

Hailey Hall School  
Specialist Sports College



Believe Strive Achieve



# Hailey Hall School Science Curriculum Booklet

## **Science Curriculum - Intent**

### **Introduction:**

The new Education Inspection Framework (EIF 2019) includes an enhanced focus on curriculum. This is structured around three pillars:

### **Curriculum Intent Curriculum Implementation Curriculum impact**

**Curriculum Intent Science:** The National Curriculum for Science aims to ensure that all children: develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them are equipped with the scientific skills required to understand the uses and implications of science, today and for the future.

We understand that it is important for lessons to have a skills-based focus, and that the knowledge can be taught through this.

**Purpose of Study:** -To encourage a lifelong passion for Science by engaging pupils in practical activities and discussions. -To encourage a curiosity and an awareness of the world around them. - To give pupils a solid conceptual understanding of Biology, Chemistry and Physics as detailed in the National Curriculum for Key Stages 3 and 4. - To ensure all pupils make progress to the best of their ability with support and challenge where needed to achieve at ks4 and provide a foundation for further study after Hailey Hall.

The Science subject area aims to inspire discussion, hypothesizing, planning, investigating, implementation and evaluation. We aim to have all pupils working towards developing a deeper understanding of the modern world around us.

We aim to, wherever possible, link work to other disciplines such as mathematics, D&T, computing, PE and art. The pupils are also given opportunities to reflect upon and evaluate their practical work with specific regards to health & safety, reliability and accuracy

The Science curriculum is planned to enable all pupils to develop skills in the following areas:

1. To develop an understanding of health and safety
2. To gain a range of practical science skills
3. To understand the impact humans and natural factors have on the environment.
4. To gain a wider understanding of the world around us, to understand the science behind modern living.
5. Nurture and develop pupils' passions and interests to help them understand the science around them.

Throughout our programs of study, every attempt is made to make explicit links to careers and the world of work. In addition to subject specific links, we aim to explicitly reinforce the skills and aptitudes which support what employers say are important in the workplace;

1. This is especially prevalent in the KS4 Btec Applied Science program of study.
2. Aiming high, staying positive and resilience
3. Communication skills (listening, speaking, presenting)
4. Teamwork and problem solving,
5. Creativity and thinking skills.

6. Self-management and leadership
7. The British values of democracy, the rule of law, individual liberty, and mutual respect of those with different faiths and beliefs are taught explicitly and reinforced in the way in which the school operates.

Underpinning all the learning aims is the school ethos is the understanding and development of pupils social, emotional, and behavioural needs. Every lesson has a strong focus on the four target areas for specific focus. – see behaviour policy for full details.

In addition to this, through the schools' soft skills data capture, specific targets are developed for each individual pupil. All teaching staff are made aware of these and each lesson is an opportunity to work on and focus on these individual targets, ensuring realistic learning and progression.

## Year 7 Science

### Why this subject is important:

The study of science fires pupils' curiosity about the world and helps them to find explanations. It links practical experience with scientific ideas. Pupils learn that science enhances knowledge and

understanding in science is rooted in evidence. Pupils discover how science and technology affects industry, business and medicine and how science improves the quality of life. Pupils appreciate science worldwide and discover how it relates to their own culture.

Pupils also gain confidence to question and discuss issues that may affect their own lives, their immediate community and the world.

### What you will learn:

Unit name	Topics	Skills and understanding	Skills and curriculum links
Structure and function of body systems	Levels of organisation exchange Breathing Skeleton Movement: joints Movement: muscles	<ul style="list-style-type: none"> <li>• Define and state examples of tissues, organs, and organ systems.</li> <li>• Explain the hierarchy of organisation in a multicellular organism.</li> <li>• Interpret information provided to decide on the function of the individual organs and of the organ system.</li> <li>• Describe the structure of the gas exchange system.</li> <li>• Describe how parts of the gas exchange system are adapted to their function.</li> </ul>	<p>Links to Adaptation &amp; inheritance. Health and life style (year 8).</p> <p>Links to survival in the genes, Year 10</p>

		<ul style="list-style-type: none"> <li>• Interpret data given to compare the difference in the composition of inhaled and exhaled air.</li> <li>• Describe the processes of inhaling and exhaling.</li> <li>• Describe how a bell jar can be used to model what happens during breathing.</li> <li>• Explain how to measure lung volume.</li> <li>• Use appropriately calibrated apparatus to obtain a lung volume.</li> <li>• Describe the structure of the skeleton.</li> <li>• Describe the functions of the skeletal system.</li> <li>• Describe the role of joints in movement.</li> <li>• Explain how to measure the force exerted by different muscles.</li> <li>• Carry out an experiment to make and record measurements of forces using the correct units.</li> <li>• Describe the function of major muscle groups.</li> <li>• Explain how antagonistic muscles cause movement.</li> <li>• - Interpret data collected in an experiment, to identify a pattern between muscle fatigue and repetitive muscle contraction.</li> </ul>	
Reproduction	Adolescence	<ul style="list-style-type: none"> <li>• State the difference between adolescence and puberty.</li> </ul>	Links to health and lifestyle (year 8)
	Reproductive systems	<ul style="list-style-type: none"> <li>• Describe the main changes that take place during puberty.</li> <li>• Interpret observations given, to categorise the changes during adolescence.</li> </ul>	Links to prevention and cure, year 9, Survival in the genes year 10 and Principles of applied science.

