

Science

Year 9 Curriculum Intent 2024-2025

The course is based on the AQA activate scheme and is taught from Year 7 into Year 9

We also begin to cover content based on the AQA specification for GCSE combined Science and “triple” Science: [AQA | GCSE | Combined Science: Trilogy | Specification at a glance](#)

How can I support my child at home?

- Ensure weekly homework is completed on SatchelOne/Educake
- Use the knowledge organisers to support retention of knowledge and understanding
- Help encourage revision, especially around assessment times: [Revision techniques from BBC Bitesize - BBC Bitesize](#)
- Use: <https://www.bbc.co.uk/bitesize/subjects/zng4d2p>
- Watch: <https://www.youtube.com/@revisionmonkey3859>
- Watch the news for Science developments – Newsround is fantastic, watch David Attenborough documentaries and Brian Cox documentaries on iPlayer

Outside reading

While outside reading isn't required for Science, it can be very beneficial to inspire, motivate and help students progress. Books we recommend:

- The green planet by Lisa Stewart Sharpe

Students have 6 hours of Science a fortnight in Year 9

Assessment: Year 9 students will be assessed throughout the year through summative and formative assessments

Big topics	Topic Name	National Curriculum Links	Skill Components	Assessment Points	from Key Stage 2 to Key Stage 4
Enquiry Processes	Taught throughout all topics	<ul style="list-style-type: none"> • evaluate risks and alter practice accordingly • ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience • make predictions using scientific knowledge and understanding • select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate • use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety • make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest improvements • apply mathematical concepts and calculate results • present observations and data using appropriate methods, including tables and graphs • interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions • present reasoned explanations, including explaining data in relation to predictions and hypotheses • evaluate data, showing awareness of potential sources of random and systematic error • identify further questions arising from their results. • undertake basic data analysis including simple statistical techniques 	<ul style="list-style-type: none"> • Recall key terminology. • Identify hazard symbols and describe ways to reduce risks • Choose appropriate lab equipment to complete practical activities • Draw labelled scientific diagrams of equipment • Use a Bunsen burner safely • Draw tables to hold data • Draw bar graphs to show discontinuous data • Draw line graphs to show continuous data • Plan a method to test one variable • Complete a practical to obtain valid results • Analyse data gained • Calculate means • Produce extended writing through practical write ups • Collaborate and communicate in completion of practicals 	<ul style="list-style-type: none"> • Bar charts and analysis (Forces) • Line graphs (States of Matter) • Method writing (Reactions) • Educake quizzes • Synoptic Assessments 	<ul style="list-style-type: none"> • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations <p>KS 4 – All required practicals</p>

Topic	Key Knowledge <i>What will all students KNOW by the end of the topic?</i>	Key Skills <i>What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?</i>	Assessment Opportunities <i>What are the key pieces of assessment? How will students be assessed?</i>	Links to prior and future knowledge
Cell Biology	<ul style="list-style-type: none"> • Structure of eukaryotic cells: plant and animal cells • Function of cell organelles. • How to calculate order of magnitude. • How specialised cells are adapted to their function. • The importance of cell differentiation. • Stem Cells – functions, location and potential uses including therapeutic cloning • Structure of prokaryotic cells • <i>Cultural/ calendar appropriate lessons (Hallowe'en) to learn about the skeletal system including names and how muscles work</i> • Different microscopy techniques to include light and electron microscopes. • The difference between magnification and resolution. • Where DNA is found in the cell • The 3 main stages of the cell cycle, including mitosis. • How substances are transported in and out of cells by diffusion • Factors that affect the rate of diffusion including concentration gradients, temperature, and presence of a membrane/barrier. • Specific examples of where diffusion occurs in organisms 	<ul style="list-style-type: none"> • Identify, draw, label and interpret cell images. • Build on experimental skills ready for KS4- Use a light microscope to observe, draw and label plant and animal cells • Build on microscopy skills from Year 7. • Evaluation skills e.g. pros and cons of the uses of different types of stem cells. • Consider the ethical implications of using stem cells. • Cell calculations using the magnification equation • Use of prefixes such as nano, micro, milli and conversions between units. To include use of standard form. • Use of models and analogies for cell division. • Recognise, draw, and interpret diagrams modelling diffusion • Apply knowledge of diffusion to real life examples 	-	<p>Year 7 & 8</p> <ul style="list-style-type: none"> - Cell structure – animal, plant, specialised, bacteria and fungi - Structural hierarchy - Structure of DNA - Diffusion <p>GCSE</p> <ul style="list-style-type: none"> • AQA cell biology

