



HAILEY HALL SCHOOL

Believe | Strive | Achieve

Hailey Hall School Curriculum Map for KS3 and KS4 Science

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 an 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 curiosity and 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 regard 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 a 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 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.

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.

Year 7 Science

What you will learn:

| Unit name | Topics | Skills and understanding | Curriculum links |
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| Working scientifically | Asking scientific questions | Gain an understanding of how to ask scientific questions and develop hypothesis for an experiment | The skills developed in these lessons will help going forward in different practical lessons. This in turn will aid pupil's when it comes to their BTEC Course, particularly in the 'Controlling industrial reaction' unit. |
| | Planning investigations | Develop the necessary skills to plan an experiment and consider the methods, apparatus and the safety factors involved in an experiment | |
| | Recording data | Conduct an experiment and record data on the experiment planned | |
| | Analysing data | Develop and understanding of the steps which need to be taken to analyse data and determine if your data is both reliable and accurate. | |
| | Evaluating data | Understand which graph and/or charts suitable for different experiments and come to conclusions using the data gathered. | |
| Cells | Observing cells | Develop and understanding of how to operate a microscope and use it to observe cells and other microscopic objects | The understanding gained in these lessons will be vital for further lessons when using microscopes independent. |

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| | Plant and animal cells | Understand and compare the structure of an animal and plant cell, using this understanding compare the two different cells and identify similarities and differences. | The topics covered and learnt here will help you when it comes to your Unit 1 exam in BTEC science. |
| | Specialised cells | Identify and state the different specialised cells to allow pupils to then explain what features make the cells specialised for their roles and how the features help the cell achieve their role in the body more effectively | |
| | Movement of substances | Identify and describe how substances move throughout cells, this will then help support further learning on levels of organisation and help develop and understand of how the body works as a system | |
| | Unicellular organisms | Identify unicellular organisms and compare these cells with eukaryotic cells. This will further highlight how cells work together in eukaryotic cells and illustrate the complexity of eukaryotic cells compared to single cell organisms. | |
| Structure and function of body systems | Levels of organisation | Develop an understanding in the levels of organisation to be able to state examples of tissues, organs and organ systems. To then be able to describe how the organ systems work together to enable organisms to survive. | The skills learn here will be used later in your Biology Units in your BTEC science in years 10/11 |
| | Gas Exchange and Breathing | Describe the structure of the gas exchange system. And how parts of the gas exchange system are adapted to their function. Using this understanding to Interpret data given to compare the difference in the composition of inhaled and exhaled air, whilst describe the processes of inhaling and exhaling by using a bell jar can be used to model what happens during breathing. | The topics covered and learnt here will help you when it comes to your Unit 1 exam in BTEC science. |
| | Skeleton and Movement: joints | To describe the structure of the skeleton and describe the functions of the skeletal | The topics covered and learnt here will help you when it comes to your Unit 1 exam in BTEC science. |

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| | | system. Gain an understanding of joints in movement. | |
| | Movement: muscles | To explain how to measure the force exerted by different muscles and carry out an experiment to make and record measurements of forces using the correct units. Develop an understanding of the function of major muscle groups and explain how antagonistic muscles cause movement. | The topics covered and learnt here will help you when it comes to your Unit 1 exam in BTEC science. |
| Reproduction | Adolescence | State the difference between adolescence and puberty and describe the main changes that take place during puberty. Using this understanding then interpret observations given, to categorise the changes during adolescence. | The topics covered here will be necessary life skills which will be needed later in life. |
| | Reproductive systems | Describe the main structures in the male and female reproductive system and describe the function of the main structures in the male and female reproductive systems. Then extract information from text to describe structures and functions of the key parts of the reproductive systems in a table. | |
| | Fertilisation and implantation, Development of a foetus and the menstrual cycle | Describe the structure and function of gametes. Then describe the processes of fertilisation, what happens during gestation and what happens during birth. Finally, state what the menstrual cycle is and describe the main stages in the menstrual cycle and present information in the form of a graphical timeline. | |
| | Flowers and pollination Fertilisation and germination | Identify the main structures of a flower and describe the process of pollination. Then differences between wind-pollinated and insect-pollinated plants and use appropriate techniques to dissect a flower into its main parts. You will then use this understanding to describe the process of fertilisation in plants and describe how seeds and fruits are formed. Finally make and | |