	<p>Fertilisation and implantation</p> <p>Development of a foetus</p> <p>The menstrual cycle</p> <p>Flowers and pollination</p> <p>Fertilisation and germination</p> <p>Seed dispersal</p>	<ul style="list-style-type: none"> <li>• Describe the main structures in the male and female reproductive systems.</li> <li>• Describe the function of the main structures in the male and female reproductive systems.</li> <li>• Extract information from text to describe structures and functions of the key parts of the reproductive systems in a table.</li> <li>• Describe the structure and function of gametes.</li> <li>• Describe the processes of fertilisation.</li> <li>• Describe what happens during gestation.</li> <li>• Describe what happens during birth.</li> <li>• State what the menstrual cycle is.</li> <li>• Describe the main stages in the menstrual cycle.</li> <li>• Present information in the form of a graphical timeline.</li> <li>• Identify the main structures of a flower.</li> <li>• Describe the process of pollination.</li> <li>• Describe the differences between wind-pollinated and insect-pollinated plants.</li> <li>• Use appropriate techniques to dissect a flower into its main parts.</li> <li>• Describe the process of fertilisation in plants.</li> <li>• Describe how seeds and fruits are formed.</li> </ul>	
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		<ul style="list-style-type: none"> <li>• Make and record observations in a table with clear headings and units, using data to calculate percentage germination.</li> <li>• State the ways seeds can be dispersed.</li> <li>• Describe how a seed is adapted to its method of dispersal.</li> <li>• - Plan a simple experiment to test one hypothesis about seed dispersal, identifying a range of variables.</li> </ul>	
Particles and their behaviour	<p>The particle model</p> <p>States of matter</p> <p>Melting and freezing</p> <p>Boiling</p> <p>More changes of state</p> <p>Diffusion</p> <p>Gas pressure</p>	<ul style="list-style-type: none"> <li>• Describe how materials are made up of particles.</li> <li>• Use the particle model to explain why different materials have different properties.</li> <li>• Use the particle model to explain how building brick models are representing common substances.</li> <li>• Describe the properties of a substance in its three states.</li> <li>• Use ideas about particles to explain the properties of a substance in its three states.</li> <li>• Use observations to decide if substances are solids, liquids, or gases.</li> <li>• Use the particle model to explain changes of state involving solids and liquids.</li> <li>• Interpret data about melting points.</li> <li>• Use cooling data to decide the melting point of stearic acid. <ul style="list-style-type: none"> <li>○ Use the particle model to explain boiling.</li> <li>○ Interpret data about changes of state.</li> </ul> </li> </ul>	<p>Separation technique Year 8</p> <p>Links to Useful chemical products, year 10.</p> <p>How polluted is the environment, Year 11.</p> <p>Principles of applied science.</p>

		<ul style="list-style-type: none"> <li>○ Select data and information about boiling points and use them to contribute to conclusions.</li> <li>○ Describe changes of state involving gases.</li> <li>○ Use the particle model to explain evaporation, condensation, and sublimation.</li> <li>○ Explain how the practical procedure can be kept fair to ensure valid results.</li> <li>○ Use the particle model to explain diffusion.</li> <li>○ Describe evidence for diffusion.</li> <li>○ Identify variables that need to be kept constant when investigating the rates of diffusion of <math>\text{KMnO}_4</math>.</li> <li>○ Use the particle model to explain gas pressure.</li> <li>○ Describe the factors that affect gas pressure.</li> </ul> <ul style="list-style-type: none"> <li>● - Collect, analyse, and interpret primary data to provide evidence for gas pressure.</li> </ul>	
Chemical Reactions	<p>Chemical reactions</p> <p>Word equations</p> <p>Burning fuels</p>	<ul style="list-style-type: none"> <li>○ Describe what happens to atoms in chemical reactions.</li> <li>○ Explain why chemical reactions are useful.</li> <li>○ Compare chemical reactions to physical changes.</li> <li>○ Identify chemical and physical reactions</li> </ul>	<p>Separation technique, Metals and Acids. Year 8</p> <p>Links to Useful chemical products, year 10.</p> <p>How polluted is the environment, Year 11.</p> <p>Principles of applied science.</p>