<p>Organisation: Tissues, Organs, and Organ Systems</p>	<ul style="list-style-type: none"> • How cells, tissues, organs and organ systems relate to each other. • Structure and function of the human digestive system • Structure and function of enzymes • Which enzymes are responsible for digestion of each biological molecule, the products and where they are found in the body • The role of bile in lipid digestion • Structure and function of the human heart • Structure and function of blood vessels. • Components and functions of the blood. • Role of natural and artificial pacemakers. - <i>Causes and treatments for coronary heart disease (related to cultural topic of valentine's day lesson and reference to non-communicable disease for next topic)</i> • Structure and function of the respiratory system - The mechanisms of breathing 	<ul style="list-style-type: none"> • Understanding of the hierarchy that our bodies and other multicellular organisms are built upon • Identify parts of the digestive system both those that come directly and indirectly into contact with food • Creating models to explain the lock and key theory of enzyme activity for specificity • How to safely carry out a heart dissection • Compare blood vessels to identify differences between all 3 types • Evaluate the pros and cons of different heart disease treatments including stents, biological and mechanical valves and pacemakers. • Analyse data to draw conclusions. • Identify key parts of the respiratory system in a lung dissection demo 		<p>Year 7 and 8</p> <ul style="list-style-type: none"> - Structural hierarchy - Digestive system <p>GCSE</p> <ul style="list-style-type: none"> • AQA organisation
<p>Infection and Response</p>	<ul style="list-style-type: none"> • The relationship between health and disease • Knowledge of examples of communicable diseases e.g., types of pathogens, spread of disease, symptoms, prevention and treatments - First and second line of defence/Role of white blood cells 	<ul style="list-style-type: none"> • Analyse and interpret disease incidence information from graphs • Research skills for finding out about different communicable disease examples • Apply key terminology from the immunity topic to practice questions • Interpret graphs for antibodies based on primary and secondary infections 		<p>Year 7 and 8</p> <ul style="list-style-type: none"> - Cells <p>GCSE</p> <ul style="list-style-type: none"> • AQA infection and response

Infection and Response	<ul style="list-style-type: none"> • Examples of sexually transmitted infections and ways reduce the spread • Immunity and vaccines • Use of painkillers and antibiotics and introduction as to how antibiotic resistance can occur. • The difference between communicable and non-communicable diseases. <ul style="list-style-type: none"> - The effect of lifestyle on disease - Risk factors for diseases • - Knowledge of what cancer is – types and risk factors <ul style="list-style-type: none"> - Process involved in drug development and clinical trials. 	<ul style="list-style-type: none"> • Evaluate the pros and cons of vaccines and the idea of herd immunity (inc. a discussion about the MMR debate from the 80s/90s) • Explain the concern with overusing antibiotics in medical care • Analyse and interpret data on risk factors and make valid judgements • Develop awareness of the difference between correlation and causation • Appreciate the difference between benign and malignant tumours based on localisation or metastasis • Understand the ethical issues associated with drug trials including animal testing as well as the risks <ul style="list-style-type: none"> - Explain how bias is eliminated in double blind trials and understand the importance of peer review and ongoing monitoring 		
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Year 9 Chemistry

Topic	Key Knowledge <i>What will all students KNOW by the end of the topic?</i>	Key Skills <i>What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?</i>	Assessment Opportunities <i>What are the key pieces of assessment? How will students be assessed?</i>	Links to prior and further knowledge
Separating Mixtures	<ul style="list-style-type: none"> ○ Physical separation processes including: <ul style="list-style-type: none"> ○ Filtration, simple and fractional distillation and chromatography 	<ul style="list-style-type: none"> ○ Be able to explain how chromatography separates mixtures. ○ Interpretation of chromatograms ○ Describing how to carry out tests for gases 	<ul style="list-style-type: none"> ○ Presenting data ○ Writing a plan – Extended writing ○ End of topic test 	Year 7 and 8 <ul style="list-style-type: none"> - Separation techniques - Gas tests GCSE

