2. CURRICULUM IMPLEMENTATION OVERVIEW PLAN

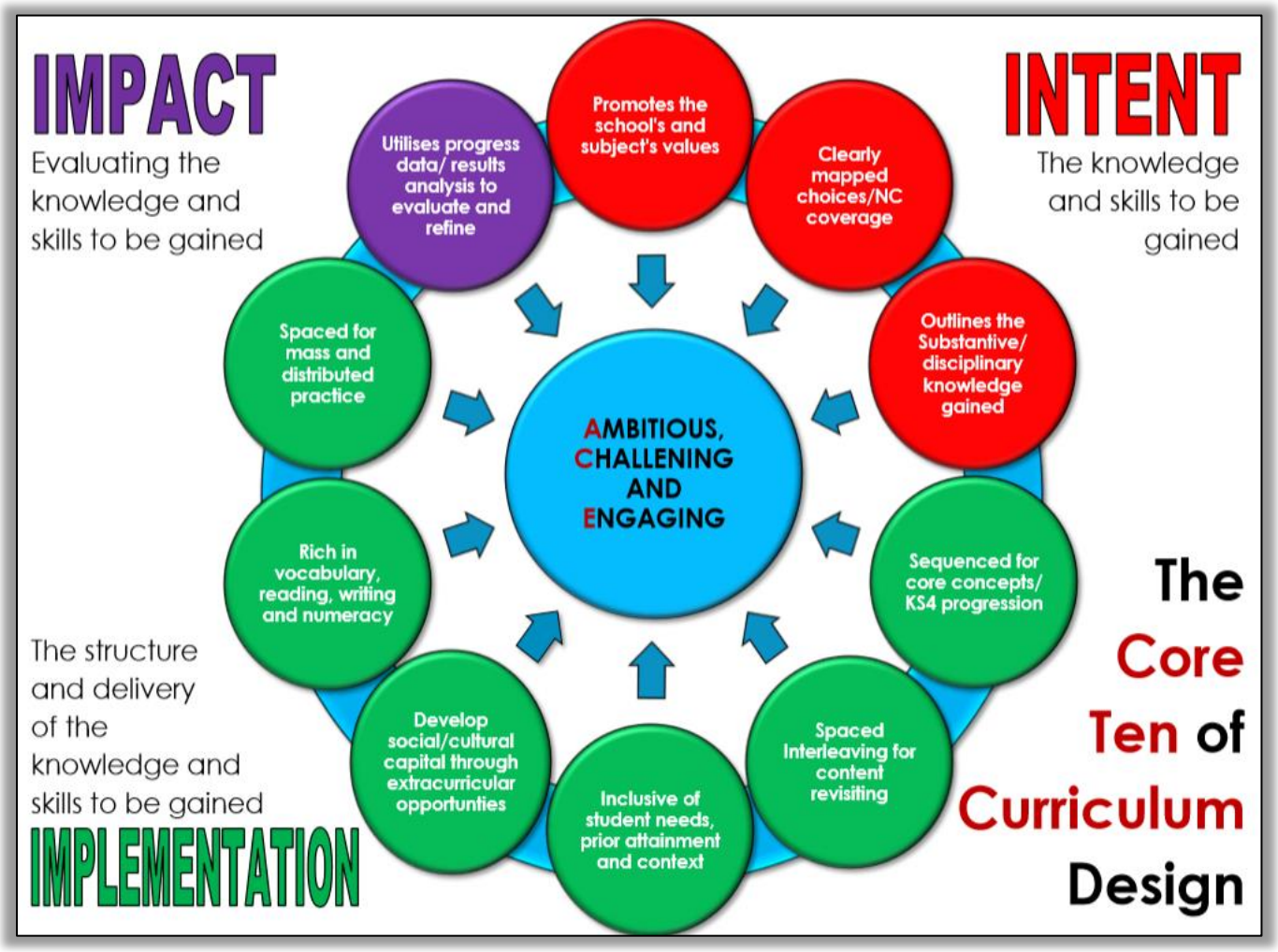
Key Stage 4

Subject: Science

Author: EMS

Created: April 2020

Updated: October 2022



Document(s) which inform this Curriculum Implementation are:

