>- Calculation of energy requirements</li> </ul>	<p><i>Topics are supported through the Edexcel scheme of work – this is the direct precursor to the GCSE 9-1 Edexcel Syllabus, allowing for a seamless transition from Years 7 -11</i></p> <p>Topics may be taught in different orders to allow for seasonal activities</p> <p><b>Cells, tissues, organs and systems</b></p> <ul style="list-style-type: none"> <li>• Life Processes</li> <li>• Organs</li> <li>• Tissues</li> <li>• Cells</li> <li>• Organ systems</li> </ul> <p><b>Sexual reproduction in animals</b></p> <ul style="list-style-type: none"> <li>• Animal sexual reproduction</li> <li>• Reproductive Organs</li> <li>• Becoming pregnant</li> <li>• Gestation and birth</li> <li>• Growing up</li> </ul> <p><b>Muscles and bones</b></p> <ul style="list-style-type: none"> <li>• Muscles and breathing</li> <li>• Muscles and blood</li> <li>• The Skeleton</li> </ul>	<p>Asks questions and develops enquiry based on observations.</p> <p>Plans a fair test based on a simple prediction made and question posed. Plans to collect sufficient evidence to answer the question, using suitably accurate equipment.</p> <p>Assesses hazards and plans how to control risks.</p> <p>Predicts outcomes and justifies predictions using scientific knowledge at or beyond expectations independently.</p> <p>Records information in a table. Units in headings, with units matching the results recorded.</p> <p>Calculates and plots mean from repeated results. Uses correct decimal places with support.</p> <p>Selects suitable ways to present evidence. Draws up line graph independently choosing the correct scales for the axes, and axes the correct way round.</p> <p>Describes patterns in data and identifies unexpected results with help.</p>	<p><b>Trust Activities:</b> Science Club for Year 7 -8 on Monday after schools with associated trips</p> <p>Science Festival</p> <p>Able and Talented Day (November)</p>

	<ul style="list-style-type: none"> <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>Gas Exchange Systems</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>The Skeletal and Muscular Systems</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> <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</li> </ul>	<ul style="list-style-type: none"> <li>• Muscles and moving</li> <li>• Drugs</li> </ul> <p><b>Ecosystems</b></p> <ul style="list-style-type: none"> <li>• Variation</li> <li>• Adaptations</li> <li>• Effects of the environment</li> <li>• Effects on the environment</li> <li>• Transfers of energy and poisons</li> </ul> <p><b>Food and digestion</b></p> <ul style="list-style-type: none"> <li>• Use of nutrients</li> <li>• Balanced diets</li> <li>• Digestion</li> <li>• Absorption</li> </ul> <p><b>Plants</b></p> <ul style="list-style-type: none"> <li>• Types of reproduction</li> <li>• Pollination</li> <li>• Fertilisation and seed dispersal</li> <li>• Germination and growth</li> </ul> <p><b>Breathing and respiration</b></p> <ul style="list-style-type: none"> <li>• The breathing system</li> <li>• Getting enough oxygen: respiration in different organisms</li> <li>• Anaerobic respiration</li> </ul> <p><b>Unicellular organisms</b></p> <ul style="list-style-type: none"> <li>• Cells</li> <li>• Algae</li> <li>• Yeast and fungi</li> <li>• Helpful bacteria</li> <li>• Harmful bacteria</li> </ul>	<p>Compares results to prediction, then draws upon scientific knowledge to give a reason for findings at age expected level.</p> <p>Identifies errors and describes weaknesses in method that have led to them. Offers some improvements based on these weaknesses (limitations).</p>	
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	<p>(including maternal lifestyle on foetus)</p> <ul style="list-style-type: none"> <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><u><b>Materials Cycles and Energy</b></u></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> </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><u><b>Interactions and Interdependencies</b></u></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</li> </ul>			
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	<p>food security</p> <ul style="list-style-type: none"> <li>- How organisms are affected by their environment including bioaccumulation</li> </ul> <p><u>Genetics and Evolution</u></p> <ul style="list-style-type: none"> <li>• Inheritance, Chromosomes, DNA and Genes</li> </ul> <p><b>Chemistry</b></p> <p><u>The Particulate nature of Matter</u></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>Mixtures and Separation</b></p> <ul style="list-style-type: none"> <li>• Mixtures</li> <li>• Solutions</li> <li>• Evaporation</li> <li>• Chromatography</li> <li>• Distillation</li> </ul> <p><b>Acids and bases</b></p> <ul style="list-style-type: none"> <li>• Hazards</li> <li>• Indicators</li> <li>• The pH scale</li> <li>• Neutralisation</li> <li>• Neutralisation in everyday life</li> </ul> <p><b>The particle model</b></p> <ul style="list-style-type: none"> <li>• Solids, liquids and gases</li> <li>• Particles</li> <li>• Brownian motion</li> <li>• Diffusion</li> <li>• Air pressure</li> </ul> <p><b>Atoms, elements and compounds</b></p> <ul style="list-style-type: none"> <li>• The air we breathe</li> <li>• Earth's elements</li> <li>• Metals and non-metals Making compounds</li> <li>• Chemical reactions</li> </ul>		
