



SCIENCE

CURRICULUM OVERVIEW



Quality of Education
NOTTINGHAM ACADEMY

SCIENCE CURRICULUM- LONG TERM PLAN

CURRICULUM INTENT

At Nottingham Academy, our science curriculum aims to cultivate students into informed citizens who comprehend the phenomena of the world around them. By fostering a deep, broad understanding of science, we aim to instil a sense of wonder and full engagement with the natural world. Our curriculum equips students with the powerful knowledge needed to interpret scientific news, make informed health decisions, and engage confidently in discussions about critical environmental issues.

All students study science up to GCSE, following a five-year curriculum plan that builds on Key Stage 2 knowledge and extends beyond the National Curriculum for a comprehensive science education. At Key Stage 4, students choose between separate Biology, Chemistry, and Physics (leading to three GCSEs) or combined science (covering all three disciplines, leading to two GCSEs), following the AQA specification.

At Key Stage 5, we offer A Levels in Biology, Chemistry, and Physics through the OCR specification. Our program emphasizes extensive practical work, teaching students to conduct scientific investigations and apply their knowledge in various contexts, preparing them for university and the workplace.

Adaptations for students with SEND needs include differentiated instruction and resources to meet diverse learning needs, use of visual aids, hands-on activities, and technology to enhance understanding, and regular assessments and feedback to ensure all students know more, remember more, and do more, tailored to their individual learning needs. By focusing on these principles, we aim to ensure every student can succeed and thrive in science, knowing more, remembering more, and doing more.

KEY CONCEPTS

Earth	Matter	Organisms	Forces	Energy
<ul style="list-style-type: none"> Understanding geological processes, structure of the earth, and types of rocks. Learning about outer space, climate change, and human impact on the environment. 	<ul style="list-style-type: none"> Understanding atomic structure, states of matter, and the particle model. Learning about separating substances and chemical reactions. 	<ul style="list-style-type: none"> Study of cells, tissues, and organ systems. Exploring genetics, evolution, and biodiversity. 	<ul style="list-style-type: none"> Introduction to gravity, speed, and force calculations. Studying pressure, friction, and turning forces. 	<ul style="list-style-type: none"> Learning about energy transfers, conservation, and different energy stores. Investigating energy resources and sustainable use to reduce the impact on the environment.
Electromagnetism	Waves	Ecosystems	Genes	Reactions
<ul style="list-style-type: none"> Understanding electrical circuits, current, and potential difference. Exploring magnetism and the creation of electromagnets. 	<ul style="list-style-type: none"> Study of sound waves, light waves, and electromagnetic waves. Conducting experiments to model wave behaviour and properties. 	<ul style="list-style-type: none"> Investigating interactions between organisms and their environment. Learning about biodiversity, food chains, and human impact on ecosystems. 	<ul style="list-style-type: none"> Understanding the principles of genetics, inheritance, and variation. Learning about genetic disorders, gene expression, and modern genetic technologies. 	<ul style="list-style-type: none"> Study of chemical reactions, reaction rates, and energy changes. Understanding types of reactions, catalysts, and balancing chemical equations.

KEY CONCEPTS MAPPING

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7	Working scientifically, Matter	Matter, Organisms	Forces, Reactions	Energy, Genes	Electromagnetism, Earth	Waves, Ecosystems
Year 8	Forces, Matter	Energy, Organisms	Organisms, Earth	Reactions, Genes	Waves, Electromagnetism	Ecosystems Recap
Year 9	Life processes, Chemical reactions, Physical interactions	Life processes, Chemical reactions, Physical interactions	Cell structure, Atomic structure, Radioactivity	Cell transport, Particle model, Periodic table	Cell division, Chemical bonding, Energy conservation	Organisation of animals, Properties of matter, Energy transfer
Year 10	Chemical changes, Energy changes, Photosynthesis	Electricity, Respiration	Chemical calculations, Rate of reaction, Nervous system	Forces, Hormonal coordination	Earth's atmosphere and resources, Reproduction	PPE revision and feedback, Variation and evolution
Year 11	Genetics, Waves	Organic chemistry, Interdependence	Ecosystems, Electromagnetism	Revision consolidation and exam preparation	Revision consolidation and exam preparation	GCSE examinations
Year 12 Biology	Module 3 - Gas Exchange and the Heart Module 2 - Cells	Module 3 - Plant Transport Module 2 - Biological Molecules	Module 4 - Immune System Module 2 - DNA and Genes	Module 4 - Classification and Evolution Module 2 - Enzymes	Module 4 - Biodiversity Module 2 - Cell Membrane and Cell Division	Practical Skills and Revision
Year 13 Biology	Module 5 - Nervous System Module 6 - Genetics	Module 5 - Homeostasis Module 6 - Genetic Engineering	Module 5 - Photosynthesis Module 6 - Biotechnology and Microorganisms	Module 5 - Respiration Module 6 - Ecosystems	Revision and Exams	
Year 12 Chemistry	Atomic Structure and Bonding	Acids, Redox, and Organic Chemistry	Periodicity and Organic Reactions	Energetics and Reaction Rates	Equilibrium and Organic Synthesis	PAG Review and Preparation for Year 13:
Year 13 Chemistry	Reaction Rates and Benzene Chemistry	Equilibrium and Amines	pH and Spectroscopy	Thermodynamics and Transition Metals	Electrochemistry and Revision	A-Level Revision
Year 12 Physics	Foundations of Physics and Motion	Forces in Action, Work, Energy and Power, & Materials	Laws of Motion and Momentum, Current and Charge, & Energy, Power and Resistance	Electrical Circuits and Waves I	Waves II and Quantum Physics	Thermal Physics and Ideal Gases
Year 13 Physics	Circular Motion, Oscillations, and Capacitance	Gravitational Fields, Electric Fields, and Magnetic Fields	Stars, Particle Physics, and Radioactivity	Cosmology and Nuclear Physics	Medical Imaging	A-Level Revision

