Programme of study for Year 11 Science

Autumn (1st half term)	Autumn (2nd half term)	Spring (1st half term)	Spring (2nd half term)	Summer (1st half term)	Summer (2nd half term)
Topics: • P11 Waves • P12 Electromagnetic Spectrum • C11 Chemistry of the atmosphere • B16 Organising an ecosystem • B17 Biodiversity and ecosystems Assessment: Waves required practical. Ecology required practical.	Topics: • C12 Using resources • C10 Chemical analysis • B12 Reproduction • B13 Variation and Evolution Assessment: Mock exam paper 1.	Topics: • P5 Electricity in the Home • P13 Electromagnetism • B14 Genetics and evolution • B15 Adaptations, interdependence and competition Assessment: Required practical	Topics: • B11 Hormonal Coordination revision • C6 Rate and Extent of Chemical Change Revision Assessment: Mock exam paper 2	Topics: • P10 Force and motion recap • P7 Radioactivity recap Assessment: Required practical	Topics: This half term is for revising, improving exam technique, completing any outstanding required practicals, to prepare for the GCSE exams.
Skills (students should be able to do): AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures					

Key learning outcomes (Students should know): **P11 Waves** • Describe the properties of waves, including amplitude, wavelength, frequency, and speed. • Differentiate between transverse and longitudinal waves, providing examples of each. • Calculate wave speed using the formula v=fλv = f \lambdav=fλ and apply it to various scenarios. • Explain how waves are reflected, refracted, and diffracted in different mediums. **P12 Electromagnetic Spectrum** • Identify and describe the	Key learning outcomes (Students should know): C12 Using Resources Describe the processes involved in obtaining potable water and the treatment of wastewater. Explain the life cycle assessment (LCA) of products and its importance in evaluating environmental impact. Discuss sustainable use of resources, including recycling, reusing materials, and reducing waste. Understand the extraction of metals and methods to reduce the environmental impacts of extraction processes. C10 Chemical Analysis	Key learning outcomes (Students should know): **P5 Electricity in the Home** • Explain the components of mains electricity, including live, neutral, and earth wires. • Describe the role of fuses, circuit breakers, and earthing in electrical safety. • Calculate power using P=IVP = IVP=IV and energy transfer with E=PtE = PtE=Pt. • Compare the efficiency and energy use of household appliances. **P13 Electromagnetism** • Describe how magnetic fields are created around electric currents. • Explain the principles of electromagnets and factors that affect their strength.	Key learning outcomes (Students should know): B11 Hormonal Coordination Describe the roles of key hormones, such as insulin, adrenaline, and reproductive hormones, in regulating body functions. Explain the feedback mechanisms involved in maintaining homeostasis, including blood glucose regulation. Understand the menstrual cycle and the role of hormones in reproduction. Discuss the impact of hormonal imbalances and treatments available for regulation. C6 Rate and Extent of Chemical Change Describe factors affecting the rate of chemical reactions, including temperature, concentration, surface area, and catalysts. Explain how to measure reaction rates and interpret rate graphs.	Key learning outcomes (Students should know): **P10 Force and Motion** • Describe and calculate the relationships between force, mass, and acceleration using F=maF = maF=ma. • Explain the concepts of velocity, speed, and acceleration and interpret motion graphs. • Understand the effects of friction, air resistance, and other forces on objects in motion. • Describe momentum and apply the principle of conservation of momentum in collisions. **P7 Radioactivity** • Describe the structure of the	Key learning outcomes (Students should know): This half term is for revising, improving exam technique, completing any outstanding required practicals, to prepare for the GCSE exams.

main types of electromagnetic waves, from radio waves to gamma rays. • Explain the uses and hazards of different electromagnetic waves, particularly in healthcare, communication, and everyday technology. • Describe how electromagnetic waves are generated and detected. • Understand the speed of electromagnetic waves in a vacuum and the concept of wave frequency and energy. **C11 Chemistry of the Atmosphere** • Describe the composition of Earth's atmosphere and how it has changed over time.	Describe the techniques used in chemical analysis, including chromatography and spectroscopy. Differentiate between pure substances and mixtures and understand how to identify them. Explain tests for common gases, such as oxygen, carbon dioxide, hydrogen, and chlorine. Interpret chromatograms and explain how they are used to identify substances. B12 Reproduction Describe the process of sexual and asexual reproduction and give examples of each. Explain the structure and function of reproductive systems in humans. Understand the	• Understand the applications of electromagnetism in motors, generators, and transformers. • Calculate force on a conductor in a magnetic field and describe its applications. **B14 Genetics and Evolution** • Describe the structure of DNA, genes, and chromosomes and their role in inheritance. • Explain Mendelian inheritance, including dominant and recessive alleles. • Discuss genetic variation and the process of natural selection. • Describe the evidence for evolution, including fossils and genetic similarities. **B15 Adaptations, Interdependence, and Competition** • Explain the	Understand reversible reactions and the concept of dynamic equilibrium. Apply Le Chatelier's Principle to predict the effect of changing conditions on equilibrium.	atom and identify types of radioactive decay: alpha, beta, and gamma radiation. • Explain half-life and calculate it from given data. • Discuss the uses and dangers of radioactivity, including medical applications and safety precautions. • Understand nuclear fission and fusion processes and their role in energy production.	

