

Science

Year 10 Curriculum Intent 2024 - 2025

Combined Science (Trilogy) - Physics

The course is based on the AQA GCSE 9 – 1 Combined Science Trilogy Chemistry Physics (8464) Specification and is taught across Year 10 and Year 11. It is our intention as Science Department to provide all children, regardless of their prior learning, background, or special needs, with a broad and balanced science curriculum. We aim to promote positive attitudes to science as an interesting and enjoyable subject as well as to develop pupils` awareness of how science impacts on their everyday life.

Students at KS4 have 3 lessons of each science per fortnight.

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](#)

How else can my child increase their knowledge and love of science?

While outside reading isn't required for Science, it can be very beneficial to inspire, motivate and help students progress. In addition to books, online videos and journals may be of interest to your child

Websites and journals we recommend:

- BBC Bitesize
- Seneca Learning - www.Senecalearning.com
- TED ED - <https://www.youtube.com/teded/featured>
- In a nutshell - <https://www.youtube.com/user/Kurzgesagt>
- Freescience lessons - https://www.youtube.com/channel/UCqbOeHaAUXw9II7sBVG3_bw

- Primrose Kitten - <https://primrosekitten.org/gcse-science/> or on youtube - <https://www.youtube.com/channel/UCBgvmal8AR4QIK2e0EfJwaA>
- BMJ News - www.bmj.com/new
- Nature - www.nature.com/
- New Scientist - www.newscientist.com/
- RSB Letters & Opinions - royalsocietypublishing.org/journal/rsbl

Books we recommend (some push KS4+ knowledge):

- Adam Kay – This is going to hurt
- Matthew Walker – Why we sleep
- Dean Burnett – The idiot brain
- Adam Nicolson – The sea is not made of water
- Emma Young – Super senses
- Bill Bryson – The body
- Randall Munroe – What if?: Serious scientific questions to absurd hypothetical questions
- Bill Bryson – A short history of nearly everything
- Ben Goldacre – Bad science
- Charles Darwin – Origin of the Species
- Matt Ridley – Genome
- James Watson: DNA
- Daniel Chamovitz – What a plant knows
- Steven Pinker – The language instinct
- Steven Pinker – How the mind works
- Richard Dawkins – The selfish gene
- Jonny Keeling – Seven World One Planet
- Professor Brian Cox – Forces of Nature
- Professor Brian Cox – Wonders of Life
- Sir David Attenborough – Amazing Rare things.

Big topics	Topic Name	Specification & NC Links	Skill Components	Assessment Points	from Key Stage 3 to Key Stage 5
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>KS4 – All required practicals</p>

Topic Name	Big ideas	Specification & NC Links	Skill Components	Assessment Points	from Key Stage 3 to Key Stage 5
Atomic Structure	Bonding atomic structure of atoms & radioactivity	<ul style="list-style-type: none"> Recap of atoms & isotopes (from start of Year 9 Chemistry & end of year 9 Physics) Radioactive decay & nuclear radiation Nuclear equations Half-lives Contamination, irradiation & their hazards Hazards & uses of radioactive emissions Background radiation Nuclear fission & fusion 	<ul style="list-style-type: none"> Recall key terminology including the nature of alpha, beta & gamma decay Balance nuclear equations Use graphs & calculations in relation to half-lives Interpretation of data & application of knowledge to problem solving Apply their knowledge of nuclear radiation to evaluate the best source of radiation to use in a given situation Evaluate the perceived risk of using nuclear radiations in relation to given data 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practicals Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock Year 11 mocks External GCSE exams 	<ul style="list-style-type: none"> Year 7 electrical current – atomic structure Year 9 particles Year 9 atomic structure (chem)
Electricity	Circuits and national grid	<ul style="list-style-type: none"> Recap of Current Electricity, Resistance from Year 9 Series & parallel circuits Required practical 4 – IV graphs (in 3 parts – resistor, filament lamp & diode) Ohm's law & resistance Thermistors & LDRs Mains electricity & the National Grid Transferring energy & power Electric fields 	<ul style="list-style-type: none"> 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. Lines of best fit Method writing and identifying variables Linking ideas between forces and Electric Fields Linking to Magnets from KS3 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock Year 11 mocks External GCSE exams 	<ul style="list-style-type: none"> Year 7 electrical current Year 7 energy – fuel bills Year 8 energy Year 8 electrical current Year 9 energy Year 9 electricity

