Key Stage 3 Science Learning Journey

Students will learn the following topics:

Year	Biology	Chemistry	Physics
7	**7B1 Organisation: Cells** What are living things made of? How can we observe cells? **7B2 Organisation: Movement** What structures allow the human body to move? **7B3 Genes: Variation and reproduction** Why do we all look different? How is new life created?	**7C1 Matter: Particle Model** What are substances? What gives substances their physical properties? **7C1 Matter: Mixtures** How can we separate mixtures of substances using their physical properties? **7C3 Reactions: Chemical changes** What is a chemical change? What is a chemical reaction?	**7P1 Forces: Speed** Why do things move and change? **7P2 Energy: Energy transfers and stores** Why do things move and change? How is energy transferred in a system? **7P3 Waves: Sound** How does information and energy spread? **7P4 Earth: Universe** Where are we in space?
8	**8B1 Ecosystems: Interdependence** How do organisms depend on each other and their environment? **8B2 Organisation: Breathing and digestion?** How can lifestyle choices affect our health? **8B3 Ecosystem: Respiration and photosynthesis** What is the chemistry of living things?	**8C1 Matter: The Periodic Table** What are elements, compounds, and mixtures? **8C2 Reactions: Chemical reactions and chemical energy** How is energy transferred in chemical reactions? **8C3 Earth: Structure of the Earth** What is the Earth made of and how is it changing?	**8P1 Waves: Light** How does information and energy spread? **8P2 Forces: Contact Forces** Why do things move and change? **8P3 Electromagnetism: What is electricity & magnetism?** What is happening in an electric circuit? How does an electromagnet use an electrical current to generate a magnetic field?

9	**9B1 Genes: Inheritance** How do characteristics get passed onto offspring? **9B2 Genes: Evolution** Why are living things so diverse? What is natural selection?	**9C1 Earth: Using resources** How does chemistry effect our world?	**9P1 Forces: Pressure** What is pressure? How does pressure act in a fluid? **9P2 Energy: Heating and cooling** How is thermal energy transferred in a system?

From Autumn Half-Term 2 our Y9 curriculum provides a bridge between KS3 and KS4
During this time, students will continue to have four periods of science lessons per week and will complete four GCSE modules

Biology	We return to the big question "what are living things made of?" with a unit building on the concept of cells first introduced in YR7. Students revisit cells and sub-cellular structures and are introduced to electron microscopy and more sub-cellular structures. Eukaryotes (animal and plant cells) are compared to those of prokaryotes. Osmosis is studied (building on knowledge of diffusion) and active transport introduced as mechanisms for moving substances into and out of cells. Finally, students learn how cells divide and differentiate and consider the role of stem cells.
Chemistry	We investigate further how substances can be separated based on physical properties. Students revisit the structure of atoms and study changing theories by exploring the timeline of how our current model of the atom was developed, looking in more depth at the work of Rutherford and the alpha particle scattering experiment. They learn about isotopes and use this knowledge as a foundation for understanding what relative atomic mass is. They study how the periodic table has changed over time due to the work of Mendeleev. This leads to reinforcing groups in the periodic table and the patterns of chemical and physical properties that exist within them whilst linking with their knowledge of atomic structure to explain these patterns further. In Summer 2, students start learning about ionic, covalent, and metallic bonds. How each is formed and represented using different models and how the structures explain the physical properties of substances.

Physics	Physics topics are linked together by the big idea of energy which underpins several key concepts. Students build on their understanding of energy stores and transfers from earlier years, learning that energy stored and transferred can be quantified. They are supported in understanding we can use mathematical relationships between abstract concepts to make accurate predictions about phenomena, which students investigate through a series of required practicals. Many physics topics in KS4 are applications of the big idea of "energy transfers" and that modelling them mathematically enables us to make accurate predictions.