	<p>Thermal decomposition</p> <p>Conservation of mass</p> <p>Exothermic and endothermic</p>	<p>from practical observations.</p> <ul style="list-style-type: none"> <li>○ Identify reactants and products in word equations.</li> <li>○ Write word equations to represent chemical reactions.</li> <li>○ Represent practical observations using word equations.</li> <li>○ Predict products of combustion reactions.</li> <li>○ Categorise oxidation reactions as useful or not.</li> <li>○ Suggest an improvement to the practical procedure to improve on the accuracy of the results obtained.</li> <li>○ Identify decomposition reactions from word equations.</li> <li>○ Use a pattern to predict products of decomposition reactions.</li> <li>○ Use practical results to decide which compound decomposes most readily.</li> <li>○ Explain conservation of mass in chemical reactions.</li> </ul>	
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		<ul style="list-style-type: none"> <li>○ Calculate masses of reactants and products.</li> <li>○ Make a conclusion from data based on the idea of conservation of mass.</li> <li>○ Describe the characteristics of exothermic and endothermic changes.</li> <li>○ Classify changes as exothermic or endothermic.</li> </ul> <ul style="list-style-type: none"> <li>● - Calculate the temperature change and make a conclusion in a range of familiar exothermic and endothermic changes.</li> </ul>	
Forces	<p>Introduction to forces</p> <p>Squashing and stretching</p> <p>Drag forces and friction</p> <p>Forces at a distance</p> <p>Balanced and unbalanced</p>	<ul style="list-style-type: none"> <li>● Explain what forces do.</li> <li>● Describe what is meant by an interaction pair</li> <li>● Make predictions about forces in familiar situations.</li> <li>● Describe how forces deform objects.</li> <li>● Explain how solid surfaces provide a support force.</li> <li>● Use Hooke's Law.</li> <li>● Present data on a graph, and identify a quantitative relationship in the pattern.</li> <li>● Describe the effect of drag forces and friction.</li> <li>● Explain why drag forces and friction arise.</li> <li>● Plan and carry out an experiment to investigate friction, selecting suitable equipment.</li> <li>● Describe the effects of a field.</li> </ul>	<p>Electricity and magnetism, Motion and Pressure Year 8</p> <p>Links to green electricity year 10.</p> <p>Principles of applied science.</p>

		<ul style="list-style-type: none"> <li>Describe the effect of gravitational forces on Earth and in space.</li> <li>Present results in a simple table.</li> <li>Describe the difference between balanced and unbalanced forces.</li> <li>Describe situations that are in equilibrium.</li> <li>Explain why the speed or direction of motion of objects can change.</li> <li>Present observations in a table including force arrow drawings.</li> </ul>	
Waves and Sound	<p>Waves</p> <p>Sound and energy transfer</p> <p>Loudness and pitch</p> <p>Detecting sound</p> <p>Echoes and ultrasound</p> <p>Light</p> <p>Reflection</p> <p>Refraction</p> <p>The eye and the camera</p>	<ul style="list-style-type: none"> <li>Describe the different types of wave and their features.</li> <li>Describe what happens when water waves hit a barrier.</li> <li>Describe what happens when waves superpose.</li> <li>Identify patterns in observations from wave experiments.</li> <li>Describe how sound is produced and travels.</li> <li>Explain why the speed of sound is different in different materials.</li> <li>Contrast the speed of sound and the speed of light.</li> <li>Compare the time for sound to travel in different materials using data given.</li> <li>Describe the link between loudness and amplitude.</li> <li>Describe the link between frequency and pitch.</li> </ul>	<p>Energy, Year 8.</p> <p>Unit 1 principles of applied science Year 10.</p> <p>Final frontier year 9</p>

	Colour	<ul style="list-style-type: none"> <li>• State the range of human hearing and describe how it differs from the ranges of hearing in animals.</li> <li>• Explain how sounds will differ in different situations.</li> <li>• Describe how the ear works.</li> <li>• Describe how your hearing can be damaged.</li> <li>• Describe how a microphone detects sound.</li> <li>• Explain some risks of loud music.</li> <li>• Describe what ultrasound is.</li> <li>• Describe some uses of ultrasound.</li> <li>• Explain, with reasons, why animals use echolocation.</li> <li>• Describe what happens when light interacts with materials.</li> <li>• State the speed of light.</li> <li>• Compare results with other groups, suggesting reasons for differences.</li> <li>• Explain how images are formed in a plane mirror.</li> <li>• Explain the difference between specular reflection and diffuse scattering.</li> <li>• Use appropriate equipment and take readings safely without help.</li> <li>• Describe and explain what happens when light is refracted.</li> <li>• Describe what happens when light travels through a lens.</li> <li>• Record observation using a labelled diagram.</li> </ul>	
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		<ul style="list-style-type: none"> <li>• Describe how the eye works.</li> <li>• Describe how a simple camera forms an image.</li> <li>• Choose suitable materials to make models of the eye and the camera.</li> <li>• Explain what happens when light passes through a prism.</li> <li>• Describe how primary colours add to make secondary colours.</li> <li>• Explain how filters and coloured materials subtract light.</li> <li>• Predict the colour of object in red light and the colour of light through different filters.</li> </ul>	
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#### **How you will be assessed:**

You will be constantly assessed throughout the year with regular verbal and written feedback.

Each unit will end with a summative assessment in the form of a test, to assess knowledge or a practical task to assess knowledge and skills.