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| | | record observations in a table with clear headings and units, using data to calculate percentage germination. | |
| | Seed dispersal | You will be able to state the ways seeds can be dispersed and describe how a seed is adapted to its method of dispersal. Then plan a simple experiment to test one hypothesis about seed dispersal, identifying a range of variables. | |
| Particles and their behaviour | The particle models. | Describe how materials are made up of particles and use the particle model to explain why different materials have different properties. To then use the particle model to explain how building brick models are representing common substances. | The skills learnt here will be used in your BTEC science, specifically your chemistry and unit 1 exam |
| | States of matter | Describe the three states of matter and explain how the states of matter move from one state to another. Then Identify how the particles would be arranged depending on the state the substance is in. | |
| | States of matter More changes of state | Describe the properties of a substance in its three states and use ideas about particles to explain the properties of a substance in its three states. To then use observations to decide if substances are solids, liquids, or gases and use the particle model to explain changes of state involving solids and liquids. | |
| | Melting and freezing Boiling | Interpret data about melting points and use cooling data to decide the melting point of stearic acid. To use the particle model to explain boiling and interpret data about changes of state, select data and information about boiling points and use them to contribute to conclusions. | The skills learnt here will be used in your BTEC science, specifically your chemistry and unit 1 exam. |
| | Diffusion | Describe changes of state involving gases. Then Use the particle model to explain evaporation, condensation, and sublimation to then explain how the practical procedure | |

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| | | can be kept fair to ensure valid results. | | |
| | Gas pressure | Use the particle model to explain diffusion and describe evidence for diffusion. Then Identify variables that need to be kept constant when investigating the rates of diffusion of KMnO_4 . Finally, to Use the particle model to explain gas pressure and describe the factors that affect gas pressure. | | |
| Elements, atoms and compounds | Elements | Develop an understanding of what an element is, identify a range of different elements and explain how the periodic table relates to elements | The skills learnt here will be used in your BTEC science, specifically your chemistry and unit 1 exam. | |
| | Atoms | Understand that atoms make up everything in the universe and recognise how small atoms are. | | |
| | Compounds | Identify different compounds and state what elements make up well know compounds such as water, carbon dioxide etc. then identify atoms, mixtures and compound by their structure. | | |
| | Chemical formula | State what elements are in a chemical formula using a periodic table as a guide. This will then help support pupils when they look at word equations later in the year. | | |
| Chemical Reactions | Chemical reactions | Describe what happens to atoms in chemical reactions and explain why chemical reactions are useful. Then compare chemical reactions to physical changes and identify chemical and physical reactions from practical observations. | The skills learnt here will be used in your BTEC science, specifically your chemistry and unit 1 exam. | |
| | Word equations | Identify reactants and products in word equations and write word equations to represent chemical reactions. Then represent practical observations using word equations. | | This understanding will be vital in your unit 1 exam |
| | Burning fuels | Predict products of combustion reactions and categorise | | |

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| | | oxidation reactions as useful or not then suggest an improvement to the practical procedure to improve on the accuracy of the results obtained. | |
| | Thermal decomposition | Identify decomposition reactions from word equations and use a pattern to predict products of decomposition reactions and use practical results to decide which compound decomposes most readily. | This understanding will be used in your unit 1 exam and in the chemistry, units covered |
| | Conservation of mass | Explain conservation of mass in chemical reactions then calculate masses of reactants and products and make a conclusion from data based on the idea of conservation of mass. | |
| | Exothermic and endothermic | Describe the characteristics of exothermic and endothermic changes and classify changes as exothermic or endothermic. Then calculate the temperature change and make a conclusion in a range of familiar exothermic and endothermic changes. | |
| Alkali and acids | Acids and alkalis | Identify a range of different alkalis and acids then describe the uses of weak/strong alkali/acids in everyday life. | These skills will be used later in your unit 1 exam for BTEC science |
| | Indicators and pH | Using a pH scale Identify a strong/ weak alkali/acid, then explain how we can see different indicators such as universal indicator to test the pH of different substances. | |
| | Neutralisation | Describe how to neutralise strong acids and alkalis then explain how this understanding could be applied to everyday life | |
| | Making salts | Make salts using evaporation technique then explain the chemical formula and the word equation for making salt. | |
| Forces | Introduction to forces | Explain what forces do and describe what is meant by an interaction pair. Then make predictions about forces in familiar situations. | These skills will be used later in your unit 1 exam for BTEC science |

