Academic Year **<u>Year; 9</u>**	**Content.** **Unit title and brief outline of content.**	**Skills taught in each unit.**	**Assessment – what knowledge and skills will be assessed and how?**
Autumn A	Cell Structure and transport • microscopes • animal and plant cells • eukaryotic and prokaryotic cells • cell specialisation • diffusion and osmosis • active transport Conservation and dissipation of energy • conservation of energy • energy transfers • power and efficiency Energy transfer by heating • conduction and radiation • specific heat capacity	Converting data to different formats – manipulating raw data to create an appropriate graph. Understand how scientific methods and theories develop over time. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Apply mathematical principles to evaluate unfamiliar investigations. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.	Exam style questions covering each unit with 30% weighting on content, 35% weighting on scientific skills and 35% weighting on application of skills. One 45-minute assessment mid-way through the half term.
Autumn B	Cell Division • cell division • growth • stem cells Organisation and the digestive system • tissue and organs • digestive system • catalysts and enzymes Atomic Structure	Evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Apply mathematical principles to evaluate unfamiliar investigations. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga,	One 45-minute exam question based test with the same weightings as Autumn A. Questions will cover Cell division, energy transfer and organisation & digestive system

	• atoms • separating techniques • electronic structure The periodic table • electronic structure and the periodic table • group 1 and 7 • explaining trends • transition elements	mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.	
Spring A	Structure and Bonding • states of matter • ionic and covalent bonding • ionic and covalent structures • metallic bonding and structure • nanoparticles Organising animals and plants • the circulatory system • the respiratory system and gas exchange • tissue, organs and transport in plants Energy resources • Renewable and non renewable energy sources • Energy and the environment Electric circuits	Science practical investigation skills. Using scientific equipment to build evidence towards a conclusion. Converting data to different formats – manipulating raw data to create an appropriate graph. Evaluate methods and suggest possible improvements and further investigations. Recognise the importance of scientific quantities and understand how they are determined. Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Apply mathematical principles to evaluate unfamiliar investigations. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.	Same format as previous assessments, though two tests will be sat in one week covering every topic covered since September over 90 minutes.
Spring B	Organising animals and plants (Finish)	Science practical investigation skills. Using scientific equipment to build evidence towards a conclusion. Converting data to different formats – manipulating raw data to create an	One 45 minute exam question based

	Communicable diseases • pathogens and disease • bacteria and viruses • human defence responses • plant diseases Electric circuits • charge and current • pd and resistance • circuits Electricity in the home • DC and AC • Electrical safety • Appliances and efficiency	appropriate graph. Understand how scientific methods and theories develop over time. Appreciate the power and limitations of science and consider any ethical issues which may arise. Use scientific theories and explanations to develop hypotheses. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Make and record observations and measurements using a range of apparatus and methods. Use scientific vocabulary, terminology and definitions.	assessment on organising animals and plants, communicable diseases and electric circuits with two questions covering content from the Autumn term.
Summer A	Communicable diseases (Finish) Chemical calculations • Relative mass and moles • Balancing equations • Yield and atom economy • titrations	Evaluate the accuracy, reliability & validity of data. Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Apply mathematical principles to evaluate unfamiliar investigations. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.	One 45 minute exam question based assessment on electricity in the home, communicable diseases and chemical calculations with two questions from Spring term content.
Summer B	Preventing and treating disease • vaccination • antibiotics and drugs Chemical changes • the reactivity series • displacement • extracting metals • neutralisation and salts	Recognise the importance of peer review of results and of communicating results to a range of audiences. Evaluate methods and suggest possible improvements and further investigations. Recognise the importance of scientific quantities and understand how they are determined. Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Apply a knowledge of a range of techniques, instruments,	End of Key stage exams – two 90 minute paper covering all content from Year 7 onwards.

		apparatus, and materials to select those appropriate to the experiment. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.	

Key Stage 2 content summary; Scientific enquiry principles. Plant biology, forces and magnets, rocks, Light, living things and their habitat, animals (inc. humans), states of matter, sound, electricity, properties and change of materials, Earth and space, evolution and inheritance.