#### **How parents / carers can help:**

Provide your child with a quiet place to do home learning and revision

#### **Useful website and details of course books:**

<http://www.bbc.co.uk/education/subjects/zng4d2p>

#### **Progression routes and career opportunities: BTEC Principles of Applied Science**

#### **Who to contact and how if you have a query regarding your child:**

<b>Name</b>	<b>Position</b>	<b>Email Address</b>	<b>Telephone</b>
<b>Mr K.Mukherji</b>	<b>Science Co-ordinator</b>	<b>kmukherji@haileyhall.herts.sch.uk</b>	<b>01992 465208</b>
<b>Mr</b>	<b>Deputy head</b>	<b>@haileyhall.herts.sch.uk</b>	<b>01992 465208</b>

## Year 8 Science

### Why this subject is important:

The study of science fires pupils' curiosity about the world and helps them to find explanations. It links practical experience with scientific ideas. Pupils learn that science enhances knowledge and

understanding in science is rooted in evidence. Pupils discover how science and technology affects industry, business and medicine and how science improves the quality of life. Pupils appreciate science worldwide and discover how it relates to their own culture.

Pupils also gain confidence to question and discuss issues that may affect their own lives, their immediate community and the world.

### Intent: What you will learn:

Unit name	Topics	Skills and understanding	Curriculum links
Adaptation and inheritance	<p>Competition and adaptation</p> <p>Adapting to change</p> <p>Variation</p> <p>Continuous and discontinuous variation</p> <p>Inheritance</p> <p>Natural selection</p> <p>Extinction</p>	<ul style="list-style-type: none"> <li>Describe some resources that plants and animals compete for.</li> <li>Describe how organisms are adapted to their environments.</li> <li>Describe how organisms adapt to environmental changes.</li> <li>Describe how competition can lead to adaptation.</li> <li>Interpret secondary data to describe trends and draw simple conclusions about predator-prey relationships.</li> <li>Describe how variation in species occurs.</li> <li>Describe the difference between environmental and inherited variation.</li> <li>Record and categorise observations of variations between different species of gull.</li> <li>Describe the difference between continuous and discontinuous variation.</li> </ul>	<p>Links to Principle of applied science unit 1, year 10.</p> <p>Survival in the genes, year 10.</p>

		<ul style="list-style-type: none"> <li>• Represent variation within a species using graphs.</li> <li>• Record results in a table and plot a histogram.</li> <li>• Describe how characteristics are inherited.</li> <li>• Describe how scientists worked together to develop the DNA model.</li> <li>• Describe that one team of scientists built on earlier work of another team in the discovery of DNA structure.</li> <li>• Describe the process of natural selection.</li> <li>• Describe how organisms evolve over time.</li> <li>• Create an evolutionary family tree, giving justification for the route chosen in the tree.</li> <li>• Describe some factors that may lead to extinction.</li> <li>• Describe the purpose of gene banks.</li> <li>• Interpret evidence provided in scientific texts to explain the most likely theory for dinosaur extinction.</li> </ul>	
Ecosystem processes	Photosynthesis Leaves Plant minerals Chemosynthesis Aerobic respiration Anaerobic respiration	<ul style="list-style-type: none"> <li>• Describe the process of photosynthesis.</li> <li>• State the word equation for photosynthesis.</li> <li>• Carry out and record observations for an experiment to test for the presence of starch in a leaf.</li> <li>• Describe the structure and function of the main components of a leaf.</li> </ul>	Links to BTEC unit 1 principles of applied science. Affecting the environment, year 9. Survival in the gene's year 10. How pollute is the environment year 11.

	<p>Food chains and webs</p> <p>Disruption to food chains and webs</p> <p>Ecosystems</p>	<ul style="list-style-type: none"> <li>• Explain the distribution of the chloroplasts in a leaf.</li> <li>• Make observations of stomata from the underside of the leaf, and record observations as a labelled diagram.</li> <li>• Describe how a plant uses minerals for healthy growth.</li> <li>• Explain the role of nitrates in plant growth.</li> <li>• Record measurements in a table, and calculate arithmetic means of results.</li> <li>• Describe where chemosynthesis takes place.</li> <li>• Describe the process of chemosynthesis.</li> <li>• Describe how the view of chemosynthesis by the scientific community changed with time.</li> <li>• State the word equation for aerobic respiration.</li> <li>• Describe the process of respiration.</li> <li>• Plan an investigation to measure the effect of exercise on breathing rates.</li> <li>• State the word equation for anaerobic respiration.</li> <li>• Describe the differences between aerobic and anaerobic respiration.</li> <li>• Evaluate data collected, suggesting possible sources of error.</li> </ul>	
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		<ul style="list-style-type: none"> <li>• Describe what food chains show.</li> <li>• Describe what food webs show.</li> <li>• Describe the interdependence of organisms.</li> <li>• Describe how toxic materials can accumulate in a food web.</li> <li>• Present population data as a graph to describe trends and draw conclusions.</li> <li>• Describe how different organisms co-exist within an ecosystem.</li> <li>• Identify niches within an ecosystem.</li> <li>• Use quadrats to take measurements in an ecosystem, describing trends observed.</li> </ul>	
Health and lifestyle	<p>Nutrients</p> <p>Food tests</p> <p>Unhealthy diet</p> <p>Digestive system</p> <p>Bacteria and enzymes in digestion</p> <p>Drugs</p> <p>Alcohol</p> <p>Smoking</p>	<ul style="list-style-type: none"> <li>• Describe the components of a healthy diet.</li> <li>• Explain the role of each nutrient in the body.</li> <li>• Interpret nutritional information on food packaging to identify a healthy food.</li> <li>• Describe how to test foods for starch, lipids, sugar, and protein.</li> <li>• Describe the positive result for each food test.</li> <li>• Use appropriate techniques to carry out a range of food tests safely.</li> </ul>	<p>Links to BTEC unit 1 principles of applied science.</p> <p>Prevention and cure year 11.</p>