DISCIPLINARY LITERACY- KEYWORDS & TERMINOLOGY

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7	Working scientifically, Matter Atom, element, particle, molecule compound, energy, variable. temperature, hazard, beaker	Matter, Organisms Substance, solubility, solute, arrangement evaporation, bone, microscope muscle, skeletal, nucleus	Forces, Reactions Force, unbalanced, direction, acceleration, weight, acid, alkali, indicator, metal, reactant.	Energy, Genes Joules, transfer, fossil fuels, power, renewable, dissipate, variation, continuous, gamete, fertilisation.	Electromagnetism, Earth Igneous, metamorphic, sedimentary, ceramics, observations, resistance, parallel, charge, electric field, potential difference	Waves, Ecosystems Supersonic, Vacuum, Amplitude, Frequency, Lenses, Fertilisation, Pollination, Dispersal, Interdependence, Population
Year 8	Forces, Matter Pivot, moment, compression. extension, pressure, collide, atom. element, periodic table, atomic number	Energy, Organisms Electron, proton, neutron, periodic table, mixture, temperature, thermal, conductor, insulator, transfer	Organisms, Earth Trachea, alveolus, diaphragm, respiration, carbohydrate, vitamin, combustion, ore, extinction, biodiversity	Reactions, Genes Conservation, catalyst, endothermic, exothermic, activation, evolution, fossils, competition, ecosystem, population	Genes, Waves, Electromagnetism Natural selection, extinct, evolution, fossils, electromagnetic, spectrum, ionisation, magnetic, attract, repel.	Ecosystems Recap Glucose, Oxygen, Haemoglobin, Anaerobic, Fermentation, Biotechnology, Yeast, Microorganisms, Photosynthesis, Chlorophyll
Year 9	Life processes, Chemical reactions , Physical interactions Potential difference, gravity, mitochondria, ribosomes, membrane, element, atom, proton, neutron, electron	Life processes, Chemical reactions, Physical interactions Acid, alkali, compound, potential difference, current, resistance, electromagnet, anaerobic, respiration, photosynthesis	Cell structure, Atomic structure, Radioactivity Atom, ion, isotope, alpha, beta, gamma, vacuole, chloroplast, cell wall, half-life	Cell transport, Particle model, Periodic table Diffusion, osmosis, active transport, period, group, element, vaporisation, fusion, density, latent heat	Cell division, Chemical bonding, Energy conservation Ion, compound, ionic, covalent, valence, mitosis, cell cycle, kinetic, electrostatic, gravitational potential	Organisation of animals, Properties of matter, Energy transfer Plasma, platelets, arteries, veins, capillaries, conduction, convection, radiation, insulator, efficiency
Year 10	Chemical changes, Energy changes , Photosynthesis Photosynthesis, glucose, respiration, factor, aerobic, anaerobic, electrolysis, acid, alkali, cathode	Electricity, Respiration Current, potential difference, charge, resistance, component, endothermic, exothermic, equilibrium, energy, neutralisation	Chemical calculations, Rate of reaction, Nervous system Homeostasis, receptor, gland, stimuli, insulin, moles, relative, exothermic, endothermic, reversible	Forces, Hormonal coordination Ovaries, oestrogen, ovulation, testosterone, scalar, vector, resultant, friction, resolution, Newtons	Earth's atmosphere and resources, Reproduction Acceleration, Hooke's law, extension, homozygous, heterozygous, genotype, phenotype, particulate, pollutant, atmosphere	PPE revision and feedback, Variation and evolution Volcano, renewable, gene, distillation, reduce, recessive, evolution, genome, mutation, variation.
Year 11	Genetics, Waves Transverse, longitudinal, oscillations, radiation, infra-red, electromagnetic, genotype, phenotype, inherited, evolution	Organic chemistry , Interdependence Magnetic, induced, electromagnet, attraction, repel, community, interdependence, abundance, distribution, quadrat	Ecosystems, Electromagnetism Particulates, peat bog, carbon store, global dimming, cracking, catalyst, polymers, monomers, combustion, hydrocarbon	Revision consolidation and exam preparation Mitosis, meiosis, Biuret's, glucagon, glycogen	Revision consolidation and exam preparation	GCSE examinations

Year 12 Biology	<p>Module 3 - Gas Exchange and the Heart lymph, tissue fluid, spiracles</p> <p>Module 2 - Cells Nucleolus, lysosome, golgi apparatus, graticule,</p>	<p>Module 3 - Plant Transport Xylem, phloem, transpiration, translocation, potometer</p> <p>Module 2 - Biological Molecules Carbohydrate, starch, protein, lipids</p>	<p>Module 4 - Immune System Neutrophils, phagosomes, antibodies, auto immune disease, B- lymphocytes,</p> <p>Module 2 - DNA and Genes mRNA, DNA, nucleic acid, phosphate, deoxyribose</p>	<p>Module 4 - Classification and Evolution Phylogeny, binomial naming, evolution, classification</p> <p>Module 2 - Enzymes Substrate, denature, inhibitor,</p>	<p>Module 4 - Biodiversity Transect, sampling, qualitative, quantitative Module 2 - Cell Membrane and Cell Division Hydrophobic, hydrophilic, mitosis, meiosis, haploid, diploid,</p>	<p>Practical Skills and Revision statistical analysis, agar, aseptic, variable, significant, control, independent, dependent</p>
Year 13 Biology	<p>Module 5 - Nervous System Neurone, dendrite, convergent, divergent, myofibrils,</p> <p>Module 6 - Genetics operon, intron, exon, repressor, activator</p>	<p>Module 5 - Homeostasis Endotherm, ectotherm, endocrine, deamination, dialysis,</p> <p>Module 6 - Genetic Engineering micropropagation, somatic therapy, embryo twinning,</p>	<p>Module 5 - Photosynthesis Pigment, coenzyme, photophosphorylation, hexose, redox,</p> <p>Module 6 - Biotechnology and Microorganisms aseptic, immobilised enzymes, electrophoresis, primer, bacteriophage</p>	<p>Module 5 - Respiration Kreb cycle, oxidation, phosphorylation, Krebs cycle,</p> <p>Module 6 - Ecosystems denitrification, climax community, trophic level, biomass, producer, decomposer</p>	<p>Revision and Exams</p>	
Year 12 Chemistry	<p>Atomic Structure and Bonding</p>	<p>Acids, Redox, and Organic Chemistry</p>	<p>Periodicity and Organic Reactions</p>	<p>Energetics and Reaction Rates</p>	<p>Equilibrium and Organic Synthesis</p>	<p>PAG Review and Preparation for Year 13</p>
Year 13 Chemistry	<p>Reaction Rates and Benzene Chemistry</p>	<p>Equilibrium and Amines</p>	<p>pH and Spectroscopy</p>	<p>Thermodynamics and Transition Metals</p>	<p>Electrochemistry and Revision</p>	<p>A-Level Revision</p>
Year 12 Physics	<p>Foundations of Physics Absolute Uncertainties, random error , percentage uncertainties, vernier scale, SI units</p> <p>Motion Acceleration, deceleration, velocity</p>	<p>Forces in Action Displacement, Free-Fall, Instantaneous speed, Projectile motion</p> <p>Work, Energy and Power Kinetic energy, gravitational potential</p> <p>Materials Strain, stress, elastic deformation, tensile strength</p>	<p>Laws of Motion and Momentum Archimedes principle , Couple, Equilibrium, Moment of force, Normal contact force ,Principle of moments, Tension, Triangle of forces, Upthrust, Weight,</p> <p>Current and Charge Coulomb, drift velocity, Kirchoff;s Law</p> <p>Energy, Power and Resistance Resistivity, kinetic, electromotive force</p>	<p>Electrical Circuits Kirchhoff's First Law Mean Drift Velocity Quantisation of Charge Semiconductors</p> <p>Waves I Amplitude, Antinode, Coherence,</p>	<p>Waves II Constructive, Interference, Critical Angle, Destructive Interference , Diffraction,</p> <p>Quantum Physics Quantum charge, photoelectric effect, threshold</p>	<p>Thermal Physics Absolute Temperature, Absolute Zero,</p> <p>Ideal Gases Boyle's Law, Brownian Motion. Change of Phase, Equation of State</p>