Key Stage 4 Combined Science Learning Journey

Year 10 **Biology**	**Year 10** **Chemistry**	**Year 10** **Physics**
Autumn Term <u>B2 Organisation</u> - Organisation and the digestive system - Organising animal and plants	**Autumn Term** <u>C2 Structure and bonding</u> - Ionic, covalent and metallic bonding <u>C3 Quantitative chemistry</u> - Masses and moles	**Autumn Term** <u>P2 Electricity</u> - Electric circuits - Electricity in the home
Spring Term <u>B3 Infection and response</u> - Communicable diseases - Preventing and treating diseases	**Spring Term** <u>C4 Chemical Reactions</u> - Chemical changes - Electrolysis	**Spring Term** <u>P3 Particle Model of Matter</u> - Density - Changes of state <u>P4 Atomic Structure</u> - Radioactivity

Summer Term B4 Bioenergetics - Photosynthesis - Respiration B7 Ecology - Adaptations, Interdependence and competition - Organising an ecosystem - Biodiversity and ecosystems	**Summer Term** C5 Energy changes - Endothermic and exothermic reactions	**Summer Term** P4 Atomic Structure - Radioactivity (completed)
Year 11 **GCSE Biology**	**Year 11** **GCSE Chemistry**	**Year 11** **GCSE Physics**
Autumn Term B5 Biological Responses - The Human nervous system - Hormonal coordination	**Autumn Term** C6 Rates of reaction and equilibrium - Collision theory - Energy and reversible reactions C7 Organic Chemistry - Crude oil and fuels C8 Chemical Analysis - Chromatograms - Testing for gases	**Autumn Term** P5 Forces - Forces in balance - Motion - Force and motion P6 Waves - Wave properties
Spring Term B6 Genetics and reproduction - Reproduction - Variation and evolution - Genetics and evolution Mock Paper 2	**Spring Term** C9 The Earth's Atmosphere - Our evolving atmosphere C10 Earth's resources - The Earth's resources - Using the Earth's resources Mock Paper 2	**Spring Term** P6 Waves - Electromagnetic waves P7 Electromagnetism - Magnetic fields - Electromagnets in devices - Motor Effect Mock Paper 2

Summer Term Revision and exams	**Summer Term** Revision and exams	**Summer Term** Revision and exams

Key Stage 4 Separate Science Learning Journey

Year 10 **GCSE Biology**	**Year 10** **GCSE Chemistry**	**Year 10** **GCSE Physics**
Autumn Term <u>B2 Organisation</u> - Organisation and the digestive system - Organising animal and plants <u>B3 Infection and response</u> - Communicable diseases	**Autumn Term** <u>C2 Structure and bonding</u> - Ionic, covalent and metallic bonding - Nanoparticles <u>C3 Quantitative chemistry</u> - Masses and moles - Percentage yields and atom economy - Titrations	**Autumn Term** <u>P2 Electricity</u> - Electric circuits - Electricity in the home <u>P3 Particle Model of Matter</u> - Density - Changes of state - Gas pressure & temperature/Gas pressure & volume
Spring Term <u>B3 Infection and response</u> - Preventing and treating diseases <u>B4 Bioenergetics</u> - Photosynthesis - Respiration	**Spring Term** <u>C4 Chemical Reactions</u> - Chemical changes - Electrolysis	**Spring Term** <u>P4 Atomic Structure</u> - Radioactivity - Nuclear fission and fusion <u>P5 Forces</u> - Forces in balance

Summer Term B7 Ecology - Adaptations, Interdependence and competition - Organising an ecosystem - Biodiversity and ecosystems	**Summer Term** C5 Energy changes - Endothermic and exothermic reactions - Chemical cells and batteries/ Fuel cells C6 Rates of reaction and equilibrium - Collision theory - Energy and reversible reactions	**Summer Term** P5 Forces - Motion - Force and motion - Force and pressure
Year 11 **GCSE Biology**	**Year 11** **GCSE Chemistry**	**Year 11** **GCSE Physics**
Autumn Term B5 Biological Responses - The Human nervous system - Hormonal coordination - Homeostasis in action	**Autumn Term** C7 Organic Chemistry - Crude oil and fuels - Organic reactions - Polymers C8 Chemical Analysis - Chromatograms - Testing for ions and anions	**Autumn Term** P6 Waves - Wave properties - Electromagnetic waves - Light P7 Electromagnetism - Magnet fields - Electromagnets in devices - Motor effect / generator effect
Spring Term B6 Genetics and reproduction - Reproduction - Variation and evolution - Genetics and evolution Mock Paper 2	**Spring Term** C9 The Earth's Atmosphere - Our evolving atmosphere C10 Earth's resources - The Earth's resources - Using the Earth's resources Mock Paper 2	**Spring Term** P8 Space - Formation of the solar system - Lifecycle of a star - Expanding universe Mock Paper 2
Summer Term Revision and exams	**Summer Term** Revision and exams	**Summer Term** Revision and exams