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Energy changes	Energy changes in different chemical reactions	<ul style="list-style-type: none"> Calculations using work done, GPE, KE and EPE equations Energy as a quantity that can be calculated 	<ul style="list-style-type: none"> Use of increasingly complex formulae in calculations (e.g. squared terms) Calculations involving rearranging (now including the need to use the square-root function) - Use of correct units 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock Year 11 mocks External GCSE exams 	<ul style="list-style-type: none"> Year 7 energy Year 8 energy Year 9 energy
Particle model of matter	Particle models, pressure & gas changes	<ul style="list-style-type: none"> Using the particle model of matter explain motion of particles in a gas. How gases exert forces on the walls of their containers. How changing the temperature of a gas affects the pressure exerted How changing the pressure of a gas affects the volume of the gas (and vice versa). How pressure and volume of a gas are linked. (Boyle's Law) Work done on a gas and the change in internal energy caused How to calculate % of an element in a compound 	<ul style="list-style-type: none"> Graph plotting and choice of appropriate scale (e.g. y axis does not need to start at 0) Explanatory answers needing to be in appropriate depth for the number of marks on offer 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock Year 11 mocks External GCSE exams 	<ul style="list-style-type: none"> Year 7 forces - pressure Year 8 forces Year 9 particles

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Electromagnetism	Magnetic force, use of electromagnets	<ul style="list-style-type: none"> Permanent and induced magnetism Poles of a magnet Magnetic forces & fields Electromagnetism & its uses Force on a current carrying conductor & the motor effect Fleming's left-hand rule Use of the motor effect in electric motors Use of the motor effect in loudspeakers & headphones Induced potential & the generator effect Use of then generator effect in alternators & dynamos Use of the generator effect in microphones & headphones Use of the generator effect in transformers The structure of step-up & step-down transformers The relationship between number of turns and p.d. for step-up & step-down transformers 	<ul style="list-style-type: none"> Describe how to plot the magnetic fields pattern of a magnet using a compass Describe how the magnetic effect of a current can be demonstrated interpret diagrams of electromagnetic devices in order to explain how they work Use Fleming's left-hand rule to determine the direction of the force, current or magnetic field given the direction of the other two Application of the motor effect to new experimental arrangements Connections to Topic 2 (Electricity), Topic 5 (Newton's Laws subtopic) & Topic 6 (Sound subtopic) to explain how the motor effect is used to convert variations in current in electrical circuits to pressure variations in sound waves Apply the principles of the generator effect in a given context Connections to Topic 2 (Electricity) and power transfer in transformers 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock Year 11 mocks External GCSE exams 	<ul style="list-style-type: none"> Year 7 electrical current – electromagnets Year 8 forces Year 9 energy
Forces	Newton's Laws, velocity and momentum	<ul style="list-style-type: none"> Newton's 1st & 2nd laws of motion Required practical 7- investigation of Newton's 2nd Law (in 2 parts) Concepts of directly proportional & inversely proportional Newton's 3rd law of motion Terminal velocity Stopping distance, thinking distance & braking distance Reaction time & factors affecting it Factors affecting braking distance Momentum & conservation of momentum Changes in momentum review 	<ul style="list-style-type: none"> Plot and draw appropriate graphs selecting appropriate scales for the axes. Method writing and clarity on variables - Recall of practical terms from Year 9 and addition of new terms# - Apply Newton's 3rd law of motion to equilibrium situations Application of Newton's 2nd law of motion to stopping vehicles safely Evaluate the effect of various factors on thinking distance based on given data Describe & explain examples of conservation of momentum Complete calculations involving an event such as a collision 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Presenting and Evaluating data Correct interpretation of results Synoptic Assessments End of year 10 mock 	<ul style="list-style-type: none"> Year 7 forces Year 8 forces Year 9 forces

Topic Name	Big ideas	Specification & NC Links	Skill Components	Assessment Points	from Key Stage 3 to Key Stage 5
		<ul style="list-style-type: none"> Distance-time graphs Distance, displacement, speed & velocity Scalar & vector quantities 	<ul style="list-style-type: none"> Apply equations relating forces, mass, velocity & acceleration to explain how the changes are inter-related Explain safety features such as air bags with reference to the rate of change of momentum 	<ul style="list-style-type: none"> Year 11 mocks External GCSE exams 	
Waves	Types of waves, measuring waves	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Peer and Self Assessment embedded throughout Educake Quizzes Completion of practical Starter tasks which interleave knowledge from previous learning Data collection for required practicals Presentation and evaluation of collected data for practicals Synoptic Assessments End of year mock 	<ul style="list-style-type: none"> Year 8 Waves Year 9 Energy – energy transfers
Consolidation	All topics	<ul style="list-style-type: none"> Revise all topics in the specification 	<ul style="list-style-type: none"> Recall key terminology. Apply knowledge from all topics Devise methods to investigate scientific theories Interpret given data Complete practice questions 	<ul style="list-style-type: none"> Peer and self assessments throughout Educake Quizzes Synoptic Assessments 	

Cultural and skills lessons:

- Throughout the year students will also complete lessons to improve their cultural capital and skills such as problem solving. These themes will include:
 - How to revise
 - How to use textbooks
 - How to use Seneca learning and BBC bitesize to aid independent learning

Assessment: Year 10 and 11 students will be assessed throughout the year through summative and formative assessments.. They will also complete mock exams based on previous years external GCSE exa