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| | Squashing and stretching | Describe how forces deform objects and explain how solid surfaces provide a support force by using Hooke's Law. Then present data on a graph and identify a quantitative relationship in the pattern. | |
| | Drag forces and friction. | Describe the effect of drag forces and friction and explain why drag forces and friction arise. Then plan and carry out an experiment to investigate friction, selecting suitable equipment. | These skills will be used later in your unit 1 exam for BTEC science. |
| | Forces at a distance | Describe the effects of a field and the effect of gravitational forces on Earth and in space. Then present results in a simple table. | |
| | Balanced and unbalanced | Describe the difference between balanced and unbalanced forces and describe situations that are in equilibrium. Then explain why the speed or direction of motion of objects can change and present observations in a table including force arrow drawings. | These skills will be used later in your unit 1 exam for BTEC science. |
| Waves, light and Sound | Waves | Describe the different types of wave and their features and what happens when water waves hit a barrier. Then describe what happens when waves superpose and identify patterns in observations from wave experiments. | These skills will be used in your Ionising radiation coursework for BTEC science |
| | Sound and energy transfer | Describe how sound is produced and travels and explain why the speed of sound is different in different materials. Then contrast the speed of sound and the speed of light and compare the time for sound to travel in different materials using data given. | These skills will be used later in your Unit 1 exam. |
| | Loudness and pitch | Describe the link between loudness and amplitude, frequency and pitch and state the range of human hearing and describe how it differs | These skills will be used later in your Unit 1 exam. |

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| | | from the ranges of hearing in animals. | |
| | Detecting sound | Explain how sounds will differ in different situations and describe how the ear works and how your hearing can be damaged. Then describe how a microphone detects sound and explain some risks of loud music. | These skills will be used later in your Unit 1 exam. |
| | Echoes and ultrasound | Describe what ultrasound is describe some uses and explain, with reasons, why animals use echolocation. | These skills will be used later in your Unit 1 exam. |
| | Light, Reflection, Refraction | Describe what happens when light interacts with materials and state the speed of light then compare results with other groups, suggesting reasons for differences. Explain how images are formed in a plane mirror and explain the difference between specular reflection and diffuse scattering. Use appropriate equipment and take readings safely without help and describe what happens when light is refracted. | These skills will be used later in your Unit 1 exam. |
| | The eye and the camera | Describe what happens when light travels through a lens then record observation using a labelled diagram. Then Understand how the eye works and how a simple camera forms an image, using this understanding choose suitable materials to make models of the eye and the camera and explain what happens when light passes through a prism. | These skills will be used later in your Unit 1 exam. |
| | Colour | Describe how primary colours add to make secondary colours and explain how filters and coloured materials subtract light and predict the colour of object in red light and the colour of light through different filters. | These skills will be used later in your Unit 1 exam. |
| Space | The night sky | Identify what structures make up the night sky and state how the night sky changes from | The content covered directly relates to 'The final frontier' |

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| | | night to night and from location to location. Then identify constellations in the night sky and name the most recognisable constellation (big dipper, little dipper etc.) | unit required for your BTEC course. |
| | The solar system | Identify and describe the planets which make up the solar system and name other structures which make up the solar system such as dwarf planets, asteroids and comets. | |
| | The earth | State how the earth was formed and identify some key differences between the earth and other planets in the solar system. | |
| | The moon | State how the moon was formed, recognise the key features of the moon. Then understand the 'space race' identify the first men to the moon and what NASA and other space agencies are doing to get back to the moon. | |

| Name | Position | Email Address | Telephone |
|--------------------|----------------------|------------------------------------|--------------|
| Mr Sean O'Sullivan | Science Co-ordinator | Sosullivan@haileyhall.herts.sch.uk | 01992 465208 |
| Mr Joseph Hunter | Science teacher | Jhunter@haileyhall.herts.sch.uk | 01992 465208 |