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	<p><b><u>Reactions</u></b> <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> <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> <li>the chemical properties of metal and non-metal oxides with respect to acidity.</li> </ul> <p><b>Energetics</b></p> <ul style="list-style-type: none"> <li>energy changes on changes of state (qualitative)</li> <li>exothermic and endothermic chemical reactions (qualitative).</li> </ul> <p><b><u>Materials</u></b></p> <p><b>The Periodic Table</b></p> <ul style="list-style-type: none"> <li>To be started while looking at Atoms but completed in Topic 1 Year 9</li> </ul> <p><b>Reactivity of Metals</b></p> <ul style="list-style-type: none"> <li>the order of metals and carbon in the reactivity series</li> </ul>	<p><b>Combustion</b></p> <ul style="list-style-type: none"> <li>Oxidation</li> <li>Fire safety</li> <li>Air pollution</li> <li>Global warming</li> </ul> <p><b>The Periodic Table</b></p> <ul style="list-style-type: none"> <li>Chemical properties of elements</li> <li>Mendeleev's table</li> <li>Trends in physical properties</li> <li>Trends in chemical properties</li> </ul> <p><b>Metals and their uses</b></p> <ul style="list-style-type: none"> <li>Corrosion</li> <li>Metals and water</li> <li>Metals and acids</li> <li>Pure metals and alloys</li> </ul> <p><b>Rocks</b></p> <ul style="list-style-type: none"> <li>Sedimentary rocks</li> <li>Igneous rocks</li> <li>Metamorphic rocks</li> <li>The changing Earth</li> </ul>		
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	<ul style="list-style-type: none"> <li>the use of carbon in obtaining metals from metal oxides</li> <li>properties of ceramics, polymers and composites (qualitative).</li> </ul> <p><b>Properties of Materials</b></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> <li>Earth as a source of limited resources and the efficacy of recycling</li> <li>the carbon cycle</li> <li>the composition of the atmosphere</li> <li>the production of carbon dioxide by human activity and the impact on climate.</li> </ul> <p><b>Physics</b></p> <p><u>Energy</u> <b>Calculation of fuels uses and costs in the domestics context</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>Energy Changes and Transfers</b></p> <ul style="list-style-type: none"> <li>simple machines give bigger force but at</li> </ul>	<p><b>Energy</b></p> <ul style="list-style-type: none"> <li>Energy from food</li> <li>Energy transfers and stores Fuels</li> <li>Other energy resources</li> <li>Using resources</li> </ul> <p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Switches and current</li> <li>Models for circuits</li> <li>Series and parallel circuits</li> <li>Changing the current</li> <li>Using electricity</li> </ul>		
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	<p>the expense of smaller movement (and vice versa): product of force and displacement unchanged</p> <ul style="list-style-type: none"> <li>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</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>Changes in Systems</b></p> <ul style="list-style-type: none"> <li>energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</li> <li>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</li> <li>using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.</li> </ul> <p><b><u>Motion and Forces</u></b> <b><u>Describing Motion</u></b></p> <ul style="list-style-type: none"> <li>speed and the quantitative relationship</li> </ul>	<p><b>Forces</b></p> <ul style="list-style-type: none"> <li>Different forces</li> <li>Springs</li> <li>Friction</li> <li>Pressure</li> <li>Balanced and unbalanced forces</li> </ul> <p><b>Sound</b></p> <ul style="list-style-type: none"> <li>Making sounds</li> <li>Moving sounds</li> <li>Detecting sounds</li> <li>Using sound</li> <li>Comparing waves</li> </ul> <p><b>Fluids</b></p> <ul style="list-style-type: none"> <li>Changing state</li> <li>Pressure in fluids</li> <li>Floating and sinking</li> <li>Drag</li> </ul> <p><b>Light</b></p> <ul style="list-style-type: none"> <li>Reflection</li> <li>Refraction</li> <li>Cameras and eyes</li> <li>Colour</li> </ul> <p><b>Energy transfers</b></p> <ul style="list-style-type: none"> <li>Transferring energy</li> <li>Controlling energy transfers Power and efficiency</li> <li>Paying for energy</li> </ul> <p><b>The Earth and Space</b></p> <ul style="list-style-type: none"> <li>Seasons</li> <li>Finding your way</li> </ul>		
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	<p>between average speed, distance and time (speed = distance ÷ time)</p> <ul style="list-style-type: none"> <li>the representation of a journey on a distance-time graph</li> <li>relative motion: trains and cars passing one another.</li> </ul>	<ul style="list-style-type: none"> <li>Stars</li> <li>Gravity</li> </ul>		