1. Curriculum Intent Overview Plan (KS4)

THINKING PROCESS - CURRICULUM IMPLEMENTATION OVERVIEW PLAN – KS4

IMPLEMENTATION – SEQUENCING AND PRACTICE

How are your topics sequenced below so as to ensure the following:

- key concepts are ordered and taught, so as to support progression to more challenging material
- content and concepts ordered to support progression from KS3 and to KS5
- topics are spaced between unrelated topics, to allow thinking time; then revisited and furthered
- mass practice (end of topic assessments)are used to evaluate the knowledge and skills gained
- distributed practice (mini assessments) are used where content/topics are reassessed in shortened versions, at later spaced out intervals

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
10	**Unit/Topic**	B2. Organisation P2. Electricity	B3. Infection and response P3. Particle model of matter	C2. Bonding, structure, and the properties of matter C3. Quantitative chemistry P4. Atomic structure	B4. Bioenergetics P5. Forces	C4. Chemical changes P5. Forces	B5. Homeostasis and response C5. Energy changes C6. The rate and extent of chemical change

	Specification/ Assessment Objective	4.2.1 Principles of organisation 4.2.2.1 The human digestive system 4.2.2.2 The heart and blood vessels 4.2.2.3 Blood 4.2.2.4 Coronary heart disease: a non-communicable disease 4.2.2.5 Health issues 4.2.2.6 The effect of lifestyle on some non-communicable diseases 4.2.2.7 Cancer 4.2.3.1 Plant tissues 4.2.3.2 Plant organ system 6.2.1.1 Standard circuit diagram symbols 6.2.1.2 Electrical charge and current 6.2.1.3 Current, resistance and potential difference 6.2.1.4 Resistors 6.2.2 Series and parallel circuits 6.2.3.1 Direct and alternating potential difference 6.2.3.2 Mains electricity 6.2.4.1 Power	4.3.1.1 Communicable (infectious) diseases 4.3.1.2 Viral diseases 4.3.1.3 Bacterial diseases 4.3.1.4 Fungal diseases 4.3.1.5 Protist diseases 4.3.1.6 Human defence systems 4.3.1.7 Vaccination 4.3.1.8 Antibiotics and painkillers 4.3.1.9 Discovery and development of drugs **4.3.2.1 Producing monoclonal antibodies** **4.3.2.2 Uses of monoclonal antibodies** **4.3.3.1 Detection and identification of plant diseases** **4.3.3.2 Plant defence responses** 6.3.1.1 Density of materials 6.3.1.2 Change of state 6.6.2.1 Internal energy 6.3.2.2 Temperature change in a system and specific heat capacity	5.2.1.1 Chemical bonds 5.2.1.2 Ionic bonding 5.2.1.3 Ionic compounds 5.2.1.4 Covalent bonding **4.2.4.1 Sizes of particles and their properties** **4.2.4.2 Uses of nanoparticles** 5.2.2.3 Properties of ionic compounds 5.2.2.4 Properties of small molecules 5.2.2.5 Polymers 5.2.2.6 Giant covalent structures 5.2.2.7 Properties of metals and alloys 5.2.2.8 Metals as conductors 5.2.3.1 Diamond 5.2.3.2 Graphite 5.2.1.5 Metallic bonding 5.2.2.1 The three states of matter 5.2.2.2 State symbols 5.3.1.1 Conservation of mass and balanced chemical equations 5.3.1.2 Relative formula mass5.3.1.3 Mass changes when a	4.4.1.1 Photosynthetic reaction 4.4.1.2 Rate of Photosynthesis 4.4.1.3 Uses of glucose from photosynthesis 4.4.2.1 Aerobic and anaerobic respiration 4.4.2.2 Response to exercise 4.4.2.3 Metabolism 6.5.1.1 scalar and vector quantities 6.5.1.2 Contact and non-contact forces 6.5.1.3 Gravity 6.5.1.4 Resultant forces 6.5.2 Work done and energy transfer 6.5.3 Forces and elasticity **4.5.4 Moments, levers and gears** **4.5.5.1 Pressure in a fluid** **4.5.5.1.2 Pressure in a fluid 2** **4.5.5.2 Atmospheric pressure** 6.5.4.1.1 Distance and displacement 6.5.4.1.2 Speed 6.5.4.1.3 Velocity 6.5.4.1.4 The distance-time relationship 6.5.4.1.5 Acceleration	5.4.1.1 Metal oxides 5.4.1.2 The reactivity series 5.4.1.3 Extraction of metals and reduction 5.4.1.4 Oxidation and reduction in terms of electrons (HT only) 5.4.2.1 Reactions of acids with metals 5.4.2.2 Neutralisation of acids and salt production 5.4.2.3 Soluble salts 5.4.2.4 The pH scale and neutralisation **4.4.2.5 Titrations** 5.4.2.5 Strong and weak acids (HT only) 5.4.3.1 The process of electrolysis 5.4.3.2 Electrolysis of molten ionic compounds 5.4.3.3 Using electrolysis to extract metals 5.4.3.4 Electrolysis of aqueous solutions 5.4.3.5 Representation of reactions at electrodes as half equations (HT only) 6.5.1.1 scalar and vector quantities 6.5.1.2 Contact and non-contact forces	4.5.1 Homeostasis 4.5.2 The human nervous system 4.5.2.2 The brain 4.5.2.3 The eye 4.5.2.4 Control of body temperature 4.5.3.1 Human endocrine system 4.5.3.2 Control of blood glucose concentration 4.5.3.3 Maintaining water and nitrogen balance in the body 4.5.3.3 Hormones in human reproduction 4.5.3.4 Contraception 4.5.3.5 The use of hormones to treat infertility 4.5.3.6 Feedback systems **4.5.4 Plant hormones** **4.5.4.1 Control and coordination** **4.5.4.2 Use of plant hormones** 5.5.1.1 Energy transfer during exothermic and endothermic reactions 5.5.1.2 Reaction profiles 5.5.1.3 The energy change of reactions **4.5.2.1 Cells and batteries**