<p>Year 13 Physics</p>	<p>Circular Motion Angular Velocity, Centripetal Acceleration Centripetal Force</p> <p>Oscillations Simple harmonic motion, damping, driving, resonance</p> <p>Capacitance Frequency Capacitor, Farad, Time Constant, Coulomb's Law</p>	<p>Gravitational Fields Field Lines, Parallel Plate Capacitor Permittivity</p> <p>Electric Fields Electric Field Strength, Electric Field Electric Potential Energy, Faraday's Law</p> <p>Electric Potential</p> <p>Magnetic Fields Field Lines, lens law, magnetism, magnetic flux density, Faraday's Law</p>	<p>Stars Absorption, emission, Hertzsprung-Russell diagram, luminosity</p> <p>Particle Physics Anti particles, quarks, hadrons, leptons, Pair Production</p> <p>Radioactivity Gamma Rays, Hadrons, Half-Life, Isotopes, Leptons, Mass Defect, Moderator, Neutron, Decay Constant, Electron</p>	<p>Cosmology Doppler effect, Hubble's Law, Big bang theory</p> <p>Nuclear Physics Nuclear Fission, Nuclear Fusion Nucleon Number, Positron, Proton Number, Proton, Quarks Radioactive Dating Random Nature of Decay Strong Nuclear Force</p>	<p>Medical Imaging A-Scan, Acoustic Impedance, Anode, B-Scan, Cathode, Compton Effect, Computerised Axial Tomography Scanning, Contrast Media, Gamma Camera, Medical Tracers, Piezoelectric Effect Positron Emission Tomography Scans, Simple Scatter Ultrasound</p>	<p>A-Level Revision</p>
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ADAPTATIONS FOR SEND STUDENTS IN SCIENCE LESSONS

GENERAL SCIENCE SEND STRATEGIES

<p>READING SUPPORT</p> <ul style="list-style-type: none"> • Pre-Reading Activities: Introduce key vocabulary and concepts before reading the text to build background knowledge. • Glossaries and Visual Aids: Provide glossaries with definitions and visual aids to help students understand technical terms. • Annotating Texts: Teach students to annotate texts by highlighting key information and summarizing sections in the margins. • Guided Reading Sessions: Use targeted questions to guide students through complex texts, ensuring comprehension. • Reading Logs: Encourage students to maintain reading logs to track progress and reflect on their understanding. • Pairing Reading with Visuals: Support reading with visual aids, diagrams, and videos to reinforce content. • Multimodal Texts: Provide texts in various formats, such as digital articles with interactive elements, videos, and podcasts, to cater to different learning preferences. Encourage students to explore these resources and discuss them in class. • Graphic Organizers: Use graphic organizers like concept maps, Venn diagrams, and T-charts to help students visualize and organize information. This is especially useful for comparing and contrasting concepts such as elements, compounds, and mixtures or different types of forces.
<p>EXAM PREPARATION</p> <p>Science-Specific Strategies:</p> <ul style="list-style-type: none"> • Visual Aids and Step-by-Step Practice Problems: Use diagrams, flowcharts, and structured practice problems to help students grasp difficult concepts. • Regular Practice Tests with Feedback: Provide frequent practice tests with detailed feedback to build confidence and identify areas for improvement. <p>General Strategies:</p> <ul style="list-style-type: none"> • Clear and Concise Revision Guides: Offer revision guides that break down key concepts into manageable chunks, using bullet points and visual aids. • Variety of Revision Methods: Encourage the use of different revision techniques, such as mind maps, flashcards, and interactive quizzes, to cater to diverse learning styles.

SEND WITHIN SCIENCE KEY CONCEPTS

<p>Earth</p> <ul style="list-style-type: none"> • Visual Aids: Use geological maps and models to illustrate earth structures and processes. • Interactive Demonstrations: Incorporate hands-on activities like rock identification and simulations of volcanic eruptions. 	<p>Matter</p> <ul style="list-style-type: none"> • Simplified Diagrams: Provide clear, labelled diagrams of atomic structures and states of matter. • Practical Experiments: Conduct simple, safe experiments to demonstrate changes of state, such as melting ice or evaporating water. 	<p>Organisms</p> <ul style="list-style-type: none"> • Visual Supports: Use detailed diagrams and models of cells, tissues, and organ systems. • Real-Life Examples: Relate lessons to familiar concepts, like comparing the human body to a well-known machine or system (e.g., comparing the heart to a pump). 	<p>Forces</p> <ul style="list-style-type: none"> • Visual Demonstrations: Use videos and interactive simulations to show the effects of gravity, friction, and other forces. • Simplified Calculations: Break down force calculations into smaller, manageable steps, using real-life examples to illustrate concepts. 	<p>Energy</p> <ul style="list-style-type: none"> • Interactive Models: Use physical models to demonstrate energy transfers and conservation (e.g., pendulums, roller coasters). • Step-by-Step Guidance: Provide clear instructions and guided practice for experiments involving energy changes, such as measuring temperature changes in exothermic and endothermic reactions.
<p>Electromagnetism</p> <ul style="list-style-type: none"> • Hands-On Activities: Allow students to build simple circuits and electromagnets using basic materials. • Visual Explanations: Use diagrams and videos to illustrate the concepts of current, voltage, and magnetic fields. 	<p>Waves</p> <ul style="list-style-type: none"> • Visual and Auditory Aids: Use animations and sound demonstrations to explain the properties of sound and light waves. • Interactive Experiments: Conduct experiments where students can see and hear the effects of wave behaviours, such as using tuning forks and water waves. 	<p>Ecosystems</p> <ul style="list-style-type: none"> • Visual Charts: Use food chains, food webs, and ecosystem diagrams to illustrate interactions between organisms. • Field Trips and Outdoor Learning: If possible, organize visits to local ecosystems or nature reserves to observe real-life examples of concepts discussed in class. 	<p>Genes</p> <ul style="list-style-type: none"> • Visual Tools: Use genetic diagrams and models to explain inheritance patterns and genetic disorders. • Interactive Simulations: Utilize computer simulations to model genetic crosses and explore genetic variation. 	<p>Reactions</p> <ul style="list-style-type: none"> • Practical Experiments: Conduct hands-on chemical reactions with clear, step-by-step guidance. • Visual Aids: Use reaction equations and diagrams to illustrate the process of chemical changes and reaction rates.

