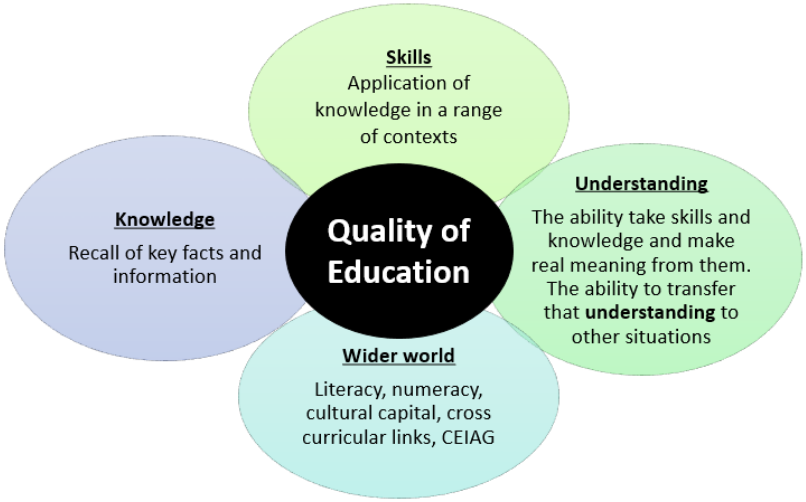
CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

Curriculum objectives
To inspire a love of scientific discovery that empowers learners to meet the challenges of education, work and life.

- **Curriculum values and context**

Developing an understanding of each topic and an awareness of where the topic fits in to everyday life and career opportunities.



- **Knowledge and understanding being developed**

- **Curriculum sequencing and structure**

The mandatory units provide the knowledge, skills and understanding for the NEA units. Recognition of prior learning (RPL) is the process for recognising learning that never received formal recognition through a qualification or certification. It includes knowledge and skills gained in school, college or outside of formal learning situations. These may include: • domestic/family life • education • training • work activities • voluntary activities.

- **Development of students' cultural capital, FBV's, personal development**

Discussions on cells and links to the biology A Level specification, discussions on chemical structure and links to the chemistry A Level specification, and discussions on waves and links to the physics A Level specification.

- **Curriculum equality and access**

- What are the objectives for your curriculum? To inspire a love of scientific discovery that empowers learners to meet the challenges of education, work and life.

- What do you want pupils to be able to know and do by the time they leave? See Yr12/13 KSU

- How does your curriculum plan set out the sequence and structure of how it's going to be implemented? A spiral structure for year 12 and 13, teaching mandatory examined units before NEA's as these have the threshold topics within them.

- about the curriculum you have in place? Providing the opportunity for skills to be introduced at KS3 and built upon, allowing for practice and revisiting with further complexity.

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

- How does your curriculum reflect your school's context? Examples can refer to the local context.

- To what extent have you made these objectives clear? Does everybody know them? Specialist teachers, students are aware of which teacher teaches which subject.

- How does your curriculum reflect national policy (for example, British values and PSHE)? Discussions on cells and links to the biology A Level specification, discussions on chemical structure and links to the chemistry A Level specification, and discussions on waves and links to the physics A Level specification.

- How does your curriculum cater for disadvantaged and minority groups? How do you ensure these pupils aren't 'shut out' of pursuing subjects they wish to study because of too sharp a focus on exam results Opportunity to support students, making the content accessible and relatable through giving wider world scenarios that students can understand and see the relevance in.

- How do you ensure that curriculum knowledge is interleaved? Retrieval practice across the course, random topics starter quiz. Recall assessments at the start of lessons. Looking at topics from previous key stages and building on this knowledge to level 3. Knowing the specification and linking current topics to previous topics

Meeting the needs of SEND students within the classroom
Intent: • Identification of key fundamental building blocks based on student need **Implementation:** • Knowledge of SEND need - knowing who they are, targeted T&L and classroom strategies to meet need. • Staff trained to meet needs of SEND students specifically to their subject area • Differentiated teaching and resources based on identified needs • Targeted live marking and questioning • Deploying TA's to support wider group to allow subject specialist support for SEND (helicopter approach) • Personalised home learning • Access arrangements – identification and application • **Impact:** • Grading below Grade 1 to monitor progress • Structured accessible assessments.