		<ul style="list-style-type: none"><li>• Describe some health issues caused by an unhealthy diet.</li><li>• Calculate the energy requirements of different people.</li><li>• Collect experimental data and draw conclusions from results obtained.</li><li>• Describe the structure and function of the main parts of the digestive system.</li><li>• Describe the process of digestion.</li><li>• Give a structured account of digestion using information gathered by research.</li><li>• Describe the role of enzymes in digestion.</li><li>• Describe the role of bacteria in digestion.</li><li>• Record experimental data using a suitable results table.</li><li>• Describe the difference between recreational and medicinal drugs.</li><li>• Describe the effects of drugs on health and behaviour.</li><li>• Interpret experimental observations to draw simple conclusions.</li><li>• Describe the effect of alcohol on health and behaviour.</li><li>• Describe the effect alcohol has on conception and pregnancy.</li></ul>	
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		<ul style="list-style-type: none"> <li>• Design a results table and plot subsequent experimental data on an appropriate graph.</li> <li>• Describe the effects of tobacco smoke on health.</li> <li>• Describe the effects of tobacco smoke on pregnancy.</li> <li>• Present secondary data using an appropriate method, interpreting this data to draw conclusions.</li> </ul>	
Separation techniques	Mixtures Solutions Solubility Filtration Evaporation and distillation Chromatography	<ul style="list-style-type: none"> <li>• Describe particle arrangements in mixtures.</li> <li>• Explain how to identify pure substances.</li> <li>• Select appropriate separation techniques for different mixtures.</li> <li>• Describe solutions using key words.</li> <li>• Use the particle model to explain dissolving.</li> <li>• Use data to predict how much solute is dissolved in a solution or the mass of a solution.</li> <li>• Explain what a saturated solution is.</li> <li>• Explain the meaning of solubility.</li> <li>• Plan an investigation to compare solubility with temperature, considering variables.</li> <li>• Explain how filtration works.               <ul style="list-style-type: none"> <li>◦ Describe how to filter a mixture.</li> </ul> </li> <li>• Label a diagram of apparatus used for filtration</li> </ul>	Links to BTEC unit 1 principles of applied science, Year 9, chemical reactivity and bonding, controlling industrial reactions. Year 10, useful chemical products.

		<p>to show where the filtrate and residue are found.</p> <ul style="list-style-type: none"> <li>• Explain how to use evaporation to separate mixtures.</li> <li>• Explain how distillation works.</li> <li>• Explain observations made during distillation of inky water.</li> <li>• Explain how chromatography separates mixtures.</li> <li>• Analyse chromatograms to identify substances in mixtures.</li> <li>• Explain how a chromatogram can be used to identify a suspect's pen.</li> </ul>	
Metals and Acids	<p>Acids and metals</p> <p>Metals and oxygen</p> <p>Metals and water</p> <p>Metal displacement reactions</p> <p>Extracting metals</p> <p>Ceramics</p> <p>Polymers</p> <p>Composites</p>	<ul style="list-style-type: none"> <li>• Compare the reactions of different metals with dilute acids.</li> <li>• Explain the test for hydrogen gas.</li> <li>• Decide which metals react more vigorously from practical observations.</li> <li>• Compare the reactions of different metals with oxygen.</li> <li>• Use state symbols in balanced formula equations.</li> <li>• Rank metals in order of how vigorously they react with oxygen.</li> <li>• Compare the reactions of metals with water.</li> <li>• Use the reactivity series to predict reactions.</li> </ul>	<p>Links to BTEC, Useful chemical products.</p> <p>Principles of applied science.</p> <p>Chemical reactivity and bonding year 9.</p> <p>Year 10 useful chemical products.</p>