Year 8 Science

What you will learn

| Unit name | Topics | Skills and understanding | Curriculum links |
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| Adaptation and inheritance | Competition and adaptation, adapting to change | Describe some resources that plants and animals compete for and how organisms are adapted to their environments/environmental changes. Using this understanding describe how competition can lead to adaptation and interpret secondary data to describe trends and draw simple conclusions about predator-prey relationships. | Skills learnt here will be used in your survival in Genes unit for your BTEC Science coursework. |

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| | Variation, Continuous and discontinuous variation | Describe how variation in species occurs and the difference between environmental and inherited variation. Then record and categorise observations of variations between different species of gull. You will then identify and describe the difference between continuous and discontinuous variation and represent variation within a species using graphs then record results in a table and plot a histogram. | Skills learnt here will be used in your survival in Genes unit for your BTEC Science coursework. |
| | Inheritance | Describe how characteristics are inherited. You will then describe how scientists worked together to develop the DNA model and how one team of scientists built on earlier work of another team in the discovery of DNA structure. | Skills learnt here will be used in your survival in Genes unit for your BTEC Science coursework. |
| | Natural selection and Extinction | Describe the process of natural selection and how organisms evolve over time. Then create an evolutionary family tree, giving justification for the route chosen in the tree. Describe some factors that may lead to extinction and the purpose of gene banks. Using this understanding interpret evidence provided in scientific texts to explain the most likely theory for dinosaur extinction. | Skills learnt here will be used in your survival in Genes unit for your BTEC Science coursework. |
| Ecosystem processes | Photosynthesis | Describe the process of photosynthesis and state the word equation for photosynthesis. Then carry out and record observations for an experiment to test for the presence of starch in a leaf. | The skills you learn here will be used in your unit 1 BTEC Exam for Science |
| | Leaves | Describe the structure and function of the main components of a leaf and explain the distribution of the chloroplasts in a leaf. Then make observations of stomata from the underside of the leaf, | The skills you learn here will be used in your unit 1 BTEC Exam for Science |

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| | | and record observations as a labelled diagram. | |
| | Plant minerals | Describe how a plant uses minerals for healthy growth and explain the role of nitrates in plant growth. Record measurements in a table and calculate arithmetic means of results. | The skills you learn here will be used in your unit 1 BTEC Exam for Science |
| | Chemosynthesis | Describe where chemosynthesis takes place and describe the process of chemosynthesis. Then describe how the view of chemosynthesis by the scientific community changed with time. | The skills you learn here will be used in your unit 1 BTEC Exam for Science |
| | Aerobic respiration and Anaerobic respiration | State the word equation for aerobic respiration/ Anaerobic and describe the process of respiration. Describe the differences between aerobic and anaerobic respiration. Then plan an investigation to measure the effect of exercise on breathing rates and evaluate data collected, suggesting possible sources of error. | The skills you learn here will be used in your unit 1 BTEC Exam for Science |
| | Food chains and webs, Disruption to food chains, webs and Ecosystems | Describe what food chains and food web show. Then describe the interdependence of organisms and how toxic materials can accumulate in a food web. Present population data as a graph to describe trends and draw conclusions. Then describe how different organisms co-exist within an ecosystem. Identify niches within an ecosystem and use quadrats to take measurements in an ecosystem, describing trends observed. | The skills you learn here will be used in your survival in the genes coursework for BTEC science |
| Health and lifestyle | Nutrients | Describe the components of a healthy diet and explain the role of each nutrient in the body. Interpret nutritional information on food packaging. | The skills learnt here will be used in your BTEC unit 1 exam and for later life. |
| | Food tests | Identify a healthy food and describe how to test foods for | |