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

	Knowledge	Skills	Understanding	Wider world
Year 13	***Microbiology (Unit 18)*** • Classify and identify microorganisms • Use of microorganisms in agriculture • Microorganisms in food production • Action of antimicrobials ***Laboratory techniques (Unit 2)*** • Aspects of good laboratory practice throughout • Techniques to separate and identify substances present in a mixture • Alternative qualitative and quantitative techniques offering improve separation and identification and enhanced accuracy and sensitivity • Techniques to determine concentration of an acid or base using titration • Techniques to examine and record features of biological samples • Techniques to identify cations and anions in samples • The purpose of working in aseptic or clean room whilst maintaining sterility and cleanliness ***Product testing techniques (Unit 21)*** • The influence of regulatory bodies on development of consumer products • How product testing determines development of consumer products	• Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures. • Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: • in a theoretical context • in a practical context • when handling qualitative data • when handling quantitative data • Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: ➔ make judgements and reach conclusions ➔ develop and refine practical design and procedures **Practical techniques** • gram staining • aseptic techniques • titrations • flame testing	• How to plan a scientific investigation • How to carefully, following a written risk assessment, carry out a scientific investigation • How to obtain, analyse and evaluate a scientific investigation • How enzymes work • How diffusion occurs • How to use field techniques to monitor population size • How to measure energy in fuels • How to construct and use electrical circuits • Structure and function of the musculoskeletal system and health matters relating to the musculoskeletal system • Structure and function of the lymphatic system and health matters relating to this system • Structure and function of the digestive system and health matters relating to this system • Write risk assessments for all scientific investigations carried out • Undertake a number of chemistry based scientific investigation eg. titration, colorimetry, chromatography • Review own learning and practical results • How to use a range of mathematical techniques • Structure and bonding in science • The periodic table • Cell theory • Structure and function of tissues • Wave features • Musical instruments and how they produce notes • Using physics equations	***Extracurricular activities*** • Lincoln University • Nottingham University • After school revision session • Sampling visit for required practical ***Careers*** • Biomedical Science degree • Allied Health and Nursing degree • Life Sciences degree • Forensic Science degree ***Curriculum Links*** These A Level subjects might complement this qualification: • A Level Biology • A Level Chemistry • A Level Geography • A Level Physical Education Use of microorganisms in brewing, baking and yoghurts Role of microorganisms as disease causing organisms Commercial use of microorganism in medical microbiology and food production ***PSHE, PD and Cultural Capital Links*** • Health and wellbeing • Relationships and

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

	• Quantitative titration techniques on consumer products • Use extraction and separation techniques on consumer products •			ethics - Units involving **scientific investigations** and **dat a handling** often include discussions on **ethics**, **integrity**, and **collaboration**, which tie into PSHE themes of respectful relationships and responsible behaviour. • Living in the wider world - Careers in science, **employability skills**, and **workplace safety** (e.g., COSHH, risk assessments) are covered, supporting PSHE goals around **economic wellbeing**, **career planning**, and **citizenship**. • British Values and SMSC (Spiritual, Moral, Social and Cultural) Development - Encouraged through group work, debates on controversial scientific issues (e.g., genetic engineering), and understanding the impact of science on society.
Year 12	**F180 Fundamentals of science** • **Cell structure & microscopy** • **Biodiversity & ecosystems** • **Atomic structure & periodic table** • **Quantitative chemistry** • **Structure & bonding** • **Rates of reaction & enthalpy changes** • **Electricity** (including potential difference, resistance, circuits) • **Motion** (kinematics, energy, SUVAT equations) • **Medical physics** (e.g. X-rays, ultrasound) **Investigating science** • Roles and methods of scientists (data collection, surveys, sampling, surveys vs estimation) • Statistical/data handling & interpretation • Ethical, social, environmental implications of science • Principles of spectroscopic techniques and interpreting spectra	**F180 Fundamentals of Science (Biology)** • How to draw a low -power plan of an EM image • How to prepare and examine microscope slides for use in light microscopy, including the use of an eyepiece graticule and stage micrometer • How to use and interpret the most commonly used stains, including iodine, safranin, methylene blue and Leishman stain • How to draw a low-power plan of an LM image • How to use a haemocytometer and a Coulter counter to count cells in a sample • Use of the equation: Magnification = observed size ÷ actual size • How to carry out thin layer chromatography (TLC) • Use of the equation: Percentage efficiency = useful energy transferred (J) ÷ total energy transferred (J) × 100 **Chemistry (F180)** • Use of the equation: Relative atomic mass = Σ(isotope mass × isotope abundance) ÷ 100 • Use of the equation: Amount of substance (mol) = mass of	**F180 Fundamentals of Science (Biology)** • Why it is essential for living cells to have a cell surface membrane, cytoplasm and nucleic acid • How to use the features of a photomicrograph to draw and label a eukaryotic cell • Features of the cell surface membrane as shown by the fluid mosaic model, including relevance in osmosis, simple and facilitated diffusion and active transport • The functional link between the Golgi apparatus, and vesicles/lysosomes • Why a fungal cell could be identified as both a plant cell and an animal cell • How prokaryotic cells differ from eukaryotic cells • How the differential response to antibiotics can be used to identify bacteria • Why cells have different functions in a multi-cellular organism • Why sperm and egg cells are so specialised • How animal stem cells can differentiate into a wide range of specialised cells • Why water flows along the transpiration stream in a plant leaf • Why nutrients flow along phloem sieve elements in a plant leaf • How to extrapolate the function of a tissue, based on its structural features shown in a diagram and photomicrograph	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		substance (g) ÷ molar mass (g mol−1) Use of the equation: $\text{Concentration (mol dm}^{-3}\text{)} = \frac{\text{amount of solute (mol)}}{\text{volume (dm}^3\text{)}}$ Use of the equation: $\text{Concentration (g dm}^{-3}\text{)} = \frac{\text{mass of solute (g)}}{\text{volume (dm}^3\text{)}}$ Use of the equation: $\text{Amount of gas (mol)} = \frac{\text{volume of gas (dm}^3\text{)}}{24\ (\text{dm}^3\ \text{mol}^{-1})}$ **Physics (F180)** Use of the equation: Charge (C) = current (A) × time (s) • Use of the equation: Potential difference (V) = current (A) × resistance (Ω) Use of the equations: Power (W) = current (A) × potential difference (V) $\text{Power (W)} = (\text{current (A)})^2 \times \text{resistance (Ω)}$ $\text{Power (W)} = \frac{(\text{potential difference (V)})^2}{\text{resistance (Ω)}}$ • Use of the equation: Work done (J) = potential difference (V) × current (A) × time (s) • Use of the equation: Work done (J) = potential difference (V) × charge (C)	• Why root tissues are usually non-photosynthetic • What is the function of root hairs • Why the retention of roots is essential for successful transplantation • How to interpret biological drawings and photomicrographs of chloroplasts • How the outer membrane of the chloroplast provides an enclosed site for different stages of photosynthesis, including the impact on enzyme/ substrate collision • Why water is not combined with carbon dioxide to form glucose • How light absorption is affected by the type of photosynthetic pigment found and the concentration of chloroplasts • How to interpret the light absorption spectrum for different photosynthetic pigments • How to interpret graphs showing the impact of light intensity on the rate of photosynthesis in pondweed • Why CO2 absorption can reduce the predicted increase of greenhouse gas levels in the context of climate change • How the mitochondrion provides an enclosed site for different stages of cellular respiration, a large SA:Vol ratio for reactions, including the impact on enzyme- substrate collision • Why active animal cells have an abundance of mitochondria, including: • Sperm cell • Muscle cell/fibre • Renal tubule cell • Synaptic knob of neuron • Why active plant cells have an abundance of mitochondria, including: • Root hair cell • Phloem companion cell	***Cultural capital*** • Science Identity and Representation - Encouraging students to see themselves as scientists helps build their science identity, a key part of cultural capital. • Science Identity and Representation - Encouraging students to see themselves as scientists helps build their science identity, a key part of cultural capital. • Science Identity and Representation - Encouraging students to see themselves as scientists helps build their science identity, a key part of cultural capital. • Science Identity and Representation - Encouraging students to see themselves as scientists helps build their science identity, a key part of cultural capital. • Science Identity and Representation - Encouraging students to see themselves as scientists helps build their science identity, a key part of cultural capital. • Science Identity and Representation - Encouraging students to see themselves as