	<ul style="list-style-type: none"> ○ The difference between pure substances and mixtures and formulations ○ The gases: <ul style="list-style-type: none"> ○ Hydrogen ○ Oxygen ○ Carbon dioxide and ○ Chlorine <ul style="list-style-type: none"> ○ can be identified by simple laboratory tests and the positive test results for these gases ○ The difference between atoms, elements and compounds 	<ul style="list-style-type: none"> ○ Application of key mathematical skills: ○ Calculating Rf values or distances moved by a solvent or a substance during chromatography. ○ Practical skills and development and apparatus use: Setting up running paper chromatography 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ Synoptic Assessments 	AQA chemical analysis
Atmosphere	<ul style="list-style-type: none"> ○ The carbon cycles ○ The theory of how the Earth's early atmosphere was generated, how it has changed and what has and is currently changing it. <p>Specifically:</p> <ul style="list-style-type: none"> ○ Combustion reactions ○ Carbon dioxide production ○ Other pollutants ○ Locking up in rocks and the ocean ○ Photosynthesis <ul style="list-style-type: none"> ○ The proportions of the different gases in the atmosphere ○ Principles behind the greenhouse effect ○ How human activities contribute towards the greenhouse effect ○ Principles behind and effects of climate change ○ 	<ul style="list-style-type: none"> ○ Recall key terminology ○ Create a cycle to show the flow of carbon throughout a system ○ Explaining how (new) evidence can lead to changes in and/or re-enforcement of accepted models. ○ Be able to evaluate the quality of evidence 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ Synoptic Assessments ○ Extended writing 	<p>Year 7</p> <ul style="list-style-type: none"> ● Renewable and Non-Renewable Energy Sources <p>Year 8</p> <ul style="list-style-type: none"> ● Combustion ● Respiration ● Photosynthesis <p>GCSE AQA Chemistry of the Atmosphere</p>

<p>Changing Theories</p>	<ul style="list-style-type: none"> ○ A simple model of the atom ○ The development of the model of the atom including: <ul style="list-style-type: none"> ○ The Dalton Model ○ The plum pudding model ○ The nuclear model and ○ The Bohr model including associated evidence ○ Sizes, locations, masses and charges of sub-atomic particles ○ The development of the periodic table ○ The structure of the modern periodic table 	<ul style="list-style-type: none"> ○ Fluency in the use of IUPAC nomenclature regarding element symbols, atomic numbers and mass numbers and electronic structures. ○ Construction and use of word and symbol equations. ○ Explaining how new evidence can lead to changes in accepted models. ○ Application of key mathematical skills: calculating numbers of subatomic particles, the relative size of atoms, using extremely small and large numbers and the associated use of standard form, SI units and standard prefixes 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ Synoptic Assessments ○ End of topic test ○ Extended writing 	<p>Year 7 and 8</p> <ul style="list-style-type: none"> - Atom structure - Elements and compounds - Word equations - Development of the periodic table - Properties of groups <p>GCSE AQA – atomic structure and the periodic table</p>
<p>The Periodic Table</p>	<ul style="list-style-type: none"> ○ The structure of the modern periodic table ○ The chemistry of the elements of: <ul style="list-style-type: none"> ○ Group 1 ○ Group 7 ○ Group 0 	<ul style="list-style-type: none"> ○ Fluency in the use of IUPAC nomenclature regarding element symbols, atomic numbers and mass numbers and electronic structures. ○ Construction and use of word and symbol equations. 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ Synoptic Assessments 	<p>Year 7 and 8</p> <ul style="list-style-type: none"> - Atom structure - Elements and compounds - Word equations - Development of the periodic table - Properties of groups <p>GCSE AQA – atomic structure and the periodic table</p>
<p>Atomic Structure</p>	<ul style="list-style-type: none"> ○ The electronic structure(s) of elements and ions up to and including calcium ○ Sizes, locations, masses and charges of sub-atomic particles including relative atomic mass in elements, ions and isotopes ○ Explaining the reactivity of elements in the periodic table based on their electron configuration 	<ul style="list-style-type: none"> ○ Application of key mathematical skills: calculating numbers of subatomic particles, the relative size of atoms, using extremely small and large numbers and the associated use of standard form, SI units and standard prefixes ○ 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ End of Topic Tests ○ Future synoptic assessments in years 10 and 11 	<p>Year 7 and 8</p> <ul style="list-style-type: none"> - Atom structure - Elements and compounds - Word equations - Development of the periodic table - Properties of groups