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| | | starch, lipids, sugar, and protein. Then Describe positive result for each food test and use appropriate techniques to carry out a range of food tests safely. | |
| | Unhealthy diet | Describe some health issues caused by an unhealthy diet and calculate the energy requirements of different people. Then collect experimental data and draw conclusions from results obtained. | The skills learnt here will be used in your BTEC unit 1 exam and for later life. |
| | Digestive system | Describe the structure and function of the main parts of the digestive system and the process of digestion. Using this understanding give a structured account of digestion using information gathered by research. | The skills learnt here will be used in your BTEC unit 1. |
| | Bacteria and enzymes in digestion | Describe the role of enzymes and bacteria in digestion. Then record experimental data using a suitable results table. | |
| | Drugs and Alcohol | Describe the difference between recreational and medicinal drugs. And the effects of drugs on health and behaviour. Using this understanding interpret experimental observations to draw simple conclusions. Then describe the effect of alcohol on health and behaviour and the effect alcohol has on conception and pregnancy. | The skills learnt here will be used in your BTEC unit 1 exam and for later life. |
| | Smoking | Describe the effects of tobacco smoke on health and the effects of tobacco smoke on pregnancy. Then present secondary data using an appropriate method, interpreting this data to draw conclusions. | The skills learnt here will be used in your BTEC unit 1 exam and for later life. |
| The periodic table | Metals and non-metals | Identify where on the periodic table you would find metals and non-metals. Then compare the similarities and differences between metals and non metals and state the | The skills learnt here will be used in your BTEC unit 1 exam and for later life. |

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| | | similarities within metals and non metals | |
| | Groups and periods | Describe how you can use groups and periods to identify different elements and recognise how the elements within a group may have similar properties | |
| | The elements in group 1 | Describe the similarities within group 1 and name the elements within group 1. Then observe group 1 elements reacting with water and state what happens as you go down the group when the elements are reacting with water. | The skills learnt here directly relate to the BTEC unit ' Chemical reactivity and bonding' and will help scaffold the learning later on. |
| | The elements in group 7 | State the elements within group 7 and identify their common name. then describe the common trends within the group. | |
| | The elements in group 0 | State the elements within group 0 and identify their common name. then describe the common trends within the group. | |
| Separation techniques | Mixtures | Describe particle arrangements in mixtures and explain how to identify pure substances. Then select appropriate separation techniques for different mixtures. | The skills learnt here will be used in your Unit 1 exam for BTEC science |
| | Solutions | Describe solutions using key words and use the particle model to explain dissolving. You will then have the skills to use data to predict how much solute is dissolved in a solution or the mass of a solution and explain what a saturated solution is and the meaning of solubility. Once you have this understanding you will plan an investigation to compare solubility with temperature, considering variables. | The skills learnt here will be used in your Unit 1 exam for BTEC science |
| | Solubility, Filtration, Evaporation, and distillation | Explain how filtration works and describe how to filter a mixture. Then label a diagram of apparatus used for filtration to show where the filtrate and residue are found. Explain how to use evaporation to separate mixtures and how distillation works. Then observations made during distillation of inky water | The skills learnt here will be used in your Unit 1 exam for BTEC science |

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| | Chromatography | Explain how chromatography separates mixtures and analyse chromatograms to identify substances in mixtures. To then Explain how a chromatogram can be used to identify a suspect's pen. | The skills learnt here will be used in your Unit 1 exam for BTEC science |
| Metals and Acids | Acids and metals | Compare the reactions of different metals with dilute acids and explain the test for hydrogen gas. With this understanding decide which metals react more vigorously from practical observations. | The skills learnt here will be used in your BTEC science unit 1 exam and your controlling industrial reactions coursework. |
| | Metals and oxygen | Compare the reactions of different metals with oxygen and state symbols in balanced formula equations. Then rank metals in order of how vigorously they react with oxygen. | The skills learnt here will be used in your BTEC science unit 1 exam and your controlling industrial reactions coursework. |
| | Metals and water | Compare the reactions of metals with water and use the reactivity series to predict reactions. With this understanding plan a practical to compare the reactivity of three metals and predict if a given pair of substances will undergo displacement. | The skills learnt here will be used in your BTEC science unit 1 exam and your controlling industrial reactions coursework. |
| | Metal displacement reactions | Use the reactivity series to explain displacement reactions and predict which combinations of metals and metal compounds will lead to displacement reactions. Then Use the reactivity series to decide which metals can be extracted from their ores by heating with carbon. | The skills learnt here will be used in your BTEC science unit 1 exam and your controlling industrial reactions coursework. |
| | Extracting metals | Calculate the amounts of metals in ores and Link an example of metal extraction to knowledge of the reactivity series. | |
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| | Ceramics | Explain ceramic properties and why properties of ceramics make them suitable for their uses. Then plan a method for comparing the strength of ceramic materials, identifying the variables that need to be controlled. | |
| | Polymers | Describe polymer properties and explain how polymer properties make them suitable for their uses. This will allow you to then interpret data on polymers to decide on the best polymer for a given purpose, justifying the choice. | |
| | Composites | Describe composite properties and explain why composite properties make them suitable for their uses. Then state the relationship shown on a graph of composite strengths. | |
| The Earth | The Earth and its atmosphere | Describe properties of the different layers of the Earth's structure and the composition of the atmosphere. With this understanding describe advantages and disadvantages of a given model of the Earth's structure. | The skills and understanding learnt here will be used in your affecting the environment coursework for BTEC science. |
| | Sedimentary rocks, Igneous and metamorphic rocks | Explain two properties of sedimentary rocks and how sedimentary rocks are made. Then describe how models are representing sedimentary rock formation processes. Compare the ways that igneous and metamorphic rocks form and explain how igneous and metamorphic rocks form. With this understanding predict observations when a substance representing lava is | The skills and understanding learnt here will be used in your affecting the environment coursework for BTEC science. |