		6.2.4.2 Energy transfers in everyday appliances 6.2.4.3 The National Grid **4.2.5.1 Static charge** **4.2.5.2 Electric fields**	6.3.2.3 Changes of state and specific latent heat 6.3.3.1 Particle motion in gases 4.3.3.2 Pressure in gases 4.3.3.3 Increasing the pressure of a gas	reactant or product is a gas 5.3.1.4 Chemical measurements 5.3.2.1 Moles 5.3.2.2 Amounts of substances in equations 5.3.2.3 Using moles to balance equations 5.3.2.4 Limiting reactants 5.3.2.5 Concentration of solutions 4.3.3.1 Percentage yield 4.3.3.2 Atom economy 4.3.4 Using concentrations of solutions in mol/dm3 4.3.5 Use of amount of substance in relation to volumes of gases 6.4.1.1 The structure of the atom 6.4.1.2 Mass number, atomic number and isotopes 6.4.1.3 The development of the model of the atom 6.4.2.1 Radioactive decay and nuclear radiation 6.4.2.2 Nuclear equations	6.5.4.2.1 Newton's First Law 6.5.4.2.2 Newton's Second Law 6.5.4.2.3 Newton's Third Law 6.5.4.3.1 Stopping distance 6.5.4.3.2 Reaction time 6.5.4.3.3 Factors affecting braking distance 1 6.5.4.3.4 Factors affecting braking distance 2 6.5.5.1 Momentum is a property of moving objects (HT) 6.5.5.2 Conservation of momentum **4.5.7.3 Changes in momentum**	6.5.1.3 Gravity 6.5.1.4 Resultant forces 6.5.2 Work done and energy transfer 6.5.3 Forces and elasticity **4.5.4 Moments, levers and gears** **4.5.5.1 Pressure in a fluid** **4.5.5.1.2 Pressure in a fluid 2** **4.5.5.2 Atmospheric pressure** 6.5.4.1.1 Distance and displacement 6.5.4.1.2 Speed 6.5.4.1.3 Velocity 6.5.4.1.4 The distance-time relationship 6.5.4.1.5 Acceleration 6.5.4.2.1 Newton's First Law 6.5.4.2.2 Newton's Second Law 6.5.4.2.3 Newton's Third Law 6.5.4.3.1 Stopping distance 6.5.4.3.2 Reaction time 6.5.4.3.3 Factors affecting braking distance 1 6.5.4.3.4 Factors affecting braking distance 2	**4.5.2.2 Fuel cells** 5.6.1.1 Calculating rates of reactions 5.6.1.2 Factors which affect the rates of chemical reactions 5.6.1.4 Catalysts 5.6.2.1 Reversible reactions 5.6.2.2 Energy changes and reversible reactions 5.6.2.3 Equilibrium 5.6.2.4 The effect of changing conditions on equilibrium 5.6.2.5 The effect of changing concentration 5.6.2.6 The effect of temperature changes on equilibrium 5.6.2.7 The effect of pressure changes on equilibrium