Year 7 Content *These units form the foundations of science. Without teaching these units, students would not have the basic knowledge to build upon over time.* Working scientifically, Cells, Particles and their behaviour, Forces, Structure of the body system, Elements, atoms and compounds, Reactions, Sound, Reproduction, Chemical reactions, Acids and Alkalis, Light, Space.	**Skills taught**. *Are the skills taught in a spiral curriculum? What is the rationale for your sequencing of skills* *Science has a spiral curriculum for scientific skills. The first term is used to ensure that all students' skills are consistent and then each year layers the depth and complexity of skills required to succeed in every Key Stage in Science.* Year 7 - science practical investigation skills. Using scientific equipment to build evidence towards a conclusion. Converting data to different formats – manipulating raw data to create an appropriate graph. Understand how scientific methods and theories develop over time. Appreciate the power and limitations of science and consider any ethical issues which may arise. Use scientific theories and explanations to develop hypotheses. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and
Year 8 Content *These units build upon the foundations of science and deliver the key principles that can then be layered upon with more complexity in the next key stage.* Health and Lifestyle, The periodic table, Electricity and magnetism, Ecosystems, Separating techniques, Energy, Adaptation and inheritance, Metals and Acids, Motion and Pressure, The Earth.	

Year 9 Content *These units map out the start of GCSE and use all of the Ks3 content to deepen the complexity and understanding of the science.*
Cell Structure and transport, Conservation and dissipation of energy, Energy transfer by heating, Cell Division, Organisation and the digestive system, Atomic Structure, The periodic table, Structure and Bonding, Organising animals and plants, Energy resources, Electric circuits, Communicable diseases, Electricity in the home, Chemical calculations, Preventing and treating disease, Chemical changes.

Year 10 & 11 (Double and Triple work at a different pace so some topics in some classes will be taught at a different time) *These units are the culmination of content taught in previous years and require a firm grasp of skills and content before. They cannot be taught any earlier.*
Taught in specialisms.
Bioenergetics, Homeostasis and response, Inheritance, variation and evolution, Ecology, Quantitative chemistry, Chemical changes, Energy changes, The rate and extent of chemical change, Organic chemistry, Chemical analysis, Chemistry of the atmosphere, Using resources, Particle model of matter, Atomic structure, Electrolysis, Forces, Waves, Magnetism and electromagnetism.

Year 11 Content – see above.

Is all of the NC Ks3 content taught in Year 7 & 8? If not, where is this made up? *The NC Ks3 content is delivered in Year 7-8 in Science, with students moving to Double and Triple science classes in Year 10. In Year 9, students start* health and safety considerations. Make and record observations and measurements using a range of apparatus and methods. Use scientific vocabulary, terminology and definitions.

Year 8 – evaluate the accuracy, reliability & validity of data. Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Recognise the importance of peer review of results and of communicating results to a range of audiences. Evaluate methods and suggest possible improvements and further investigations. Recognise the importance of scientific quantities and understand how they are determined. Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.

Year 9 – evaluate the accuracy, precision, reproducibility, reliability & validity of data and experimental technique of others. Apply mathematical principles to evaluate unfamiliar investigations. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano), interconvert units and use an appropriate number of significant figures in calculation.

Year 10 & 11 focus on all of the skills with a stronger emphasis on application of scientific techniques.
Please see below for specific maths skills required in Year 9 - 11

the GCSE course, building on the skills and content from Year 7 and 8.	

Subject specific pedagogy statement; Science asks questions and finds the answers using scientific techniques. We the challenge the reliability of any conclusions made. Using this, we lift the veil on how the world around our students, from their phones to their heart, really works.
Science is the application of earned knowledge for the empowerment of our students.
Students will use practical or research methods to investigate a question or observed phenomena and then critically evaluate the conclusions made and get a clearer understanding of the science underpinning the question. Question → investigate → evaluate → understand → Apply.

Maths skill requirements in Year 9, 10 and 11

1 Arithmetic and numerical computation

a Recognise and use expressions in decimal form b Recognise and use expressions in standard form c Use ratios, fractions and percentages d Make estimates of the results of simple calculations

2 Handling data

a Use an appropriate number of significant figures b Find arithmetic means c Construct and interpret frequency tables and diagrams, bar charts and histograms d Understand the principles of sampling as applied to scientific data (biology only) e Understand simple probability (biology only) f Understand the terms mean, mode and median g Use a scatter diagram to identify a correlation between two variables (biology and physics only) h Make order of magnitude calculations

3 Algebra

a Understand and use the symbols: =, <, <<, >>, >, ∝ , ~ b Change the subject of an equation c Substitute numerical values into algebraic equations using appropriate units for physical quantities (chemistry and physics only) d Solve simple algebraic equations (biology and physics only)

4 Graphs

a Translate information between graphical and numeric form b Understand that $y = mx + c$ represents a linear relationship c Plot two variables from experimental or other data d Determine the slope and intercept of a linear graph e Draw and use the slope of a tangent to a curve as a measure of rate of change (chemistry and physics only) f Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate (physics only)

5 Geometry and trigonometry

a Use angular measures in degrees (physics only) b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.