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| | | cooled at different temperatures | |
| | The rock cycle | Use the rock cycle to explain how the material in rocks is recycled and describe how changes in the wax used to represent a rock represent the real rock cycle | |
| | The carbon cycle | Explain why the concentration of carbon dioxide in the atmosphere did not change for many years and use the carbon cycle to identify reservoirs of carbon | The skills and understanding learnt here will be used in your affecting the environment coursework for BTEC science. |
| | Climate change | Explain why global warming happens and some impacts of global warming. Then design a model to represent global warming, and describe how it represents the real situation | The skills and understanding learnt here will be used in your affecting the environment coursework for BTEC science. |
| | Recycling | Explain how aluminium is recycled and analyse the advantages and disadvantages of recycling, then plot a bar chart of recycling rates for two towns | The skills and understanding learnt here will be used in your affecting the environment coursework for BTEC science. |
| Electricity and magnetism | Charging up | Explain how objects can become charged and describe how charged objects interact and what is meant by an electric field. With this understanding interpret observations, identifying patterns linked to charge. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| | Circuits and current | Describe what is meant by current and how to measure current. Then set up a circuit including an ammeter to measure current. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| | Potential difference | Describe what is meant by potential difference and how to measure potential difference. Then describe what is meant by the rating of a battery or bulb and set up a simple circuit and use | The skills learnt here will be used in your Green electricity unit for your BTEC science. |

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| | | appropriate equipment to measure potential difference. | |
| | Series and parallel | Describe the difference between series and parallel circuits and how current and potential differences vary in series and parallel circuits. This will give you the understanding of how to identify the pattern of current and potential difference in series and parallel circuits. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| | Resistance | Describe what is meant by resistance and calculate resistance of a component and of a circuit. Then describe the difference between conductors and insulators in terms of resistance. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| | Magnets and magnetic fields | Describe how magnets interact and how to represent magnetic fields. Then describe the Earth's magnetic field and draw field lines round a magnet in detail. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| | Electromagnets and Using electromagnets | With this understanding on electromagnets describe how to make an electromagnet and how to change the strength of an electromagnet and predict and test the effect of changes to an electromagnet. Then describe some uses of electromagnets and how a simple motor works. Then complete an experiment and pose scientific questions to be investigated. | The skills learnt here will be used in your Green electricity unit for your BTEC science. |
| Energy | Food and fuels | Compare the energy values of food and fuels as well as the energy in food and fuels with the energy needed for different activities. | The skills learnt here will be used in your unit 1 exam for BTEC science |