				6.4.2.3 Half-lives and the random nature of radioactive decay 6.4.2.4 Radioactive contamination 4.4.3 Hazards and uses of radioactive emissions and of background		6.5.5.1 Momentum is a property of moving objects (HT) 6.5.5.2 Conservation of momentum **4.5.7.3 Changes in momentum**	

	Powerful Knowledge	Explore the three states of matter are solid, liquid and gas. Why do chemicals have different properties in different states? Students should be able to explain the structure of the 4 forms of carbon, explaining their properties There are three types of strong chemical bonds: ionic, covalent and metallic. For ionic bonding the particles are oppositely charged ions. For covalent bonding the particles are atoms which share pairs of electrons. For metallic bonding the particles are atoms which share delocalised electrons. Students should be able to explain chemical bonding in terms of electrostatic forces and the	Students should be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. Students should be able to explain how the spread of diseases can be reduced or prevented. Students should be able to draw and interpret circuit diagrams. Electric current is a flow of electrical charge. The size of the electric current is the rate of flow of electrical charge. Charge flow, current and time are linked by the equation: charge flow = current × time The current (I) through a component depends on both the resistance (R) of the component and the potential difference (V) across the component. The greater the	Explore the three states of matter are solid, liquid and gas. Why do chemicals have different properties in different states? Students should be able to explain the structure of the 4 forms of carbon, explaining their properties There are three types of strong chemical bonds: ionic, covalent and metallic. For ionic bonding the particles are oppositely charged ions. For covalent bonding the particles are atoms which share pairs of electrons. For metallic bonding the particles are atoms which share delocalised electrons. Students should be able to explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons.	Students will be able to carry out a range of calculations to work out the number of atoms, the mass change, the elements in a compound. Photosynthesis is represented by the equation: carbon dioxide + water → glucose + oxygen Students will understand how this is the basis for much of the life on earth. Students will appreciate that life is able to reverse this reaction in order to turn chemical energy into other energy stores	Students will understand key reactions of metals with acids and how to purify a metal through electrolysis. Applying their understanding to make predictions on other metal reactions. Scalar quantities have magnitude only. Vector quantities have magnitude and an associated direction. The arrow notation for vectors. Force is a vector quantity and can be described as contact or non-contact. Examples of contact forces include friction, air resistance, tension and normal contact force. Examples of non-contact forces are gravitational force, electrostatic force and magnetic force. Weight is the force acting on an object	Students will be able to the regulation of the internal conditions. These include control of: blood glucose concentration, body temperature, water levels Students should be able to describe the roles of hormones in human reproduction, including the menstrual cycle. Students will work on how to change the rate of reaction. Carrying out far tests to vary reaction conditions. Students will learn about radioactive decay. Radioactive contamination is the unwanted presence of materials containing radioactive atoms on other materials.