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		Use of the equation:
		$R_T = R_1 + R_2 + \cdots$
		for two or more resistors in series where:
		R_T = total resistance in series (Ω)
		R_1 = resistance of resistor 1 (Ω)
		R_2 = resistance of resistor 2 (Ω)
		Use of the equation:
		$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$
		for two or more resistors in parallel where:
		R_T = total resistance in parallel (Ω)
		R_1 = resistance of resistor 1 (Ω)
		R_2 = resistance of resistor 2 (Ω)
		•
		• Use of apparatus, techniques and procedures to investigate potential divider circuits which may include a sensor such as a thermistor or an LDR
		• Use of the equations: Work done (J) = force (N) × displacement (m) Work done (J) = force (N) × displacement (m) × cosθ
		• Use of the equations: Kinetic energy (J) = ½ × mass (kg) × (velocity (ms–1))2 Gravitational potential energy = mass × acceleration × height of free fall (J) (kg) (ms–2) (m)
		• Elastic potential energy (J) = ½ × force (N) × extension (m)
		Elastic potential energy (J) = ½ × spring constant (Nm^{-1}) × (extension (m))^2
			• Why water-logged soils can reduce the active uptake of mineral ions
			• Why ATP synthesis is not 100% efficient
			• When anaerobic respiration can be applied to industrial and agricultural processes
			• How to interpret molecular diagrams of mono-, di- and triglycerides
			• Why triglycerides are an effective energy source in plants (including seeds) and animals (within adipose tissue)
			• How lipids in the myelin sheath provide insulation of the neuron axon
			• How to interpret molecular diagrams of amino acids
			• How to interpret chromatograms to identify amino acids
			• How carboxylic and amino groups form the peptide bond between adjacent amino acids
			• Why there is such a diverse range of proteins, including structural and functional types
			• How to explain the lock and key and induced fit hypotheses
			• How to interpret molecular diagrams of mono- and polynucleotides, including both DNA and RNA
			• Why climate change has such a profound influence on the distribution and survival of organisms
			• Why different sampling techniques are needed for different types of organisms, including: • Plants • Sedentary or mobile animals • Algae and seaweed
			• How to determine soil features of water, humus, and particulate mass
				scientists helps build their science identity, a key part of cultural capital.