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| Energy adds up | Explain data on food intake and energy requirements for a range of activities and describe energy before and after a change. Then explain what brings about transfers in energy and present observations of energy transfers in a table. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Energy and temperature | State the difference between energy and temperature and describe what happens when you heat up solids, liquids, and gases. Explain what is meant by equilibrium. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Energy transfer: particles | Describe how to reduce error in experimental apparatus. Then describe how energy is transferred by particles in conduction and convection and how an insulator can reduce energy transfer. With this understanding describe the pattern in conduction shown by results, using numerical data to inform a conclusion. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Energy transfer: radiation | Describe some sources of infrared radiation and explain how energy is transferred by radiation. With this understanding identify risks and explain why it is important to reduce them. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Energy resources | Describe the difference between a renewable and a non-renewable energy resource and how electricity is generated in a power station. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Energy and power | Explain the difference between energy and power and describe the link between power, fuel use, and cost of using domestic appliances. With this understanding predict the power requirements | The skills learnt here will be used in your unit 1 exam for BTEC science |

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| | | of different equipment and how much it costs to use. | |
| | Work, energy, and machines | Calculate work done and apply the conservation of energy to simple machines. Then evaluate results from the practical. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| Motion and Pressure | Speed | Calculate speed using the speed equation and describe relative motion. Then choose equipment to make appropriate measurements for time and distance to calculate speed and interpret distance–time graphs. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| | Motion graphs | Calculate speed from a distance time graph and plot data on a distance time graph accurately. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| | Pressure in gases | Describe the factors that affect gas pressure and how atmospheric pressure changes with height. Then interpret observations of atmospheric pressure. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| | Pressure in liquids | Describe how liquid pressure changes with depth and explain why some things float and some things sink, using force diagrams. With this understanding predict how water pressure changes in a familiar context, using scientific knowledge and understanding. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| | Pressure on solids | Calculate pressure and apply ideas of pressure to different situations. Then predict quantitatively the effect of changing area and/or force on pressure. | The skills learnt here will be used in your unit 1 exam for BTEC science |
| | Turning forces | Describe what is meant by a ‘moments’ and calculate the moment of a force. Then independently identify scientific questions from results. | The skills learnt here will be used in your unit 1 exam for BTEC science |

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| Name | Position | Email Address | Telephone |
|--------------------|----------------------|------------------------------------|--------------|
| Mr Sean O'Sullivan | Science Co-ordinator | Sosullivan@haileyhall.herts.sch.uk | 01992 465208 |
| Mr Joseph Hunter | Science teacher | Jhunter@haileyhall.herts.sch.uk | 01992 465208 |

Year 9 Science

What you will learn:

| Unit name | Topics | Skills and understanding |
|-------------------------|----------------------------------|---|
| Chemistry and Our Earth | Chemical Reactivity and Bonding | <ul style="list-style-type: none"> • Explain the trends in chemical properties of group 1 and 7 elements in terms of electronic structure • Describe trends in the physical and chemical properties of group 1 and 7 elements • Describe the physical and chemical properties of group 1 and 7 elements • Relate applications of compounds to their properties and to their bonding and structure • Explain the properties of ionic and covalent substances • Describe the formation of ionic and covalent substances • Compare properties of ionic and covalent substances • Draw dot-and-cross diagrams of simple ionic and covalent substances |
| | Controlling Industrial Reactions | <ul style="list-style-type: none"> • Analyse how different factors affect the rate and yield of an industrial reaction • Explain how different factors affect the rate of industrial reactions |

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| | | <ul style="list-style-type: none"> • Explain the terms 'yield' and 'atom economy' in relation to specific chemical reactions • Describe the factors that can affect the rates of chemical reactions • Identify the number and types of atoms in balanced chemical equations |
| | Affecting the Environment | <ul style="list-style-type: none"> • Describe natural factors that have changed the surface and atmosphere of the Earth • Describe the human activities that affect the Earth and its environment • Discuss the extent to which human activity has changed the environment, in comparison to natural activity • Evaluate possible solutions to changes in the environment, occurring from natural or human activity |
| Energy and Our Universe | The Final Frontier | <ul style="list-style-type: none"> • Describe how the Universe and the Solar System were formed. • Describe the suitability of different methods for observing the Universe. • Describe the structure of the Universe and our Solar System. • Evaluate the evidence leading to the Big Bang theory of how the Universe was formed. • Explain how evidence shows that the Universe is changing. • Identify evidence that shows the dynamic nature of the Universe. |