		<ul style="list-style-type: none"><li>• Plan a practical to compare the reactivity of three metals.</li><li>• Predict if a given pair of substances will undergo displacement.</li><li>• Use the reactivity series to explain displacement reactions.</li><li>• Predict which combinations of metals and metal compounds will lead to displacement reactions.</li><li>• Use the reactivity series to decide which metals can be extracted from their ores by heating with carbon.</li><li>• Calculate the amounts of metals in ores.</li><li>• Link an example of metal extraction to knowledge of the reactivity series.</li><li>• Explain ceramic properties.</li><li>• Explain why properties of ceramics make them suitable for their uses.</li><li>• Plan a method for comparing the strength of ceramic materials, identifying the variables that need to be controlled.</li><li>• Describe polymer properties.</li><li>• Explain how polymer properties make them suitable for their uses.</li><li>• Interpret data on polymers to decide on the best polymer for a given purpose, justifying the choice.</li></ul>	
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		<ul style="list-style-type: none"> <li>• Describe composite properties.</li> <li>• Explain why composite properties make them suitable for their uses.</li> <li>• State the relationship shown on a graph of composite strengths.</li> </ul>	
The Earth	<p>The Earth and its atmosphere</p> <p>Sedimentary rocks</p> <p>Igneous and metamorphic rocks</p> <p>The rock cycle</p> <p>The carbon cycle</p> <p>Climate change</p> <p>Recycling</p>	<ul style="list-style-type: none"> <li>• Describe properties of the different layers of the Earth's structure</li> <li>• Describe the composition of the atmosphere</li> <li>• Describe advantages and disadvantages of a given model of the Earth's structure</li> <li>• Explain two properties of sedimentary rocks</li> <li>• Explain how sedimentary rocks are made</li> <li>• Describe how models are representing sedimentary rock formation processes</li> <li>• Compare the ways that igneous and metamorphic rocks form</li> <li>• Explain how igneous and metamorphic rocks form</li> <li>• Predict observations when a substance representing lava is cooled at different temperatures</li> <li>• Use the rock cycle to explain how the material in rocks is recycled</li> <li>• Describe how changes in the wax used to represent a rock represent the real rock cycle</li> </ul>	<p>Link to BTEC, Affecting the environment year 9. Green electrical year 10. How polluted is the environment year 11.</p>

		<ul style="list-style-type: none"> <li>• Explain why the concentration of carbon dioxide in the atmosphere did not change for many years</li> <li>• Use the carbon cycle to identify reservoirs of carbon</li> <li>• Explain why global warming happens</li> <li>• Explain some impacts of global warming</li> <li>• Design a model to represent global warming, and describe how it represents the real situation</li> <li>• Explain how aluminium is recycled</li> <li>• Analyse the advantages and disadvantages of recycling</li> <li>• Plot a bar chart of recycling rates for two towns</li> </ul>	
Electricity and magnetism	<p>Charging up</p> <p>Circuits and current</p> <p>Potential difference</p> <p>Series and parallel</p> <p>Resistance</p> <p>Magnets and magnetic fields</p> <p>Electromagnets</p> <p>Using electromagnets</p>	<ul style="list-style-type: none"> <li>• Explain how objects can become charged.</li> <li>• Describe how charged objects interact.</li> <li>• Describe what is meant by an electric field.</li> <li>• Interpret observations, identifying patterns linked to charge.</li> <li>• Describe what is meant by current.</li> <li>• Describe how to measure current.</li> <li>• Set up a circuit including an ammeter to measure current.</li> <li>• Describe what is meant by potential difference.</li> </ul>	Links to BTEC, Principles of applied science. Green Electricity, year 10. Ionising radiation year 11.

		<ul style="list-style-type: none"><li>• Describe how to measure potential difference.</li><li>• Describe what is meant by the rating of a battery or bulb.</li><li>• Set up a simple circuit and use appropriate equipment to measure potential difference.</li><li>• Describe the difference between series and parallel circuits.</li><li>• Describe how current and potential differences vary in series and parallel circuits.</li><li>• Identify the pattern of current and potential difference in series and parallel circuits.</li><li>• Describe what is meant by resistance.</li><li>• Calculate resistance of a component and of a circuit.</li><li>• Describe the difference between conductors and insulators in terms of resistance.</li><li>• Identify independent, dependent, and control variables.</li><li>• Describe how magnets interact.</li><li>• Describe how to represent magnetic fields.</li><li>• Describe the Earth's magnetic field.</li><li>• Draw field lines round a magnet in detail.</li></ul>	
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		<ul style="list-style-type: none"> <li>• Describe how to make an electromagnet.</li> <li>• Describe how to change the strength of an electromagnet.</li> <li>• Predict and test the effect of changes to an electromagnet.</li> <li>• Describe some uses of electromagnets.</li> <li>• Describe how a simple motor works.</li> <li>• From your experiment, pose scientific questions to be investigated.</li> </ul>	
Energy	<p>Food and fuels</p> <p>Energy adds up</p> <p>Energy and temperature</p> <p>Energy transfer: particles</p> <p>Energy transfer: radiation</p> <p>Energy resources</p> <p>Energy and power</p> <p>Work, energy, and machines</p>	<ul style="list-style-type: none"> <li>• Compare the energy values of food and fuels.</li> <li>• Compare the energy in food and fuels with the energy needed for different activities.</li> <li>• Explain data on food intake and energy requirements for a range of activities.</li> <li>• Describe energy before and after a change.</li> <li>• Explain what brings about transfers in energy.</li> <li>• Present observations of energy transfers in a table.</li> <li>• State the difference between energy and temperature.</li> <li>• Describe what happens when you heat up solids, liquids, and gases.</li> <li>• Explain what is meant by equilibrium.</li> </ul>	<p>Links to BTEC Unit 1 principles of science.</p> <p>Green electricity year 10. Ionising radiation year 11.</p>