LONG TERM PLAN- A CURRICULUM OVERVIEW

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Year 7	<p>Working scientifically, matter</p> <p>Students will focus on practical skills and report writing, practicing graph drawing and maths in science. In the matter topic, students will cover changes of state and the particle model.</p>	<p>Matter, organisms</p> <p>Students will learn the structure of an atom and methods for separating substances in the matter topic. In the organisms topic, students will learn about the skeleton and movement, followed by the structure of cells.</p>	<p>Forces, reactions</p> <p>Students will cover gravity, speed-distance time graphs, and basic calculations in the forces topic. In the reactions topic, students will learn about acids and alkalis, practical skills such as making salts, and reactions of metals.</p>	<p>Energy, genes</p> <p>Students will learn about the unit of energy, investigate energy in food, and other stores of energy in the energy topic. In the genes topic, students will learn about variation between living things, puberty, and reproduction.</p>	<p>Electromagnetism, earth</p> <p>Students will be introduced to electrical current, charge, and potential difference, and they will build electric circuits in the electromagnetism topic. In the earth topic, students will learn the structure of the earth, types of rocks, and outer space.</p>	<p>Waves, ecosystems</p> <p>Students will focus on sound waves and light waves in the waves topic. In the ecosystems topic, students will learn how living things interact with each other and the environment, including pollination and seed dispersal.</p>
Year 8	<p>Forces, matter</p> <p>Students will be introduced to friction, drag, turning forces, and pressure in the forces topic. The structure of an atom is revisited, and students will learn about the periodic table and properties of elements in the matter topic.</p>	<p>Energy, organisms</p> <p>Students will learn about energy transfers and the relationship between energy and work in the energy topic. In the organisms topic, students will learn about the effects of smoking, alcohol, and drugs.</p>	<p>Organisms, earth</p> <p>Students will explore cell structure further and be introduced to cell transport in the organisms topic. The earth topic will focus on climate change, global warming, and the human impact on the earth.</p>	<p>Reactions, genes</p> <p>In the reactions topic, students will learn about energy changes in chemical reactions and carry out experiments to demonstrate this. In the genes topic, students will learn about genetics, evolution, and maintaining biodiversity.</p>	<p>Waves, electromagnetism</p> <p>Students will learn about water waves, radiation, and carry out an experiment to model waves in the waves topic. The phenomenon of magnetism is revisited, and students will make electromagnets in the electromagnetism topic.</p>	<p>Ecosystems recap</p> <p>Through learning about respiration and photosynthesis, students will learn about the needs of organisms and how they obtain resources from the environment. The term will recap core knowledge from biology, chemistry, and physics to support students in accessing Year 9 content.</p>
Year 9	<p>Life processes, chemical reactions, physical interactions</p> <p>Students will learn about cells as the basic structural unit of all organisms and the importance of enzymes in biological reactions in the life processes topic. In the chemical reactions topic, students will learn about solubility and revisit atomic structure in detail and the arrangement of elements in the periodic table. Forces and motion will be explored in the physical interactions topic, with a focus on graph skills.</p>	<p>Life processes, chemical reactions, physical interactions</p> <p>Students will learn how plants and animals are adapted to carry out respiration and how the structure of plants enables efficient photosynthesis in the life processes topic. In the chemical reactions topic, students will learn about testing for common gases, common chemical reactions, and making a salt from an acid and a base. The physical interactions topic will cover fundamentals of electricity, energy transfers, and magnetism.</p>	<p>Cell structure, atomic structure, radioactivity</p> <p>Students will add detail to their knowledge of cell structure and specialized cells in the cell structure topic. In the atomic structure topic, students will learn how models of the atom have developed over time. The radioactivity topic will cover properties of radioactive substances, isotopes, and uses of radioactivity.</p>	<p>Cell transport, the particle model, the periodic table</p> <p>Students will learn about osmosis, diffusion, and active transport with practical investigations in the cell transport topic. The particle model topic will cover radiation, density, and how energy of particles impacts matter. The periodic table topic will cover how the table was developed over time, properties of different groups, and trends in the table.</p>	<p>Cell division, chemical bonding, energy conservation</p> <p>In the bonding topic, students will learn about ionic, covalent, and metallic bonding and the properties of substances. The energy topic will cover energy transfer, uses of insulation, and reducing energy dissipation.</p>	<p>Organization of animals, properties of matter, energy transfer</p> <p>In the organization topic, students will learn about cells, tissues, organs, and organ systems, including the digestive system. The particle model will be explored with practical work to find the density of objects. The energy transfer topic will continue with learning about how energy is transferred and uses of insulation to reduce energy dissipation.</p>

<p style="text-align: center;">Year 10</p>	<p>Chemical changes, energy changes, photosynthesis</p> <p>Students will learn about reduction, oxidation, and the reactivity of metals, acids, and alkalis in the chemical changes topic. They will investigate the energy changes that occur during different chemical reactions. In the photosynthesis topic, students will learn about factors affecting photosynthesis and investigate the rate of photosynthesis in pondweed.</p>	<p>Electricity, respiration</p> <p>In the electricity topic, students will investigate circuits and learn about the efficiency of electrical appliances. The respiration topic will cover aerobic and anaerobic respiration in plants, animals, and yeast, including the use of yeast in industry and the effect of exercise on humans.</p>	<p>Chemical calculations, rate of reaction, the nervous system</p> <p>Students will learn how to calculate relative atomic mass and balance chemical equations in the chemical calculations topic. The rate of reaction topic will cover factors affecting reaction rates and reversible reactions. The nervous system topic will include learning about the structure of the human nervous system, reflex actions, and factors affecting human reaction time.</p>	<p>Forces, hormonal coordination</p> <p>In the forces topic, students will investigate motion, balanced and unbalanced forces, and learn how to calculate force values. The hormonal coordination topic will cover the control of blood glucose concentration and hormones in human reproduction.</p>	<p>The Earth's atmosphere and resources, reproduction</p> <p>Students will learn about the composition of the Earth's atmosphere throughout history, the impact of humans on the atmosphere and climate, and natural resources in the Earth's atmosphere and resources topic. The reproduction topic will cover cell division, DNA, genetic inheritance, and inherited diseases.</p>	<p>PPE revision and feedback, variation and evolution</p> <p>Students will review and consolidate their knowledge in preparation for PPE exams. In the variation and evolution topic, students will learn about the process of evolution by natural selection, the fossil record, selective breeding, genetic engineering, and the ethics surrounding these topics.</p>
<p style="text-align: center;">Year 11</p>	<p>Genetics, waves</p> <p>Students will learn how characteristics are passed from parents to offspring, selective breeding, genetic engineering, and the ethics surrounding these topics in the genetics topic. In the waves topic, students will learn about properties of waves and electromagnetic waves and their uses.</p>	<p>Organic chemistry, interdependence</p> <p>Students will learn about different organic chemicals and their uses as fuels. In the chemical analysis topic, students will carry out tests for various gases, investigate chromatography, and learn about mixtures. The interdependence topic will cover the relationship between organisms and their environment, distribution, and abundance of species.</p>	<p>Ecosystems, electromagnetism</p> <p>The ecosystems topic will explore feeding relationships, material cycling, the importance of biodiversity, and the impact humans have on the natural living world. In the electromagnetism topic, students will learn about magnetism, the working of a motor, and factors affecting the strength of an electromagnet.</p>	<p>Revision consolidation and exam preparation</p> <p>Students will engage in revision, consolidation of knowledge, and preparation for their GCSE examinations.</p>		