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		• Use of the equation: $\text{Power (W)} = \frac{\text{work done (J)}}{\text{time (s)}}$ • Use of the equation: $\text{Efficiency} = \frac{\text{useful energy transferred (J)}}{\text{total energy transferred (J)}}$ • Use of the equation: • Net force (N) = mass (kg) × acceleration (m s^{-2}) Use of average velocity equation: $\text{Average velocity (m s}^{-1}\text{)} = \frac{\text{displacement (m)}}{\text{time taken (s)}}$ Use of constant acceleration equation: • $\text{Acceleration (m s}^{-2}\text{)} = \frac{\text{final velocity (m s}^{-1}\text{) - initial velocity (m s}^{-1}\text{)}}{\text{time taken (s)}}$ Use of SUVAT equations to solve constant acceleration problems: $v = u + at$ $s = \frac{1}{2}(u + v)t$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ where: v = final velocity (m s^{-1}) u = initial velocity (m s^{-1}) a = acceleration (m s^{-2}) t = time taken (s) s = displacement (m) • Use of apparatus, techniques and procedures to accurately determine the acceleration of free fall using trapdoor and electromagnet arrangement; light gates and timer Use of the equations: Energy of a photon (J) = Planck constant (J s) × frequency (Hz) • $\text{Energy of a photon (J)} = \frac{\text{Planck constant (J s)} \times \text{speed of light in a vacuum (m s}^{-1}\text{)}}{\text{wavelength (m)}}$ Use of the attenuation of X-rays equation to calculate intensity: $I = I_0 e^{-\mu x}$ with $e = 2.718$ where: I = intensity of emergent beam (W m^{-2}) I_0 = intensity of incident beam (W m^{-2}) μ = linear attenuation coefficient (m^{-1}) x = distance travelled through the medium (m) Use of the equation: • $\text{Mass attenuation coefficient (cm}^2\text{ g}^{-1}\text{)} = \frac{\text{linear attenuation coefficient (cm}^{-1}\text{)}}{\text{density of medium (g m}^{-3}\text{)}}$	• How to decide the appropriate type of sampling technique for collecting random and non-random samples in the field • How to estimate % plant cover within a quadrat • How to measure abiotic factors under field conditions **F180 Fundamentals of Science (Chemistry)** • How to work out the electron configuration of atoms in terms of main shells and sub-shells (s, p and d) up to Z = 36 • How to classify elements into s-, p- and d-block elements • How to classify types of reaction to include acid-base, acid-carbonate, acid-metal, thermal decomposition, redox and precipitation • How to convert between g dm–3 and moldm–3 • How to determine the formulae and names of salts produced by acids • How and why indicators change colour • How to construct 'dot-and-cross' diagrams of molecules and ions to represent single covalent and multiple covalent bonding • How to interpret Pauling electronegativity values • How to predict ionic charge from the position of an element in the Periodic Table • How to explain the properties in terms of the type of bonding, the particles present and the forces between particles	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		Use of the equation: $\text{Frequency (Hz)} = \frac{1}{\text{time period (s)}}$ Use of the equation for wave speed: Wave speed ($m\,s^{-1}$) = frequency (Hz) × wavelength (m) Use of the equation for intensity: • $\text{Intensity (W m}^{-2}) = \frac{\text{power (W)}}{\text{area (m}^2)}$ Use of the equation: $\text{Density (kg m}^{-3}) = \frac{\text{mass (kg)}}{\text{volume (m}^3)}$ Use of the acoustic impedance equation: Acoustic impedance = density of medium × speed of sound in the medium ($kg\,m^{-2}\,s^{-1}$) ($kg\,m^{-3}$) ($m\,s^{-1}$) Use of the intensity reflection coefficient equation: • $\alpha = \frac{I_r}{I_0} = \left(\frac{Z_2 - Z_1}{Z_2 + Z_1}\right)^2$ where: α = intensity reflection coefficient I_r = intensity of reflected wave ($W\,m^{-2}$) I_0 = intensity of incident wave ($W\,m^{-2}$) Z_1 = acoustic impedance of initial medium ($kg\,m^{-2}\,s^{-1}$) Z_2 = acoustic impedance of second medium ($kg\,m^{-2}\,s^{-1}$) Use of the activity equation: Activity = radioactive decay constant × number of undecayed nuclei Use of the equations to determine $N/N_0/A/A_0$: • $N = N_0 e^{-\lambda t}$ $A = A_0 e^{-\lambda t}$ with $e = 2.718$ where: N = number of undecayed nuclei N_0 = initial number of undecayed nuclei e = Euler's number λ = radioactive decay constant (s^{-1}) t = time (s) A = activity (Bq) A_0 = initial activity (Bq) • Use of the effective half-life equation: $^1/_{\text{effective half-life}} = {}^1/_{\text{physical half-life}} + {}^1/_{\text{biological half-life}}$ • • Hazard symbols and what they represent ***Skills developed throughout the course*** These skills include: • Communication - communication skills that are important in all	• How to use IUPAC rules of nomenclature for systematically naming organic compounds, limited to: alkanes; alkenes; alcohols; aldehydes; ketones; carboxylic acids; haloalkanes • How to draw the structural and displayed formulae of the first six members of the alkane series and their corresponding alkyl groups and write their chemical formulas • How to determine the enthalpy change of combustion of fuels directly How to use Thermal energy = mass × specific heat capacity × change in temperature (J) (kg) ($J\,kg^{-1}\,°C^{-1}$) (°C) • to calculate $\Delta_c H$ of fuels (in $kJ\,mol^{-1}$) from experimental results **F180 Physics** How resistance is defined by: • $\text{Resistance } (\Omega) = \frac{\text{potential difference (V)}}{\text{current (A)}}$ • How to solve problems for series and parallel circuits • How to solve problems for potential divider circuits with potentiometers, LDRs and thermistors • How to identify and fix faults in potential divider circuits • How to identify and fix faults in potential divider circuits • How energy is stored • How energy is transferred via energy carriers or pathways • How diagrams can be used to represent energy transfers	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		aspects of further study and life. Communicating effectively with individuals or groups. • Creativity • Critical thinking • Independent learning • Presentation skills - Presenting information, this will involve managing time and identifying aims, purpose, resources, methods. • Problem solving - Problem solving when matching and analysing data. • Project and team-based working • Referencing • Reflection • Research skills - Researching topic areas and recording research sources, then using them to interpret findings and present evidence. • Self-directed study • Time management • Writing for different purposes • Transferable learning and skills, such as evaluation, planning, presentation and research skills, that are important for progression to HE and can be applied to real-life contexts and work situations ***<u>How science works</u>*** • HSW1 - Use theories, models, and ideas to develop scientific	• How to draw scale Sankey diagrams • How to apply conservation of energy to examples involving gravitational potential energy, elastic potential energy, and kinetic energy • How X-rays are produced in an X-ray tube, including thermionic emission and energy transfers • How tube current and voltage affects the X-ray beam • How to interpret and use A-scans to solve problems • How to select a radionuclide for an appropriate use **<u>F182 NEA Investigating science</u>** • How to identify relevant sources for an investigation • How to evaluate sources of information using the Currency, Relevance, Authority, Accuracy and Purpose (CRAAP) test • How to use research to relate an investigation to an environmental, commercial or industrial process • Why there are limits to the amount and type of research that are achievable • How to create an appropriate research question from a set title • What makes a good research question, for example, that is SMART • How to construct a hypothesis and prediction from a research question • How to explain the scientific principles that support a hypothesis and prediction	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		explanations • HSW2 - Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and ideas • HSW3 - Use appropriate methodology, including information and communication technology (ICT) to answer scientific questions and solve scientific problems • HSW4 - Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts • HSW5 - Use data to provide evidence, and recognise correlations and causal relationships • HSW6 - How to evaluate methodology, evidence and data, and resolve conflicting evidence • HSW7 - How scientific knowledge and understanding develops over time • HSW8 - How to communicate information and ideas in appropriate ways using appropriate scientific terminology • HSW9 - Consider applications and implications of science and evaluate their associated benefits and risks • HSW10 - Consider impact of science and technology on humans,	• Why a null hypothesis may also be useful and when they are appropriate • How to accept or reject a hypothesis • How to identify all relevant variables that might affect the outcome of an investigation • How to decide if a variable is qualitative or quantitative • How to evaluate significant variables to control in an investigation • How to reference citations in-text and end-text • Why referencing is important • How to select an investigation method that will answer the research question • How to decide what values to select for the relevant variables in the investigation • How to ensure a method is valid • How to decide what preliminary tests are necessary for the success of the investigation • How to modify a method to reduce errors • What is meant by data of sufficient quality • How to select equipment that produces data of sufficient quality • Why there are limitations for the types of investigations that can be carried out in schools • How to complete a risk assessment □ How to differentiate between a hazard and risk • How to identify appropriate risks and hazards for an investigation	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		other organisms, and the environment • HSW11 - How to evaluate the role of the scientific community in validating new knowledge and ensuring integrity • HSW12 - How to evaluate the ways in which society uses science to inform decision making ***Mathematical skills*** **M0 – Arithmetic and numerical computation** • M0.1 - Recognise and make use of appropriate units in calculations • M0.2 - Recognise and use expressions in decimal, ordinary and standard form • M0.3 - Use ratios, fractions and percentages • M0.4 - Estimate results • M0.5 - Use calculators to find and use power functions • Use calculators to find cos x when x is expressed in degrees **M1 – Handling data** • M1.1 - Use an appropriate number of significant figures • M1.2 - Understand the terms mean, median and mode • M1.3 - Understand simple probability • M1.4 - Make order of magnitude calculations	• How to select and interpret relevant information from chemical safety data sheets • How to explain control measures using scientific principles • Why it is important to be aware of emergency measures before carrying out an investigation • Why preliminary experiments are important • What information can be gained by conducting preliminary experiments □ How to record and present outcomes of preliminary testing • How to evaluate the data from preliminary testing to decide if modifications are necessary • How to justify a plan using the data from the preliminary testing • How the practical techniques in Unit F180: Fundamentals of science can be modified for use in an investigation • Why it is important to develop competency in practical techniques and how this can be achieved • How to access and use databases and simulations to produce data • Why it is important to work safely and with due care and attention in a scientific practical investigation • How to demonstrate skilful use of practical apparatus • How to identify and mitigate sources of	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		• M1.5 - Uncertainties in measurements and use of simple techniques to determine uncertainty when data are combined by addition, subtraction, multiplication, division and raising to powers • M1.6 - Frequency tables and diagrams, bar charts, line graphs, scatter plots, pie charts, and histograms • M1.7 - Understand the principles of sampling as applied to scientific data, including representative sampling • M1.8 - Understand measures of dispersion, including standard deviation and range **M2 - Algebra** • M2.1 - Understand and use the symbols: =, , ≤, ≥, <>, ∝, ≠, ±, ≈, Δ • M2.2 - Change the subject of an equation, including non-linear equations • M2.3 - Substitute numerical values into algebraic equations using appropriate units for physical quantities • M2.4 - Solve algebraic equations, including quadratic equations **M3 - Graphs** • M3.1 - Translate information between graphical, numerical, and algebraic forms	error • How data of sufficient quality can be collected • How to determine the uncertainty associated with different measuring equipment and reduce uncertainty • How to calibrate equipment to reduce errors • How to assess the cleanliness and proper function of equipment • How to select a format for recording data that suits the data being collected • How to record data consistent with the instrument resolution • How to select which mathematical skills are appropriate • How to use appropriate mathematical skills • How to propagate uncertainties to determine total uncertainty • How to determine when and which statistical analysis is appropriate • How to use spreadsheets to process data • How to draw each type of graph, including error bars and lines and curves of best fit • How to select appropriate graph(s) to suit the data recorded • How to use spreadsheets to draw graphs, error bars, and lines and curves of best fit • How to identify each type of error in an investigation • How to explain reasons for errors • How to identify anomalous data in tables	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