		<ul style="list-style-type: none"><li>• Describe how to reduce error in experimental apparatus.</li><li>• Describe how energy is transferred by particles in conduction and convection.</li><li>• Describe how an insulator can reduce energy transfer.</li><li>• Describe the pattern in conduction shown by results, using numerical data to inform a conclusion.</li><li>• Describe some sources of infrared radiation.</li><li>• Explain how energy is transferred by radiation.</li><li>• Identify risks and explain why it is important to reduce them.</li><li>• Describe the difference between a renewable and a non-renewable energy resource.</li><li>• Describe how electricity is generated in a power station.</li><li>• Choose an appropriate source of secondary information.</li><li>• Explain the difference between energy and power.</li><li>• Describe the link between power, fuel use, and cost of using domestic appliances.</li><li>• Predict the power requirements of different equipment and how much it costs to use.</li><li>• Calculate work done.</li></ul>	
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		<ul style="list-style-type: none"> <li>• Apply the conservation of energy to simple machines.</li> <li>• Evaluate results from the practical.</li> </ul>	
Motion and Pressure	<p>Speed</p> <p>Motion graphs</p> <p>Pressure in gases</p> <p>Pressure in liquids</p> <p>Pressure on solids</p> <p>Turning forces</p>	<ul style="list-style-type: none"> <li>• Calculate speed using the speed equation.</li> <li>• Describe relative motion.</li> <li>• Choose equipment to make appropriate measurements for time and distance to calculate speed.</li> <li>• Interpret distance–time graphs.</li> <li>• Calculate speed from a distance time graph.</li> <li>• Plot data on a distance time graph accurately.</li> <li>• Describe the factors that affect gas pressure.</li> <li>• Describe how atmospheric pressure changes with height.</li> <li>• Interpret observations of atmospheric pressure.</li> <li>• Describe how liquid pressure changes with depth.</li> <li>• Explain why some things float and some things sink, using force diagrams.</li> <li>• Predict how water pressure changes in a familiar context, using scientific knowledge and understanding.</li> <li>• Calculate pressure.</li> <li>• Apply ideas of pressure to different situations.</li> </ul>	<p>Links to BTEC Unit 1 principles of science. Chemical reactivity and bonding, controlling industrial reactions, year 9.</p>

		<ul style="list-style-type: none"> <li>• Predict quantitatively the effect of changing area and/or force on pressure.</li> <li>• Describe what is meant by a 'moments'.</li> <li>• Calculate the moment of a force.</li> <li>• Independently identify scientific questions from results.</li> </ul>	
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### How you will be assessed:

You will be constantly formatively assessed throughout the year with regular verbal and written feedback.

Each unit will end with a summative assessment in the form of a test, to assess knowledge and/or a practical task to assess knowledge and skills.

### How parents / carers can help:

Provide your child with a quiet place to do home learning and revision

### Useful website and details of course books:

<http://www.bbc.co.uk/education/subjects/zng4d2p>

### Progression routes and career opportunities: BTEC Principles of Applied Science

### Who to contact and how if you have a query regarding your child:

Name	Position	Email Address	Telephone
Mr K.Mukherji	Science Co-ordinator	<a href="mailto:kmukherji@haileyhall.herts.sch.uk">kmukherji@haileyhall.herts.sch.uk</a>	01992 465208

## Year 9 Science

### Why this subject is important:

The study of science fires pupils' curiosity about the world and helps them to find explanations. It links practical experience with scientific ideas. Pupils learn that science enhances





Energy and our Universe	Green Electricity	Universe and our Solar System. <ul style="list-style-type: none"> <li>• Evaluate the evidence leading to the Big Bang theory of how the Universe was formed.</li> <li>• Explain how evidence shows that the Universe is changing.</li> <li>• Identify evidence that shows the dynamic nature of the Universe.</li> </ul>	
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**How you will be assessed:**

Your coursework will be continually assessed against the criteria throughout the year.

**The final (BTEC) grade is calculated in the following way:**

75% of the course is assessed by the submission of a portfolio of evidence of work carried out over a period of time. The course is continuously assessed by the external completion of assignments throughout the year.

25% of the course is assessed with an external examination.

**How parents / carers can help:**

Provide them with a quiet place to do home learning and revision

**Useful website and details of course books:**

<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa>  
[www.samlearning.com](http://www.samlearning.com)

**Progression routes and career opportunities**

Astrophysicist  
Environmental chemist

**Who to contact and how if you have a query regarding your child:**

Name	Position	Email Address	Telephone
Mr Kmukherji	Science Co-ordinator	kmukherji@ <a href="mailto:kmukherji@haileyhall.herts.sch.uk">haileyhall.herts.sch.uk</a>	01992 465208

## Year 10 Science

### Why this subject is important:

The study of science fires pupils' curiosity about the world and helps them to find explanations. It links practical experience with scientific ideas. Pupils learn that science enhances knowledge and understanding in science is rooted in evidence. Pupils discover how science and technology affects industry, business and medicine and how science improves the quality of life. Pupils appreciate science worldwide and discover how it relates to their own culture. Pupils also gain confidence to question and discuss issues that may affect their own lives, their immediate community and the world.