Year 12 Biology	<p>Module 3 - Gas Exchange and the Heart</p> <p>Students will study the structure and function of gas exchange and transport systems in a range of animals and in terrestrial plants.</p> <p>Module 2 - Cells</p> <p>Students will learn that all living organisms have similarities in cellular structure, biochemistry, and function. This module also provides an opportunity to use microscopy to study the cell structure of various organisms.</p>	<p>Module 3 - Plant Transport</p> <p>Students will study transport systems in multicellular organisms, with examples from terrestrial green plants and various animal phyla.</p> <p>Module 2 - Biological Molecules</p> <p>Students will study biologically important molecules, including carbohydrates, proteins, and water.</p>	<p>Module 4 - Immune System</p> <p>Students will gain an understanding of various pathogenic organisms and the ways in which plants and animals have evolved defences against disease. The evolution of pathogens and its impact on disease treatment will also be covered.</p> <p>Module 2 - DNA and Genes</p> <p>Students will study nucleic acids in terms of their structure and function.</p>	<p>Module 4 - Classification and Evolution</p> <p>Students will study relationships between organisms, considering variation, evolution, and phylogeny.</p> <p>Module 2 - Enzymes</p> <p>Students will study the structure and mode of action of enzymes in catalysing biochemical reactions.</p>	<p>Module 4 - Biodiversity</p> <p>Students will study the biodiversity of organisms and how it can be measured. This module also serves as an introduction to ecology, emphasizing practical techniques and the importance of maintaining biodiversity.</p> <p>Module 2 - Cell Membrane and Cell Division</p> <p>Students will learn that membranes form barriers within and at the surface of cells. This module also considers the structure of membranes related to methods of molecular transport, cell division, specialization, and therapeutic use of stem cells.</p>	<p>Practical Skills and Revision</p> <p>Students will focus on developing practical skills and revising the content covered in previous modules.</p>
Year 13 Biology	<p>Module 5 - Nervous System</p> <p>Students will learn about the importance of communication within the body, achieved through chemical and/or electrical signals, and how this enables organisms to respond to stimuli.</p> <p>Module 6 - Genetics</p> <p>Students will study the role of genes in regulating and controlling cell function and development.</p>	<p>Module 5 - Homeostasis</p> <p>Students will study how communication is fundamental to homeostasis, with control of temperature, blood sugar, and blood water potential being studied as examples.</p> <p>Module 6 - Genetic Engineering</p> <p>Students will study practical techniques used to manipulate DNA, such as sequencing and amplification, and their therapeutic medical use.</p>	<p>Module 5 - Photosynthesis</p> <p>Students will study the biochemical pathways of photosynthesis and respiration, with an emphasis on the formation and use of ATP as the source of energy for biochemical processes and synthesis of biological molecules.</p> <p>Module 6 - Biotechnology and Microorganisms</p> <p>Students will study the use of microorganisms in biotechnology and the associated ethical considerations. It is important that learners develop a balanced understanding of such issues.</p>	<p>Module 5 - Respiration</p> <p>Students will gain an appreciation of the role of microorganisms in recycling materials and maintaining balance within ecosystems.</p> <p>Module 6 - Ecosystems</p> <p>Students will study the need to conserve environmental resources sustainably while considering the potential conflict arising from the needs of an increasing human population. They will also consider the impacts of human activities on the natural environment and biodiversity.</p>	<p>Revision and Exams</p> <p>Students will engage in revision and exam preparation to consolidate their knowledge and skills.</p>	

Year 12 Chemistry	<p>Atomic Structure and Bonding</p> <p>Module 2:</p> <p>Students will study atomic structure, relative atomic mass, formulas and equations, determination of formulas, amount of substance, moles and volume, and PAG 1: Moles determination.</p> <p>Module 2:</p> <p>Students will continue studying atomic structure, relative atomic mass, formulas and equations, electron structure, ionic bonding and structure, covalent bonding, intermolecular forces, and hydrogen bonding.</p>	<p>Acids, Redox, and Organic Chemistry</p> <p>Module 3:</p> <p>Students will study acids and redox reactions, acid-base titrations, PAG 2: Acid-base titration, redox reactions, and shapes of molecular ions.</p> <p>Module 3:</p> <p>Students will study organic chemistry, including nomenclature, practical skills, formulas of organic compounds, reaction mechanisms, properties of alkanes, reactions of alkanes, and properties of alkenes.</p>	<p>Periodicity and Organic Reactions</p> <p>Module 3:</p> <p>Students will study electronegativity, the periodic table, ionisation energy, periodic trends, reactivity trends, group 2 elements, halogens, qualitative analysis, and PAG 4: Qualitative analysis of ions.</p> <p>Module 3:</p> <p>Students will study stereoisomerism, reactions of alkenes, electrophilic addition, polymerisation of alkenes, alcohols, reactions of alcohols and haloalkanes, and distillation.</p>	<p>Energetics and Reaction Rates</p> <p>Module 4:</p> <p>Students will study enthalpy changes, measuring enthalpy (PAG 3: Enthalpy determination), reaction rates, and catalysts.</p> <p>Module 4:</p> <p>Students will study synthesis of an organic liquid (PAG 5), practical techniques, and synthetic routes.</p>	<p>Equilibrium and Organic Synthesis</p> <p>Module 4:</p> <p>Students will study Maxwell-Boltzmann distribution, dynamic equilibrium, and equilibrium constant.</p> <p>Module 4:</p> <p>Students will study synthesis of an organic solid (PAG 5), mass spectrometry, infrared spectroscopy, preparation and recrystallization of copper sulphate, analysing an unknown compound, and making aspirin.</p>	<p>PAG Review and Preparation for Year 13:</p> <p>Students will review practical assessment groups (PAGs) and prepare for Year 13.</p>
Year 13 Chemistry	<p>Reaction Rates and Benzene Chemistry</p> <p>Module 5:</p> <p>Students will study orders of reaction, rate equations, rate constants, concentration-time graphs, rate-concentration graphs, initial rates, rate-determining step, and the effect of temperature on rate constants.</p> <p>Module 6:</p> <p>Students will be introduced to benzene, electrophilic reactions with benzene, phenol chemistry, directing groups, carbonyl compounds, identifying aldehydes and ketones, carboxylic acids, and carboxylic derivatives.</p>	<p>Equilibrium and Amines</p> <p>Module 5:</p> <p>Students will study equilibrium constants (K_{cK_c} and K_{pK_p}), controlling the position of equilibrium, Bronsted-Lowry acids and bases, pH scale, strong acids, and the acid dissociation constant (K_{aK_a}).</p> <p>Module 6:</p> <p>Students will study amines, chirality in amines, condensation polymerisation, carbon-carbon bond formation, further practical techniques, and PAG 6.</p>	<p>pH and Spectroscopy</p> <p>Module 5:</p> <p>Students will study the pH of weak acids and strong bases, buffer solutions in the body, and neutralisation reactions.</p> <p>Module 6:</p> <p>Students will study further synthetic routes, chromatography, functional groups, NMR spectroscopy (Carbon-13 NMR, Proton NMR), and PAG 7.</p>	<p>Thermodynamics and Transition Metals</p> <p>Module 5:</p> <p>Students will study lattice enthalpy, enthalpy changes of solution, factors affecting lattice enthalpy and hydration, entropy, free energy, redox reactions, and manganate titrations.</p> <p>Module 6:</p> <p>Students will study d-block elements, formation and shape of complex ions, stereoisomerism in complex ions, ligand substitution and precipitation reactions, redox reactions, and qualitative analysis.</p>	<p>Electrochemistry and Revision</p> <p>Module 5:</p> <p>Students will study iodine-thiosulfate titrations, electrode potentials, predictions from electrode potentials, and storage and fuel cells.</p> <p>Module 6:</p> <p>Students will engage in A-Level revision.</p>	<p>A-Level Revision</p> <p>Students will continue A-Level revision.</p>