		• M3.2 - How to plot two variables from experimental or other data • M3.3 - Understand that y = mx + c represents a linear relationship • M3.4 - The slope and intercept of a linear graph • M3.5 - Rate of change from a graph showing a linear relationship • M3.6 - The slope of a tangent to a curve as a measure of rate of change • M3.7 - Instantaneous rate of change and average rate of change • M3.8 - Understand the possible physical significance of the area between a curve or line and the x-axis and be able to calculate it or estimate it by graphical methods as appropriate • M3.9- Sketch relationships for graphs **M4 – Geometry and trigonometry** • M4.1 - Use angles in regular 2D and 3D structures • M4.2 - Visualise and represent 2D and 3D forms including two-dimensional representations of 3D objects • M4.3 - Areas of triangles, circumferences and areas of circles, surface areas and volumes of rectangular blocks, cylinders, and spheres	and graphs • How to account for anomalous data • How to mathematically interpret data from graphs and when it is necessary • How to find values by interpolation and extrapolation • How to interpret patterns of data from different types of graphs • How to describe relationships shown by patterns in graphs • How to write a concise conclusion(s) from primary and secondary data • How to select appropriate data from secondary sources to compare results to • How to make valid comparisons between primary and secondary data • What is meant by confidence in conclusions for an investigation • How to explain the impact of limitations on a conclusion • How the conclusion(s) is/are relevant to environmental, commercial and industrial processes • How to address the extent to which the research question was answered • What should be included in a scientific report • What is meant by a defence of conclusions • How scientists defend their research to peers • How to present a brief summary of the investigation	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