• Explain the processes that have shaped the atmosphere, such as volcanic activity, photosynthesis, and human activities. • Describe the greenhouse effect, its role in global warming, and the impact of human activities on climate change. • Discuss solutions to reduce greenhouse gas emissions and mitigate climate change. **B16 Organising an Ecosystem** • Explain the roles of producers, consumers, and decomposers in an ecosystem. • Describe the processes of energy transfer through trophic	role of chromosomes, genes, and DNA in inheritance. Describe methods of controlling reproduction, including contraception and selective breeding. B13 Variation and Evolution Explain the causes of variation within species, including genetic and environmental factors. Describe the process of natural selection and its role in evolution. Discuss the evidence for evolution, such as fossil records and genetic similarities between species. Understand the impact of artificial selection on species and how it differs from natural selection.	adaptations of organisms to their environments and how these aid survival. • Describe the concept of interdependence in ecosystems and factors affecting population sizes. • Understand the roles of producers, consumers, and decomposers in ecosystems. • Discuss competition for resources within and between species and its impact on ecosystems. .			

levels and food chains. • Understand the importance of recycling materials, including carbon and nitrogen cycles, in supporting ecosystem sustainability. • Discuss the balance between different populations and factors affecting population sizes in an ecosystem. **B17 Biodiversity and Ecosystems** • Define biodiversity and explain its importance to ecosystems and human life. • Describe human impacts on biodiversity, such as deforestation, pollution, and climate change. • Explain					

strategies for conservation and maintaining biodiversity, including protected areas, breeding programs, and sustainable resource use. • Understand the significance of biodiversity in maintaining ecosystem resilience and the impact of reduced biodiversity on ecosystem stability.					

Assessments: 2 linear assessments, 6 other assessed practicals

Building understanding: Rationale / breakdown for your sequence of lessons:

The chosen topic sequence for AQA Combined Science Trilogy follows a logical and conceptual progression that allows for a comprehensive understanding of the key principles in biology, chemistry, and physics. By rotating the teaching of these subjects, students benefit from distributed practice, reinforcing their learning over time, as well as fostering cohesion between the three sciences.

These topics expand upon and further develop the concepts explored in the previous year.

Physics: We begin with Waves and Electromagnetic Spectrum, foundational topics that build a strong basis for understanding later topics like Electricity in the Home and Electromagnetism. Revisiting Force and Motion and Radioactivity toward the end reinforces physics concepts essential to practical and theoretical applications, preparing students for both exams and real-world contexts.

Chemistry: Chemistry units are arranged to progress from broad environmental concepts to specific analytical techniques and reactions. Beginning with Chemistry of the Atmosphere and Using Resources contextualizes the importance of sustainability. Moving into Chemical Analysis allows students to apply practical analysis skills, which are essential in experimental settings. Revision of Rate and Extent of Chemical Change solidifies students' understanding of reaction dynamics, a critical component for AQA chemistry assessments.

Biology: Biological topics follow a progression from ecosystem-level concepts down to genetic and cellular principles. Starting with Organising an Ecosystem and Biodiversity and Ecosystems provides an understanding of interdependence in nature. This foundation supports learning in Reproduction, Variation and Evolution, and Genetics and Evolution, which cover heredity and natural selection. Concluding with Hormonal Coordination and Adaptations, Interdependence, and Competition ensures a well-rounded review of human biology and ecological principles.

This sequence not only maintains a balance across the sciences but also aligns with natural links between topics, such as the connections between chemical analysis in environmental science and practical applications of physics in everyday life. This approach reinforces interdisciplinary skills while allowing both teachers to build from shared content knowledge, optimizing continuity and retention across the rotation.
By teaching biology, chemistry, and physics in a rotational basis, students are exposed to the three sciences throughout the academic year. This approach promotes distributed practice, allowing students to revisit and reinforce their knowledge of the sciences over time. It also encourages the development of cross-disciplinary connections, fostering a holistic understanding of scientific principles and their applications in the real world.

The students are then able to hone in on their exam technique in preparation for their exams.

Home – Learning:
Teachers will set home learning using lesson materials. Some of these will be assessed. This will be indicated.

Reading / literacy:
Students are encouraged to prior reading on topics. In lessons students are taught how to construct answers through use of writing frames and exemplar answers where extended writing is required and command words and keywords that are relevant to the topic are consistently assessed in lessons through questioning and written question practice.

Numeracy:

- Recognise and use expressions in decimal form: Recognise and use expressions in standard form; Use ratios, fractions and percentages; Make estimates of the results of simple calculations
- Handling data: Use an appropriate number of significant figures; Find arithmetic means; Construct and interpret frequency tables and diagrams, bar charts and histograms; Make order of magnitude calculations
- Algebra: Understand and use the symbols: =, <>, >, $\propto$, ~ ;Change the subject of an equation; Substitute numerical values into algebraic equations using appropriate units for physical quantities
- Graphs: Translate information between graphical and numeric form; Understand that y = mx + c represents a linear relationship; Plot two variables from experimental or other data; Determine the slope and intercept of a linear graph; Draw and use the slope of a tangent to a curve as a measure of rate of change

- Geometry and trigonometry: Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects; Calculate areas of triangles and rectangles, surface areas and volumes of cubes

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):

- Trips during science week
- Science week
- Science club
- STEM club