<p>Foundations of Physics and Motion</p> <p>Foundations of Physics:</p> <p>In the foundation of physics topic, students explore units, vectors, approximation and estimations, errors, uncertainties, precision, and accuracy. They are also taught how to present their data appropriately.</p> <p>Motion:</p> <p>In motion, students learn how to describe and analyse motion in both one and two dimensions, including free fall, projectile motion, and motion-time graphs. They explore the motion of Olympic swimmers, sprinting cheetahs, and parachutists jumping from the very edge of space.</p>	<p>Forces in Action, Work, Energy and Power, & Materials</p> <p>Forces in Action:</p> <p>In forces, students learn the effect of forces on objects using free-body diagrams, terminal velocity, moments, and pressure in contexts including rock climbing and bridge building.</p> <p>Work, Energy and Power:</p> <p>This topic focuses on the link between energy and work. Students learn how to apply the principle of conservation of energy and about the efficiency of various situations from wind turbines to roller coasters.</p> <p>Materials:</p> <p>Students learn how to classify materials based on their properties and calculate the stress, strain, and Young's modulus of a material. They study the mathematics of the differences between a bungee cord and the latest aluminium alloy.</p>	<p>Laws of Motion and Momentum, Current and Charge, & Energy, Power and Resistance</p> <p>Laws of Motion and Momentum:</p> <p>Students use Newton's laws to predict the motion of all colliding or interacting objects, from astronauts in the International Space Station to the supermarket shopping trolley.</p> <p>Current and Charge:</p> <p>This topic covers the link between current and charge, including Kirchoff's first law. Students explore the link between lightning strikes, the human brain, and the wonder material that is graphene.</p> <p>Energy, Power and Resistance:</p> <p>Students develop the use of electrical symbols along with key ideas like electromotive force, potential difference, and resistivity. They learn how differences in resistance help archaeologists discover ancient remains and doctors care for premature babies.</p>	<p>Electrical Circuits and Waves I</p> <p>Electrical Circuits:</p> <p>Students explore the use of electrical circuits, including explanations of how potential dividers are used to make volume control dials and why a car battery can supply such a high current.</p> <p>Waves I:</p> <p>Students explore different waves and their properties. They learn about electromagnetic waves, earthquakes, and how diamonds get their sparkle.</p>	<p>Waves II and Quantum Physics</p> <p>Waves II:</p> <p>This topic includes explanations of how musical instruments produce their characteristic notes and how noise-cancelling headphones work so effectively. Students learn about the effect of interference of waves in a variety of situations.</p> <p>Quantum Physics:</p> <p>Students are introduced to ideas that not only do electromagnetic waves have wave- and particle-like behaviour, but this dual nature is also found to be characteristic of all particles, including electrons. They cover the photoelectric effect, including the equation.</p>	<p>Thermal Physics and Ideal Gases</p> <p>Thermal Physics:</p> <p>This topic introduces ideas around temperature, matter, specific heat capacity, and specific latent heat. Students learn about absolute zero and why sweating helps us cool.</p> <p>Ideal Gases:</p> <p>Students explore how the microscopic motion of atoms can be modelled using Newton's laws, providing an understanding of pressure and temperature.</p>
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	<p>Circular Motion, Oscillations, and Capacitance</p> <p>Circular Motion:</p> <p>This topic builds on the understanding of motion and explores the mathematics of motion in circular paths of objects such as planets, artificial satellites, and rollercoasters.</p> <p>Oscillations:</p> <p>Students explore motion seen in objects that vibrate back and forth, including atoms vibrating in a solid and bridges swaying in the wind.</p> <p>Capacitance:</p> <p>This topic introduces the basic properties of capacitors and how they are used in electrical circuits. Students learn how they are used as an essential source of electrical energy in most modern electrical devices.</p>	<p>Gravitational Fields, Electric Fields, and Magnetic Fields</p> <p>Gravitational Fields:</p> <p>This topic develops ideas in circular motion, relating them to planetary motion and gravitational potential energy. Students learn how Newton’s law of gravitation can be used to predict the motion of planets, stars, and distant galaxies.</p> <p>Electric Fields:</p> <p>This topic develops the important concepts of Coulomb’s law, uniform electric fields, electric potential, and energy. Students learn how electric fields relate to lightning strikes, smart windows, and particle accelerators.</p> <p>Magnetic Fields:</p> <p>This topic explores the motion of charged particles in magnetic fields, Lenz’s law, and Faraday’s law.</p>	<p>Stars, Particle Physics, and Radioactivity</p> <p>Stars:</p> <p>Students cover the life cycle of stars, including our Sun, and explore some of the Universe’s objects like neutron stars and black holes. They develop ideas on the analysis of electromagnetic radiation from space.</p> <p>Particle Physics:</p> <p>This topic develops ideas of the nature of the atom and its nucleus. Students learn about how the nucleus was first discovered and the smaller particles that make up nucleons.</p> <p>Radioactivity:</p> <p>Students learn about the impact of unstable nuclei and how radioactivity is an entirely random process.</p>	<p>Cosmology and Nuclear Physics</p> <p>Cosmology:</p> <p>Students explore ideas of the expansion of the Universe described by Hubble’s law, the Big Bang theory, and the as yet unsolved mysteries of dark matter and dark energy.</p> <p>Nuclear Physics:</p> <p>This topic explores Einstein’s equation $E=mc^2$. Students learn about nuclear fission and its use in nuclear reactors, along with how nuclear fusion might one day provide cheap, clean energy.</p>	<p>Medical Imaging</p> <p>This topic looks at various techniques used in modern diagnostic testing, including x-rays, CAT scans, PET scans, and ultrasound scans. Students learn how physics has led to the development of a number of valuable non-invasive techniques used in hospitals today.</p>	<p>A-Level Revision</p> <p>Students will engage in comprehensive revision to consolidate their knowledge and prepare for A-Level exams.</p>
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SCIENCE AT PRIMARY PHASE- AT A GLANCE