			• How to communicate clearly • How to prepare for challenges to the conclusions of an investigation • How to form relevant questions to challenge the investigation of peers • Why it is important to evaluate an investigation • How to assess the effectiveness of the equipment and methods used • How to assess the methods used to process and display the data • How to explain the limitations and sources of error in collected data • How to decide the reliability of sources of information and secondary data used in the investigation • How to suggest improvements for an investigation, limited to those available in schools • How to decide if the improvements are appropriate and what impact they will have	

At The Elizabethan Academy we offer a curriculum that:

- is broad, balanced, inspiring and inclusive
- builds confidence, independence and **resilience**
- encourages students to develop the **skills, knowledge and understanding** required to succeed academically
- encourages students to participate in a wide variety of activities which extend beyond the classroom
- places creativity and imagination at the heart of learning to develop enquiring minds
- enables students to understand the connections and links between different subjects
- raises students' aspirations through promoting academic excellence
- develops students' **social and cultural knowledge**, skills and understanding
- develops students' **respect for spiritual and moral values**, and tolerance towards other races, religions and ways of life.
- gives students the opportunities to put theoretical skills into practice and expand their knowledge beyond the exam specification
- prepares students for the world of work in a rapidly changing world.

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

2025-2026	Year 12 Applied Science AAQ					
	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Knowledge, Skills and Understanding 	<u>Teacher 1</u> F180 Fundamentals of Science **B1** Cell structure and microscopy F180 Fundamentals of Science **B2** Bioenergetics F180 Fundamentals of Science **B3** Structure and function of biological molecules <u>Teacher 2</u> F180 Fundamentals of Science **P1** Electricity F180 Fundamentals of Science **P2** Motion	<u>Teacher 1</u> F180 Fundamentals of Science **B4** Biodiversity and Ecosystems F180 Fundamentals of Science **P3** Medical Physics <u>Teacher 2</u> F180 Fundamentals of Science **P2** Motion F180 Fundamentals of Science **P3** Medical Physics F180 Fundamentals of Science **C1** Atomic structure and the Periodic Table F180 Fundamentals of Science **C2** Quantitative chemistry	<u>Teacher 1</u> F182 Investigating Science NEA • Planning a scientific investigation • Performing a scientific investigation • Analysing and communicating results • Evaluating a scientific investigation <u>Teacher 2</u> F180 Fundamentals of Science **C2** Quantitative Chemistry F180 Fundamentals of Science **C3** Structure and Bonding	<u>Teacher 1</u> F182 Investigating Science NEA (Non examined assessment) • Planning a scientific investigation • Performing a scientific investigation • Analysing and communicating results • Evaluating a scientific investigation <u>Teacher 2</u> F180 Fundamentals of Science **C4** Rates of reactions and enthalpy changes	<u>Teacher 1 and 2</u> F180 Revision	<u>Teacher 1 and 2</u> F181 Science in Society • What do scientists do? • Handling scientific data • Scientific developments • Communicating science
	Baseline assessment		NEA		**F180 External exams**	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

Embed your knowledge

DIY Microscopy with a Smartphone
Objective: Understand magnification and resolution.