### What you will learn:

Unit name	Topics	Skills and understanding	Skills Curriculum links
Principles of Science	Biology	<ul style="list-style-type: none"> <li>• Cells</li> <li>• Organs</li> <li>• DNA and chromosomes</li> <li>• Inheritance</li> <li>• Homeostasis</li> <li>• Nervous System</li> </ul>	Links to Useful Chemical Products, Green Electricity, Survival in the gene.
	Chemistry	<ul style="list-style-type: none"> <li>• Atomic Structure</li> <li>• Isotopes</li> <li>• Periodic Table</li> <li>• Electron Configuration</li> <li>• Elements and compounds</li> <li>• Neutralisation</li> <li>• Acids and Salts</li> <li>• Acids and Metals</li> </ul>	
	Physics	<ul style="list-style-type: none"> <li>• Energy</li> </ul>	
Chemistry and our Earth	Useful Chemical Products	<ul style="list-style-type: none"> <li>• Transformations</li> <li>• Transfer</li> <li>• Renewable energy</li> <li>• Electromagnetic spectrum</li> <li>• Describe how chemical substances are used based on their physical properties</li> </ul>	How Polluted Is The Environment?





Biology and our Environment		<ul style="list-style-type: none"> <li>• Describe the role of genes and the environment in variation.</li> <li>• Explain the role of genes and the environment in evolution.</li> <li>• Evaluate the impact of genes and the environment on the survival or extinction of organisms.</li> </ul>	Prevention Or Cure
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### How you will be assessed:

Your coursework will be continually assessed against the criteria throughout the year.

### The final (BTEC) grade is calculated in the following way:

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25% of the course is assessed with an external examination.

### How parents / carers can help:

Provide them with a quiet place to do homework and revision

### Useful website and details of course books:

<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa>  
[www.samlearning.com](http://www.samlearning.com)

### Progression routes and career opportunities:

Electrician  
Geneticist

### Who to contact and how if you have a query regarding your child:

Name	Position	Email Address	Telephone
Mr Kmukherji	Science Co-ordinator	kmukherji@haileyhall.herts.sch.uk	01992 465208

## YEAR: 11 Science

### Why this subject is important:

The study of science fires pupils' curiosity about the world and helps them to find explanations. It links practical experience with scientific ideas. Pupils learn that science enhances knowledge and understanding in science is rooted in evidence. Pupils discover how science and technology affects industry, business and medicine and how science improves the quality of life. Pupils appreciate science worldwide and discover how it relates to their own culture.

Pupils also gain confidence to question and discuss issues that may affect their own lives, their immediate community and the world.

### What you will learn:

Unit name	Topics	Skills and understanding	Skills Curriculum links
Biology and our Environment	How Polluted Is The Environment?  Prevention Or Cure	<ul style="list-style-type: none"><li>• Describe how living and non-living indicators can be used to measure levels of pollutants.</li><li>• Describe the impact that different human activities have on ecosystems.</li><li>• Analyse the effects of pollutants on ecosystems</li><li>• Explain the long-term effects of pollutants on living organisms and ecosystems.</li><li>• Describe the different methods used to help reduce the impact of human activities on ecosystems.</li><li>• Discuss the advantages and disadvantages of methods used to reduce the impact of human activity on ecosystems.</li><li>• Evaluate the success of methods to reduce the impact</li></ul>	Progression into A Level Sciences or level 3 BTEC Science. Links to Unit 1 principles of Science.

<p>Biology and our Environment</p>		<p>of human activity on an ecosystem, for a given scenario.</p> <ul style="list-style-type: none"> <li>• Describe how lifestyle choices can affect human health.</li> <li>• Describe how pathogens affect human health.</li> <li>• Describe two different treatment regimes: one used to <i>prevent</i> a disease and one used to <i>treat</i> a disease.</li> <li>• Discuss the advantages and disadvantages of vaccination programmes.</li> <li>• Explain the use of pedigree analysis.</li> <li>• Explain how bacteria can become resistant to antibiotics.</li> <li>• Evaluate the use of antibiotics, pedigree analysis and vaccination programmes in the treatment and prevention of childhood illnesses.</li> </ul>	<p>Progression into A Level Sciences or level 3 BTEC Science. Links to Unit 1 principles of Science.</p>
<p>Energy and Our Universe</p>	<p>Ionising Radiation</p>	<ul style="list-style-type: none"> <li>• Describe half-life in terms of radioactive decay.</li> <li>• Describe the different types of ionising radiation.</li> <li>• Use graphs to explain radioactive decay and half-life.</li> <li>• Calculate the half-life of radioactive isotopes.</li> <li>• Describe the problems associated with the use of radioactive isotopes.</li> </ul>	<p>Progression into A Level Sciences or level 3 BTEC Science. Links to Unit 1 principles of Science.</p>

		<ul style="list-style-type: none"> <li>• Compare the benefits and drawbacks of using radioactive isotopes in the home or workplace.</li> <li>• Justify the selection of a radioactive isotope for a given use within the home or workplace.</li> </ul>	
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### How you will be assessed:

Your coursework will be continually assessed against the criteria throughout the **year**.

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<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa>  
[www.samlearning.com](http://www.samlearning.com)

### Progression routes and career opportunities:

Radiologist  
Nurse  
Environmental Chemist

### Who to contact and how if you have a query regarding your child:

Name	Position	Email Address	Telephone
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