	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
EYFS	Animals- Pets Naming animals and what they need to live.	Autumn - Seasonal Change Exploring the signs of autumn.	Materials - We're Going on a Bear Hunt Exploration of natural materials and their properties.	Seasonal Change Exploring signs of winter and how to help animals in winter by making bird feeders.	Materials - Clean Up Caring for living things and the environment. "Tap the Magic Tree" - exploring seasonal change.	Life Cycles Life cycle of a butterfly and chick, experience planting, and exploring what plants need to grow.
1	Seasonal Change An overview of all the seasons with a focus on autumn.	Everyday Materials Exploring materials around us and finding suitable materials to fix Noah's Ark.	Plants and Seasonal Change Types of plants - evergreen and deciduous. Recap on seasons with a focus on winter.	Plants Names of flowers, trees, and plants, parts of the plant and their function.	Animals and Seasonal Change Introduction to the 5 types of animals and a focus on spring/summer.	Humans The 5 senses and the parts of the body.
2	Living Things and their Habitats An introduction to types of habitats and animals that live there.	Animals Lifecycles and offspring of animals, how they grow and change.	Plants An in-depth look at the parts of the plant, what plants need to grow, and stages of growth.	Materials An in-depth look at common materials and their properties.	Humans How to keep our bodies fit and healthy.	Recap Gap Recap of topics covered throughout the year.
3	Light Light sources and how shadows are formed.	Rocks The three main types of rock and their properties. How fossils are formed.	Forces and Magnets Friction - comparing surfaces, exploring magnetic and non-magnetic materials, and how magnets behave.	Plants The lifecycle of a flowering plant, photosynthesis, and the function of parts of the plant.	Animals Including Humans Nutrients our bodies need, how our skeletons and muscles work, the difference between vertebrates and invertebrates.	Recap Gap Recap of topics covered throughout the year.
4	State of Matter Exploring the three states of matter, their properties, and how they can change.	Electricity Electrical appliances around us, insulators and conductors, and how to make a simple circuit.	Sound How sound is made and how it travels.	Living Things and their Habitats How habitats can change or be destroyed and the impact on animals. Classifying animals according to their characteristics.	Animals Including Humans The digestive system, a close look at our mouth and teeth, carnivores, herbivores, and the food chain.	Recap Gap Recap of topics covered throughout the year.
5	Properties and Changing Materials Properties of magnets and how they are used around us, exploring thermal insulation, and conducting filtration and evaporation experiments.	Forces An in-depth look at friction and gravity, and what happens when forces are balanced or unbalanced.	Earth and Space Planets in our solar system, how the Earth rotates and orbits, and the phases of the moon.	Living Things and their Habitats Reproduction in plants and animals.	Animals Including Humans Puberty, gestation periods, the human lifecycle, and animal lifecycles.	Recap Gap Recap of topics covered throughout the year.
6	Animals Including Humans The circulatory system.	Electricity Series and parallel circuits, types of conductors and insulators, and the function of components in a circuit.	Living Things and their Habitats Animal groups and classification, and what microorganisms are.	Evolution and Inheritance Exploring how adaptation to the environment can lead to evolution.	Light Light sources and how light travels, exploration of shadows, rainbows, and reflection.	Recap Gap Recap of topics covered throughout the year.

SCIENCE KEY CONCEPTS

Earth	Matter	Organisms	Forces	Energy
Electromagnetism	Waves	Ecosystems	Genes	Reactions

STRAND 1) WORKING SCIENTIFICALLY

1. Scientific attitudes

Nottingham Academy Curriculum Alignment:

- **Year 7:Term 1:** Working scientifically (Focus on practical skills and report writing, graph drawing, and maths in science)
- **Year 8:Term 6:** Recap and review (Core knowledge from biology, chemistry, and physics to support students with accessing Year 9)
- **Year 9:Term 6:** Recap and review (Advanced practical skills, experimental design, data analysis, and presentation)

2. Experimental skills and investigations

Nottingham Academy Curriculum Alignment:

- **Year 7:Term 1:** Working scientifically (Focus on practical skills and report writing, graph drawing, and maths in science)
- **Year 8:Term 6:** Recap and review (Core knowledge from biology, chemistry, and physics to support students with accessing Year 9)
- **Year 9:Term 6:** Recap and review (Advanced practical skills, experimental design, data analysis, and presentation)

3. Analysis and evaluation

Nottingham Academy Curriculum Alignment:

- **Year 7:Term 1:** Working scientifically (Focus on practical skills and report writing, graph drawing, and maths in science)
- **Year 8:Term 6:** Recap and review (Core knowledge from biology, chemistry, and physics to support students with accessing Year 9)
- **Year 9:Term 6:** Recap and review (Advanced practical skills, experimental design, data analysis, and presentation)

4. Measurement

Nottingham Academy Curriculum Alignment:

- **Year 7: Term 1:** Working scientifically (Focus on practical skills and report writing, graph drawing, and maths in science)
- **Year 8: Term 6:** Recap and review (Core knowledge from biology, chemistry, and physics to support students with accessing Year 9)
- **Year 9: Term 6:** Recap and review (Advanced practical skills, experimental design, data analysis, and presentation)

STRAND 2) BIOLOGY

1. Structure and function of living organisms

Nottingham Academy Curriculum Alignment:

- **Year 7: Term 2:** Organisms (Skeleton and movement, structure of cells)
- **Year 8: Term 3:** Organisms (Cell structure, cell transport)
- **Year 9: Term 1:** Life processes (Cells as the basic structural unit, importance of enzymes in biological reactions)
- **Year 9: Term 3:** Cell structure (Detail on cell structure and specialized cells)
- **Year 9: Term 6:** Organisation of animals (Cells, tissues, organs, organ systems including the digestive system)

2. Material cycles and energy

Nottingham Academy Curriculum Alignment:

- **Year 7: Term 5:** Energy (Unit of energy, investigations around energy in food and other energy stores)
- **Year 8: Term 6:** Ecosystems (Respiration and photosynthesis, needs of organisms, obtaining resources)
- **Year 9 : Term 1:** Life processes (Adaptations for respiration, structure of plants for efficient photosynthesis)

3. Interactions and interdependencies

Nottingham Academy Curriculum Alignment:

- **Year 7: Term 6:** Ecosystems (Interactions among living things, pollination, and seed dispersal)
- **Year 8: Term 6:** Ecosystems (Respiration and photosynthesis, needs of organisms, obtaining resources)
- **Year 9: Term 4:** Cell transport and ecosystems (Osmosis, diffusion, active transport, practical investigations)

4. Genetics and evolution

Nottingham Academy Curriculum Alignment:

- **Year 7: Term 4:** Genes (Variation between living things, puberty, and reproduction)
- **Year 8: Term 4:** Genes (Genetics, evolution, maintaining biodiversity)
- **Year 9: Term 4:** Genetics (Detail on genetics and evolution)