		transfer or sharing of electrons. Students should be able to draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7. Students should be able to work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. Students should be able to: • deduce that a compound is ionic from a diagram of its structure in one of the specified forms • describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure	resistance of the component the smaller the current for a given potential difference (pd) across the component. Students should be able to explain that, for some resistors, the value of R remains constant but that in others it can change as the current changes. There are two ways of joining electrical components, in series and in parallel. Some circuits include both series and parallel parts. Mains electricity is an ac supply. In the United Kingdom the domestic electricity supply has a frequency of 50 Hz and is about 230 V. Most electrical appliances are connected to the mains using three core cable. The insulation covering each wire is colour coded for easy identification:	Students should be able to draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7. Students should be able to work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. Students should be able to: • deduce that a compound is ionic from a diagram of its structure in one of the specified forms • describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure • work out the empirical formula of an ionic compound from a given model or diagram that		due to gravity. The force of gravity close to the Earth is due to the gravitational field around the Earth. The weight of an object can be calculated using the equation: weight = mass x gravitational field strength $[W = m\,g]$ weight, *W*, in newtons, N mass, *m*, in kilograms, kg gravitational field strength, *g*, in newtons per kilogram, N/kg The weight of an object and the mass of an object are directly proportional. A number of forces acting on an object may be replaced by a single force that has the same effect as all the original forces acting together. This single force is called the resultant force. Use diagrams to describe qualitatively examples where	

		• work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure. Students should be able to: • draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane • represent the covalent bonds in small molecules, in the repeating units of polymers and in part of giant covalent structures, using a line to represent a single bond • describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent molecules or giant structures	live wire – brown neutral wire – blue earth wire – green and yellow stripes. The National Grid is a system of cables and transformers linking power stations to consumers. Students should be able to recognise simple diagrams to model the difference between solids, liquids and gases. Students should be able to describe how, when substances change State. An appreciation for specific latent heat of a substance temperature.	shows the ions in the structure. Students should be able to: • draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane • represent the covalent bonds in small molecules, in the repeating units of polymers and in part of giant covalent structures, using a line to represent a single bond • describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent molecules or giant structures • deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule.		several forces lead to a resultant force on an object. Use vector diagrams to illustrate: resolution of forces; equilibrium situations and determine the resultant of two forces including magnitude and direction. Use a free body diagram to show the magnitude and direction of the forces acting on an object When a force causes an object to move through a distance, work is done on the object. The work done by a force on an object can be calculated using the equation: work done = force x distance (moved along the line of action of the force) $[W = F s]$ work done, *W*, in joules, J, force, *F*, in newtons, N distance, s, in metres Describe the energy transfer involved when work is done.	

		• deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule. The three states of matter are solid, liquid and gas. Melting and freezing take place at the melting point, boiling and condensing take place at the boiling point. **These particles, including nanoparticles, have specific sizes and properties** Students should be able to draw and interpret circuit diagrams. Electric current is a flow of electrical charge. The size of the electric current is the rate of flow of electrical charge. Charge flow, current and time are linked by the		The three states of matter are solid, liquid and gas. Melting and freezing take place at the melting point, boiling and condensing take place at the boiling point. **These particles, including nanoparticles, have specific sizes and properties**		Work done against the frictional forces acting on an object causes a rise in the temperature of the object. Elastic deformation occurs when an object returns to its original shape and size after the forces are removed. An object that does not return to its original shape after the forces have been removed has been inelastically deformed. The extension of an elastic object, such as a spring, is directly proportional to the force applied, provided that the limit of proportionality is not exceeded. force = spring constant x extension $[F = k\,e]$ force, *F*, in newtons, N spring constant, *k*, in newtons per metre, N/m extension, *e*, in metres, m Distance is how far an object moves. It is a scalar quantity.	

		equation: charge flow = current × time The current (I) through a component depends on both the resistance (R) of the component and the potential difference (V) across the component. The greater the resistance of the component the smaller the current for a given potential difference (pd) across the component. Students should be able to explain that, for some resistors, the value of R remains constant but that in others it can change as the current changes. There are two ways of joining electrical components, in series and in parallel. Some circuits include both series and parallel parts.				Displacement includes both the distance an object moves, measured in a straight line from the start point to the finish point and the direction of that straight line. Displacement is a vector quantity. Express a displacement in terms of magnitude and direction. For an object moving at constant speed the distance travelled in a specific time can be calculated using the equation: $distance\ travelled\ =$ $speed\ x\ time$ $[s\ =\ v\ t]$ If an object moves along a straight line, how far it is from a certain point can be represented by a distance–time graph. The speed of an object can be calculated from the gradient of its distance–time graph.	