Year 8	<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</li> </ul>	<p><i>Note: The above modules are also taught through to end of year 8.</i></p>	<p>Collects research and summarises in the form of a report.</p> <p>Plans a fair test based on a simple prediction made and linked to scientific understanding. Plans to collect sufficient, repeatable results to answer the question, using suitably accurate equipment.</p> <p>Assesses hazards &amp; plans how to control risks. Considers likelihood of risk and plans for this.</p> <p>Makes detailed predictions and justifies them using scientific knowledge at or beyond expectations independently.</p> <p>Tables to include appropriate headings and units (in headings only). Independent and dependent variables in correct place.</p> <p>Calculates and plots mean from repeated results using correct decimal places.</p> <p>Selects suitable ways to present evidence. Draws up line graph independently choosing the correct scales for the axes, labels/ headings (with units), and axes the correct way round.</p> <p>Describes patterns in data and identifies unexpected results independently, suggesting reasons for them.</p>	

	<p>decreases with height</p> <ul style="list-style-type: none"> <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> <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> <ul style="list-style-type: none"> <li>• frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> <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 loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> </ul>		<p>Compares results to prediction, then draws upon scientific knowledge to give a reason for findings at age expected level.</p> <p>Identifies errors and describes weaknesses in method that have led to them. Offers some improvements based on these weaknesses (limitations), and may suggest further ideas for investigation.</p>	
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	<ul style="list-style-type: none"> <li>• auditory range of humans and animals.</li> </ul> <p><b>Energy in Waves</b></p> <ul style="list-style-type: none"> <li>• pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone.</li> </ul> <p><b>Light Waves</b></p> <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; photo-sensitive 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><b><u>Electricity and Electromagnetism</u></b></p> <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</li> </ul>			
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	<p>current as flow of charge</p> <ul style="list-style-type: none"> <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, D.C. motors (principles only).</li> </ul> <p><u>Matter</u> <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</li> </ul>			
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	<p>density differences, between solids, liquids and gases</p> <ul style="list-style-type: none"> <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 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)</li> <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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<p>Year 9</p>	<p>Students now start GCSE Edexcel 9-1 syllabus</p> <p>Please click on the following links for specific GCSE objectives</p> <p><a href="#">Biology Topic 1, 2 and 3</a></p> <p><a href="#">Chemistry Topic 1, 2</a></p> <p><a href="#">Physics Topic 1, 4, 5 and 7</a></p>	<p><b>B1 Key concepts in biology</b></p> <ul style="list-style-type: none"> <li>• Cells</li> <li>• Microscopes</li> <li>• [including core practical]</li> <li>• Enzymes</li> <li>• [incl. core practical]</li> <li>• Food tests</li> <li>• [incl. core practical]</li> <li>• Transport in/ out of cells</li> <li>• [incl. core practical]</li> <li>• Transport in/ out of cells</li> </ul> <p><b>B2 Signalling</b></p> <ul style="list-style-type: none"> <li>• Cell division</li> <li>• Growth and development</li> <li>• The nervous system</li> <li>• The eye</li> </ul> <p><b>B3 Inheritance</b></p> <ul style="list-style-type: none"> <li>• Asexual and sexual reproduction</li> <li>• DNA</li> <li>• Inheritance</li> <li>• Variation</li> </ul> <p><b>C2 Separating Techniques</b></p> <ul style="list-style-type: none"> <li>• States of Matter</li> <li>• Separating and Purifying</li> </ul> <p><b>C1 Key concepts</b></p> <ul style="list-style-type: none"> <li>• Atomic Structure</li> <li>• Periodic Table</li> <li>• Ionic Bonding</li> <li>• Covalent Bonding</li> </ul>	<p>Collects research and summarises in the form of a report. Links research to Bibliography</p> <p>Plans a fair test based on a simple prediction made and linked to scientific understanding. Plans to collect a range of repeatable results to answer the question, using suitably accurate equipment.</p> <p>Assesses hazards &amp; plans how to control risks. Considers likelihood of risk and plans for this.</p> <p>Makes detailed predictions and justifies them using scientific knowledge at or beyond expectations independently.</p> <p>Tables to include appropriate headings and units (in headings only). Independent and dependent variables in correct place. Data displayed to the same decimal places.</p> <p>Maths skills - Can use a formula to calculate unknown values/ can calculate percentages and Rf values/ can calculate magnification/ graph extrapolation, interpolation</p> <p>Selects suitable ways to present evidence. Draws up line graph independently choosing the correct scales for the axes, labels/ headings (with units), and axes the correct way round. Can draw a line/curve of best and extrapolate from the graph.</p> <p>Describes patterns in data and identifies</p>	<p><b>Trust Activities:</b> Science Club for Year 7 -8 on Monday afternoons with associated trips. Year 9 have the opportunity to support these as science ambassadors</p> <p>Science Festival</p>
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