				GCSE AQA – atomic structure and the periodic table
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Year 9 Physics

Topic	Key Knowledge <i>What will all students KNOW by the end of the topic?</i>	Key Skills <i>What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?</i>	Assessment Opportunities <i>What are the key pieces of assessment? How will students be assessed?</i>	Links to prior and further knowledge
Energy	<ul style="list-style-type: none"> Quantifying changes in energy stores using conservation of energy Describing increases and decreases in the amounts of energy associated with movement, temperature, position in field (GPE) and elastic distortions 	<ul style="list-style-type: none"> Be able to use energy equations (work done, EPE) Be practise using equations SI units Use of multipliers (especially kJ and kW) 	<ul style="list-style-type: none"> Peer and self assessments throughout Educake Quizzes Synoptic Assessments 	Year 7 and 8 - Energy topic GCSE AQA Energy

	<ul style="list-style-type: none"> • Power as the rate of doing work OR the rate of energy transfer Main energy resources <ul style="list-style-type: none"> • Renewable & non-renewable • Energy resources are used for transport, heating & electricity generation • Economic, social, ethical & political, issues 	<ul style="list-style-type: none"> • Identify patterns & trends in data given in graphical and tabular form • Developing a line of argument using advantages and disadvantages of different energy resources 	<ul style="list-style-type: none"> • Application of energy pathways • End of Topic Test 	
Particles	<ul style="list-style-type: none"> ○ Show solids, liquids and gases as a particle diagrams ○ Recognise state changes ○ Define internal heat ○ Calculate specific heat capacity ○ Calculate specific latent heat ○ Describe the motion of gases ○ Calculate density 	<ul style="list-style-type: none"> • Calculate the volume of a regular and irregular object • Determine the mass of an object • Calculate the density of an object • Complete a practical to determine the specific heat capacity of a material 	<ul style="list-style-type: none"> • Peer and self assessments throughout • Educake Quizzes • Synoptic Assessments • Investigation skills • End of topic test 	Year 7 and 8 <ul style="list-style-type: none"> - Density - Specific heat capacity of water mentioned while looking at the energy content of food - Pressure in gases - Changes of state - Particle model - GCSE AQA particles
Electricity	<ul style="list-style-type: none"> • Circuit symbols, current & potential difference • Series & parallel circuits • Required practical 4 – IV graphs (in 3 parts – resistor, filament lamp & diode) • - Ohm’s law & resistance 	<ul style="list-style-type: none"> • Recognise & recall circuit symbols • Draw simple circuits including the positioning of voltmeters & ammeters • Building simple circuits • Calculations involving current, energy, charge, p.d. & time • Use of models to understand the unobservable • Building more complex circuits & taking measurements • Plot and draw appropriate graphs selecting appropriate scales for the axes. <ul style="list-style-type: none"> - Lines of best fit 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes ○ Synoptic Assessments ○ Investigation skills ○ End of topic test 	Year 7 and 8 <ul style="list-style-type: none"> - Electricity GCSE AQA Electricity
Forces	<ul style="list-style-type: none"> • What are forces? • Contact & non-contact forces • Freebody diagrams • Weight, mass & gravity 	<ul style="list-style-type: none"> • Draw free body diagrams of forces acting on an object - Practical skills in relation to measuring mass & weight and using appropriate values to 	<ul style="list-style-type: none"> ○ Peer and self assessments throughout ○ Educake Quizzes 	Year 7 and 8 <ul style="list-style-type: none"> - Forces GCSE AQA Forces

	•	calculate g Recognition of variables that are directly proportional from data in a table & from a graph - Lines of best fit	○ Future synoptic Assessments	
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Cultural and local

- Throughout the year students will also complete lessons to improve their cultural capital and skills such as problem solving. These themes will include:
 - Christmas – Physics Newtons laws
 - Treacle market – viscosity practical