- Use a **drop of water** on a smartphone camera lens to create a makeshift microscope.
- Examine items like onion skin, salt crystals, or leaf surfaces.
- Take photos and label visible structures.
- Reflect: *What are the limitations of this method compared to lab microscopes?*

Cell Structure Memory Game
Objective: Improve recall of organelle names and functions.

- Create flashcards with:
  - One side: Organelle name or image.
  - Other side: Function or description.
- Play matching games or quiz family members.

ATP Role Exploration
Task: Create a concept map showing how ATP is produced and used in cells.

- Include glycolysis, Krebs cycle, and oxidative phosphorylation.
- Highlight ATP's role in muscle contraction, active transport, and biosynthesis.

Motion Infographic

Mole Calculations with Kitchen Chemistry
Objective: Practice using the mole formula.

- Use common items like salt (NaCl) or baking soda ($NaHCO_3$).
- Weigh out a small amount (e.g. 5g).
- Calculate the number of moles using: Moles=Mass (g)MrMoles=MrMass (g)
- Extension: Calculate the number of particles using Avogadro's number.

NEA - Identify the Problem or Question

- Clearly state what you want to investigate.
- Example: *Does temperature affect the rate of enzyme activity?*

Research and Background Knowledge

- Gather relevant scientific information.
- Understand key terms, previous studies, and theoretical context.

Formulate a Hypothesis

- Make a testable prediction based on your research.
- Example: *If temperature increases, then enzyme activity will increase up to an optimum point.*

Plan the Method

- List materials and equipment.
- Write a step-by-step method that is clear and repeatable.
- Identify:
  - **Independent variable** (what you change)
  - **Dependent variable** (what you measure)

Science in the News

- **Task:** Find a recent science-related news article (e.g. climate change, medical breakthrough, space exploration).
- **Activity:** Summarise the article and explain:
  - What science is involved?
  - How does it affect society?
  - What are the ethical or environmental implications?

Science and You

- **Task:** Reflect on how science affects your daily life.
- **Activity:** Write a short journal entry or blog post:
  - How do you use science at home?
  - What scientific developments have improved your life?
  - What science-related issue do you care about most?

Extracurricular activities Careers links Curriculum links Threshold topics (bold) PSHE, PD and cultural capital links

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

	Objective: Summarise key motion concepts visually.
	• Create an infographic or poster showing:
	  • Definitions and formulas (speed, velocity, acceleration)
	  • Units
	  • Example problems
	• Use colour coding and icons for clarity.
	
	Motion in Games or Sports
	Objective: Apply motion concepts to real-world contexts.
	• Choose a sport or video game (e.g. football, racing games).
	• Describe how motion, speed, and forces are involved.
	• Link to Newton's laws or energy transfer.
		• **Control variables** (what you keep the same)
		Risk Assessment and Ethical Considerations
		• Identify potential hazards and how to reduce them.
		• Consider ethical implications if using living organisms or sensitive materials.
		Conduct the Experiment
		• Follow your method carefully.
		• Record all observations and measurements accurately.
		Collect and Present Data
		• Use tables, charts, or graphs to organise your results.
		• Include units and labels.
		Analyse the Results
		• Look for patterns, trends, or anomalies.
		• Use calculations where appropriate (e.g. averages, rates).
		Draw Conclusions
		• State whether your hypothesis was supported.
		• Explain your findings using scientific reasoning.
		Evaluate the Investigation
		• Discuss:
		  • Reliability (repeatability of results)
		  • Accuracy (how close to true values)
		  • Validity (were variables controlled?)
		• Suggest improvements or further investigations.	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

Extend your learning 	**Electricity Cost Comparison**
	Objective: Link science to real-world economics.
	• Look at your home electricity bill or use a sample online.
	• Calculate the cost of running a device for a week or month.
	Watch and Reflect
	Objective: Deepen understanding through media.
	• Watch a documentary or YouTube video on:
	  • How electricity is generated and distributed
	  • Renewable vs. non-renewable energy
	• Write a short reflection or summary.
		Research Task: Chemistry in Products
		Objective: Apply quantitative chemistry to real life.
		• Choose a household product (e.g. toothpaste, bleach).
		• Research the active ingredient and its concentration.
		• Convert between g/dm³ and mol/dm³.
			Ethics Roleplay
			• **Task:** Choose a controversial science topic (e.g. gene editing, animal testing).
			• **Activity:** Write a short script or dialogue between:
			  • A scientist
			  • A concerned citizen
			  • A policymaker
			• **Goal:** Show different perspectives and how decisions are made.
			Documentary Review
			• **Task:** Watch a science documentary (e.g. *Our Planet*, *The Race for the Vaccine*, *Cosmos*).
			• **Activity:** Write a short review:
			  • What did you learn?
			  • How does the science affect people or the planet?
			  • Was the science communicated clearly?