		Mains electricity is an ac supply. In the United Kingdom the domestic electricity supply has a frequency of 50 Hz and is about 230 V. Most electrical appliances are connected to the mains using three core cable. The insulation covering each wire is colour coded for easy identification: live wire – brown neutral wire – blue earth wire – green and yellow stripes. The National Grid is a system of cables and transformers linking power stations to consumers.				The average acceleration of an object can be calculated using the equation: acceleration = change in velocity / time taken $[a = \frac{\Delta v}{t}]$ acceleration, a, in metres per second squared, m/s^2 change in velocity, Δv, in metres per second, m/s Near the Earth's surface any object falling freely under gravity has an acceleration of about 9.8 m/s^2. An object falling through a fluid initially accelerates due to the force of gravity. Newton's First Law: If the resultant force acting on an object is zero and: • the object is stationary – the object will remain stationary • the object is moving – the object will continue to move at the same speed and	

						in the same direction. So the object continues to move at the same velocity.	
	Mass Practice	End of topic assessment for B2. Organisation P2. Electricity End of topic assessment for C2. Bonding, structure, and the properties of matter	End of topic assessment for C2. Bonding, structure, and the properties of matter End of topic assessment for B3. Infection and P3. Particle model of matter	End of topic assessment for C2. Bonding, structure, and the properties of matter C3. Quantitative chemistry End of topic assessment for P4 Atomic Structure and Radiation.	End of topic assessment for B4. End of topic assessment for P5. Forces	Bioenergetics C4. Chemical changes C5. Energy changes End of topic assessment for P5. Forces	Atomic structure B5. Homeostasis and response C6. The rate and extent of chemical change End of year mock exam on Paper 1 topics. Our scheme allows us to assess all Paper 1 content at this point

	Distributed Practice	Quick quizzes and example exam questions for B2, C2 and P2. Starters and plenaries throughout each topic that reviews previous learning. E.g. plenary quick quiz style questions on animal and plant cells to check understanding in B1, a starter asking pupils to write a method using a number of separation techniques in C2. Required practical write ups for B2/C2/P2 – writing hypotheses, identifying independent/dependent/controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures.	Quick quizzes and example exam questions for B3, P3 and C2. Starters and plenaries throughout each topic that reviews previous learning. E.g. a SPLAT plenary activity on the differences between communicable diseases in B3, a starter recap question on a conservation of mass calculation in C3, and a DNA picture activity asking to order the particles diagrams in P3. Required practical write up on density in P3 – writing hypotheses, identifying independent/dependent/controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures.	Quick quizzes and example exam questions for P4 and C2. Starters and plenaries throughout each topic that reviews previous learning. E.g. quick check starter questions on states of matter in C2 and , a review exercise on the developing the model of the atom in P4. A starter asking pupils to write a method using a number of separation techniques in C2. Reflection of learning – pupils given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions. Stretch opportunities with extended writing tasks e.g.	Quick quizzes and example exam questions for B4 Photosynthesis and P5 Forces. Required practical write up on Photosynthesis in B4. A hot seat questioning plenary on Newton's first, second and third laws in P5. Required practical write up on Force and extension in P5 – writing hypotheses, identifying independent/dependent/controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures. Reflection of learning – pupils given opportunities throughout the topics to revisit previous learning and also think about how to improve, Reflection of learning – pupils	Quick quizzes and example exam questions for C4 and C5. Starters and plenaries throughout each topic that reviews previous learning. A plenary quiz on the electrolysis of aqueous solutions in C4, and a DNA bond energy calculation in C5. A hot seat questioning plenary on Newton's first, second and third laws in P5. Required practical write up on Force and extension in P5 Required practical write up on Electrolysis and Making Salts in C4, – writing hypotheses, identifying independent/dependent /controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures. Reflection of learning – pupils	Quick quizzes and example exam questions for B5 and C6. Starters and plenaries throughout each topic that reviews previous learning. E.g. quick check starter questions on puberty and the menstrual cycle in B5, and a hot seat plenary on rates of reaction in C6. Required practical write up on reaction time and plant responses in B5, and rates of reaction in C6 –writing hypotheses, identifying independent/dependent /controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures. Reflection of learning – pupils given opportunities throughout the