STRAND 3) CHEMISTRY

1. The particulate nature of matter	2. Chemical Reactions	3. Energetics
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 1: Matter (Changes of state, particle model) • Year 8: Term 1: Matter (Revisit structure of an atom, periodic table, properties of elements) • Year 9: Term 3: Atomic structure (Structure of the atom, development of models over time) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 3: Reactions (Acids and alkalis, practical skills such as making salts and reactions of metals) • Year 8: Term 4: Reactions (Energy changes in chemical reactions, experiments) • Year 9: Term 2: Chemical reactions (Testing for common gases, common chemical reactions including making a salt from acid and a base) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 1: Matter (Energy in changes of state) • Year 8: Term 4: Chemical reactions (Energy level diagrams and bond energy) • Year 9: Term 1: Chemical reactions (Exothermic and endothermic reactions)
4. The Periodic Table	5. Materials	6. Earth & Atmosphere
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 2: Matter (Structure of an atom, separating substances) • Year 8: Term 1: Matter (Revisit structure of an atom, periodic table, properties of elements) • Year 9: Term 4: The periodic table (Development of the periodic table, properties of different groups, trends) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 2: Matter (Structure of an atom, separating substances) • Year 8: Term 3: Earth (Recycling of materials) • Year 9: Term 5: Properties of matter (Particle model, density calculations, practical work) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 6: Earth (Structure of the Earth, types of rocks, and outer space) • Year 8: Term 3: Earth (Climate change, global warming, human impact on Earth) • Year 9: Term 4: The periodic table and earth's resources (Development of the periodic table, properties of different groups, trends; earth's resources and impact)

STRAND 4) PHYSICS

1. Energy	2. Motion & Forces	3. Waves
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 4: Energy (Unit of energy, investigations around energy in food and other energy stores) • Year 8: Term 2: Energy (Energy transfers, relationship between energy and work) • Year 9: Term 5: Energy conservation (Energy transfer, uses of insulation to reduce energy dissipation) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 3: Forces (Gravity, speed-distance time graphs, and calculations) • Year 8: Term 1: Forces (Friction, drag, turning forces, pressure) • Year 9: Term 1: Physical interactions (Forces and motion, graph skills) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 6: Waves (Sound waves and light waves) • Year 8: Term 5: Waves (Water waves, radiation, experiments modeling waves) • Year 9: Term 3: Waves and radioactivity (Properties of waves, reflection, refraction, sound)
4. Electricity and electromagnetism	5. Matter	6. Space Physics
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 5: Electromagnetism (Electrical current, charge, potential difference, building electric circuits) • Year 8: Term 5: Electromagnetism (Magnetism revisited, making electromagnets) • Year 9: Term 4: Electromagnetism (Review of electricity fundamentals, explore energy transfers and magnetism) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 1: Matter (Changes of state, particle model) • Year 8: Term 1: Matter (Revisit structure of an atom, periodic table, properties of elements) • Year 9: Term 3: Atomic structure and matter (Structure of the atom, development of models over time) 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Year 7: Term 6: Earth and space (Structure of the Earth, types of rocks, and outer space) • Year 8: Term 3: Earth and space (Climate change, global warming, human impact on Earth) • Year 9: Term 3: Space physics (Space physics, properties of waves, reflection, refraction, sound)

STRAND 1) WORKING SCIENTIFICALLY

1. The development of scientific thinking

Nottingham Academy Curriculum Alignment:

- Developing hypotheses, models, and theories in Year 10 and Year 11.
- Understanding historical developments and ethical issues in Year 10 and Year 11.
- Evaluating risks in practical and wider societal contexts in Year 10 and Year 11.

2. Experimental skills and strategies

Nottingham Academy Curriculum Alignment:

- Planning experiments and investigations in Year 10 and Year 11.
- Applying knowledge of techniques and apparatus in Year 10 and Year 11.
- Making and recording observations and measurements in Year 10 and Year 11.

3. Analysis and evaluation

Nottingham Academy Curriculum Alignment:

- Collecting, presenting, and analysing data in Year 10 and Year 11.
- Performing mathematical and statistical analysis in Year 10 and Year 11.
- Evaluating data, identifying errors, and suggesting improvements in Year 10 and Year 11.

4. Vocabulary, units, symbols, and nomenclature

Nottingham Academy Curriculum Alignment:

- Developing scientific vocabulary and nomenclature in Year 10 and Year 11.
- Using SI units and understanding scientific quantities in Year 10 and Year 11.
- Interconverting units and using appropriate significant figures in Year 10 and Year 11.

STRAND 2) BIOLOGY

1. Cell biology	2. Transport systems	3. Health, disease, and the development of medicines	4. Coordination and control
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Cell structure, function, and division in Year 10. Enzymes and factors affecting enzymatic reactions in Year 10. Aerobic and anaerobic respiration in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Human circulatory system in Year 10. Transport in plants in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Communicable and non-communicable diseases in Year 10. Pathogens and the immune system in Year 10. Development of medicines and impact of lifestyle on health in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Nervous system and hormonal control in Year 10. Homeostasis and reflex actions in Year 11.
5. Photosynthesis	6. Ecosystems	7. Evolution, inheritance, and variation	
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Process of photosynthesis and factors affecting it in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Levels of organization, biotic and abiotic factors, and material cycling in Year 11. Interdependence, adaptation, and biodiversity in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Genome, gene expression, and genetic variation in Year 11. Natural selection, evolution, and selective breeding in Year 11. Modern biotechnology and its ethical considerations in Year 11. 	

STRAND 3) CHEMISTRY

1. Atomic structure and the periodic table	2. Structure, bonding, and the properties of matter	3. Chemical changes	4. Energy changes in chemistry
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Atomic structure, isotopes, and electronic configuration in Year 10. Periodic table, trends, and properties of elements in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Types of bonding, structures of substances, and properties in Year 10. Giant structures, carbon allotropes, and polymers in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Chemical equations, reactivity series, and extraction of metals in Year 10. Acids, bases, and electrolysis in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Energy changes in reactions, bond energies, and exothermic/endothermic reactions in Year 11.
5. Rate and extent of chemical change	6. Chemical analysis	7. Chemical and allied industries	8. Earth and atmospheric science
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Factors affecting rates of reaction, catalysts, and reversible reactions in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Purity, formulations, and chromatography in Year 11. Identification of ions and instrumental methods in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Life cycle assessment, recycling, and environmental impacts in Year 11. Carbon compounds, crude oil, and polymer production in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> Composition and evolution of the Earth's atmosphere, climate change, and pollution in Year 11. Water treatment and sustainability in Year 11.

STRAND 4) PHYSICS

1. Energy	2. Forces	3. Forces & Motion	4. Wave motion
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Energy changes, conservation, efficiency, and resources in Year 10. • Renewable and non-renewable energy sources in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Types of forces, pressure in fluids, and elasticity in Year 10. • Gravitational fields and force vectors in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Speed, velocity, acceleration, and graphs of motion in Year 10. • Newton's laws, weight, and terminal velocity in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Properties of waves, electromagnetic spectrum, and wave equations in Year 11. • Reflection, refraction, and sound waves in Year 11.
5. Electricity	6. Magnetism and electromagnetism	7. The structure of Matter	8. Atomic Structure
<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Current, voltage, resistance, and circuit diagrams in Year 10. • Domestic electricity, electrical power, and safety measures in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Magnetic fields, electromagnets, and electromagnetic induction in Year 11. • Transformers and the national grid in Year 11. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • States of matter, density, and particle models in Year 10. • Changes of state, specific heat capacity, and latent heat in Year 10. 	<p>Nottingham Academy Curriculum Alignment:</p> <ul style="list-style-type: none"> • Nuclear model, isotopes, and radioactive decay in Year 11. • Half-life, nuclear fission, and fusion in Year 11.