Extracurricular activities Careers links Curriculum links Threshold topics (bold) PSHE, PD and cultural capital links

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

2025-2026	Year 13 Applied Science					
	Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Knowledge, Skills and Understanding 	Unit 18 Microbiology Unit 2 Laboratory techniques	Unit 2 Laboratory techniques	Unit 21 Product testing techniques	Coursework	Revision	
	Coursework		Exam resits Coursework		Exam resits	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

Embed your knowledge

Microbe Research Project
Objective: Explore the diversity and roles of microorganisms.

- Choose one type of microorganism (e.g. *E. coli*, *Lactobacillus*, *Staphylococcus aureus*).
- Research:
  - Structure and classification
  - Where it's found
  - Benefits or risks to humans
- Present as a fact sheet, poster, or short video.

Aseptic Technique Simulation
Objective: Understand contamination control.

- Watch a video on aseptic techniques in microbiology.
- Practice a mock version using clean hands, gloves, and kitchen tools.
- Reflect: *Why is each step important in preventing contamination?*

Lab Equipment ID and Function
Objective: Recognise and understand lab tools.

- Create flashcards or a digital poster showing:
  - Common lab equipment (e.g. pipette, centrifuge, autoclave)
  - Their uses and safety considerations
- Use online images or diagrams to support learning.

Cleaning Product Effectiveness Test
Objective: Compare the cleaning power of different household products.

- Choose 2–3 cleaning products (e.g. vinegar, bleach, washing-up liquid).
- Apply each to a stained surface (e.g. muddy tile, greasy plate).
- Record:
  - Time taken to clean
  - Visual cleanliness
  - Any residue left
- Present results in a table or bar chart.

Viscosity Test of Liquids
Objective: Measure and compare viscosity.

- Use a stopwatch to time how long it takes different liquids (e.g. shampoo, hand soap, oil) to flow down a tilted surface.
- Rank from most to least viscous.
- Link to product usability and consumer preference.

pH Testing of Household Products
Objective: Test acidity/alkalinity.

- Use pH paper or a digital pH meter (if available).
- Test items like lemon juice, soap, toothpaste, and cola.
- Record and compare pH values.
- Discuss how pH affects product function and safety.

Keyword Match-Up

Flashcard Creation

- Use paper or apps like Quizlet to create flashcards for:
  - Key terms and definitions
  - Equations and units
  - Lab techniques and safety symbols

Past Paper Practice

- Download past exam questions or sample assessments.
- Time yourself and mark using the mark scheme.
- Highlight areas for improvement.

Mind Maps

- Create topic-based mind maps (e.g. microbiology, electricity, motion).
- Include:

Extracurricular activities Careers links Curriculum links Threshold topics (bold) PSHE, PD and cultural capital links

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

	Quick Quiz Challenge
	• Create a 10-question quiz on a topic.
	• Swap with a classmate or quiz a family member.
	• Use multiple choice, true/false, and short answers.
	
	Visual Revision Aids
	• Create posters or infographics for:
	  • Scientific processes (e.g. titration, aseptic technique)
	  • Equipment and their uses
	  • Safety procedures
		• Write key terms and definitions on separate cards.
		• Mix them up and match them correctly.
		• Time yourself and try to beat your score.
		
		Data Interpretation Practice
		• Use graphs, tables, or charts from textbooks or online.
		• Answer questions like:
		  • What trend is shown?
		  • What does this data suggest?
		  • Are there any anomalies?
			• Key concepts
			• Diagrams
			• Links between ideas
			
			Teach It Back
			• Record yourself explaining a topic as if teaching someone else.
			• Focus on clarity and accuracy.
			• Watch it back to identify gaps in understanding.	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**

CIM - Curriculum Intent Map Applied Science
Exam board - A'Level: OCR

Extend your learning 	Community garden project
	
	Energy conservation challenge
	
	Environmental documentaries
	
	Home Hygiene Investigation
	Objective: Understand microbial contamination and hygiene.
	• Swab different surfaces (e.g. phone, kitchen counter, door handle) using cotton buds.
	• Press onto slices of bread or agar (if available).
	• Observe changes over several days.
	• Record and analyse which surfaces had the most microbial growth.
	Note: Use gloves and seal samples in bags. Dispose of safely.
	
	Accuracy vs. Precision Task
	Objective: Understand measurement quality.
	• Use a kitchen scale to weigh the same item (e.g. 5 times).
	• Record and compare the values.
	• Discuss:
	  • Were the results accurate (close to true value)?
	  • Were they precise (consistent)?
		Sports injury prevention project
		
		Muscoloskeletal health fair
		
		Artistic Representation of Musculoskeletal Anatomy:
		• Encourage students to express their understanding of musculoskeletal anatomy through artistic mediums.
		• This can include creating detailed anatomical drawings, sculptures, or digital representations.
			Lymphatic health awareness campaign
			Holistic health fair
			Longitudinal Health Journals:
			• Have students maintain longitudinal health journals where they record their dietary habits, physical activity, and digestive health over an extended period.
			• Periodic reflections and analysis can provide a personalized understanding of the impact of lifestyle on digestive well-being.	

Extracurricular activities **Careers links** **Curriculum links** **Threshold topics (bold)** **PSHE, PD and cultural capital links**