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Year 10 Science

What you will learn:

| Unit name | Topics | Skills and understanding |
|-----------------------|---------|---|
| Principles of Science | Biology | <ul style="list-style-type: none"> • Cells • Organs |

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| | | <ul style="list-style-type: none"> • DNA and chromosomes • Inheritance • Homeostasis • Nervous System |
| | Chemistry | <ul style="list-style-type: none"> • Atomic Structure • Isotopes • Periodic Table • Electron Configuration • Elements and compounds • Neutralisation • Acids and Salts • Acids and Metals |
| | Physics | <ul style="list-style-type: none"> • Energy • Transformations • Transfer • Renewable energy • Electromagnetic spectrum |
| Chemistry and our Earth | Useful Chemical Products | <ul style="list-style-type: none"> • Describe how chemical substances are used based on their physical properties • Explain how physical and chemical properties of chemical substances make them suitable for their uses • Assess the suitability of different types of substance for a specified use |
| Energy and our Universe | Green Electricity | <ul style="list-style-type: none"> • Use $V = IR$ to predict values in electric circuit investigations • Describe methods of producing a.c. and d.c. electricity • Compare the efficiency and environmental impact of electricity generated by different sources • Describe how electricity is transmitted to the home or industry • Describe methods of producing a.c. and d.c. electricity • Assess, in qualitative terms, ways to minimise energy losses when transmitting electricity • Assess, in quantitative terms, ways to minimise energy losses either when transmitting electricity or |

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| | | when transforming electricity into other forms for consumer applications |
| Biology and our Environment | Is Survival In The Genes? | <ul style="list-style-type: none"> • Describe how characteristics are used to classify organisms. • Describe the different ways in which organisms show interdependence. • Discuss the factors that affect the relationship between different organisms. • Describe the role of genes and the environment in variation. • Explain the role of genes and the environment in evolution. • Evaluate the impact of genes and the environment on the survival or extinction of organisms. |

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Year 11 Science

What you will learn:

| Unit name | Topics | Skills and understanding |
|-----------------------------|----------------------------------|---|
| Biology and our Environment | How Polluted Is the Environment? | <ul style="list-style-type: none"> • Describe how living and non-living indicators can be used to measure levels of pollutants. • Describe the impact that different human activities have on ecosystems. • Analyse the effects of pollutants on ecosystems • Explain the long-term effects of pollutants on living organisms and ecosystems. • Describe the different methods used to help reduce the impact of |

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| | | <p>human activities on ecosystems.</p> <ul style="list-style-type: none"> • Discuss the advantages and disadvantages of methods used to reduce the impact of human activity on ecosystems. • Evaluate the success of methods to reduce the impact of human activity on an ecosystem, for a given scenario. |
| Biology and our Environment | Prevention Or Cure | <ul style="list-style-type: none"> • Describe how lifestyle choices can affect human health. • Describe how pathogens affect human health. • Describe two different treatment regimes: one used to prevent a disease and one used to treat a disease. • Discuss the advantages and disadvantages of vaccination programmes. • Explain the use of pedigree analysis. • Explain how bacteria can become resistant to antibiotics. • Evaluate the use of antibiotics, pedigree analysis and vaccination programmes in the treatment and prevention of childhood illnesses. • |
| Energy and Our Universe | Ionising Radiation | <ul style="list-style-type: none"> • Describe half-life in terms of radioactive decay. • Describe the different types of ionising radiation. • Use graphs to explain radioactive decay and half-life. • Calculate the half-life of radioactive isotopes. • Describe the problems associated with the use of radioactive isotopes. • Compare the benefits and drawbacks of using radioactive isotopes in the home or workplace. • Justify the selection of a radioactive isotope for a |

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| | | given use within the home or workplace. |
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Promoting British Values:

Democracy -

- Certain decisions on matters affecting the whole class are put to a vote
- We use voting as a system to encourage engagement in lessons, e.g. Debates – for/against arguments, respecting views of others.

Rule Of Law –

- Whole school behaviour expectations/rules are constantly discussed, especially when they are breached, with individuals, pairs or small groups. We link behaviour issues of morality and social interactions.

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 |
|---------------------------|---------------------------------|---|---------------------|
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