		Reflection of learning – pupils given opportunities throughout the topics	Required practical write up on Enzymes and Food tests for B2 –writing hypotheses, identifying independent/dependent /controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures. Reflection of learning – pupils given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions. Stretch opportunities with extended writing	QWC 6 mark exam question on the	given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions.	given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions	topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions

	What are the key concepts to be covered?	The structure and function of plant and animal cells. The structure of the atom and the composition of the Periodic Table. The different energy stores available and the different ways that energy can be transferred. The structure and organisation of the human body from cell to organ system. The different types of bonding that occurs between atoms and elements and the structure and properties of the new materials made. Building circuits and measuring voltage and current in circuits along with calculating resistance as some of the basics. The structure and function of pathogens that can invade the human body and how the body then responds to fight off infection using the immune system. Equations used to calculate amounts, concentrations and masses of chemicals and elements. Metabolism and the processes that maintain the balance in the body such as Respiration and the synthesis of proteins. The chemical changes that take place during chemical reactions such as colour changes and the production of gasses. The energy changes that take place during a chemical reactions such as a temperature which can result in an endothermic or exothermic change and the ability to calculate the rate of those changes. The structure of particles in materials such as solids, liquids and gasses and the structure of the atom. The process of homeostasis in the human body and how our bodies respond to changes such as hormone level changes and glucose level changes.

	What prior knowledge, at KS3, are you assuming they have?	Working Scientifically **Scientific attitudes** - pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility Experimental skills and investigations - ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience, make predictions using scientific knowledge and understanding; select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables; use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements **Analysis and evaluation** - present observations and data using appropriate methods, including tables and graphs **Measurement** - use and derive simple equations and carry out appropriate calculations, undertake basic data analysis including simple statistical techniques. Biology **Cells and organisation** - cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. Students should know the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts and be able to describe the similarities and differences between plant and animal cells. **The skeletal and muscular systems –** describe the structure and functions of the human skeleton **Nutrition and digestion –** know the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed. They should know plants make carbohydrates in their leaves by photosynthesis and gain mineral nutrients and water from the soil via their roots. **Gas exchange systems –** know the structure and functions of the gas exchange system in humans, including adaptations to function the mechanism of breathing to move air in and out of the lungs. They should also know the role of leaf stomata in gas exchange in plants **Reproduction -** reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems and menstrual cycle (without details of hormones). They should also know about the reproduction in plants. **Photosynthesis -** the reactants in, and products of, photosynthesis, and a word summary for photosynthesis **Cellular respiration -** aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life **Relationships in an ecosystem -** the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops. Know the importance of plant reproduction through insect pollination in human food security. Know how organisms affect, and are affected by, their environment, including the accumulation of toxic materials **Inheritance, chromosomes, DNA and genes –** know heredity as the process by which genetic information is transmitted from one generation to the next. Be able to recognise a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. Pupils should also be able to identify the differences between species. Chemistry

		The particulate nature of matter – know the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure. They should know about the changes of state in terms of the particle model **Atoms, elements and compounds –** they should be able to draw a simple atomic model, describe differences between atoms, elements and compounds and have a knowledge about chemical symbols and formulae for elements and compounds. **Pure and impure substances –** know about the concept of a pure substance, mixtures (including dissolving), diffusion in terms of the particle model, and simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography **Chemical reactions -** chemical reactions as the rearrangement of atoms. Representing chemical reactions using formulae and using equations. Know about combustion, neutralisation, thermal decomposition, oxidation and displacement reactions. Students should know about the pH scale for measuring acidity/alkalinity; and indicators, reactions of acids with metals and alkalis and state what catalysts do. **The periodic table –** pupils should know about the varying physical and chemical properties of different elements, the periodic table: periods and groups; metals and non-metals, how patterns in reactions can be predicted with reference to the periodic table, and the properties of metals and non-metals **Earth and atmosphere –** pupils should know about the composition and structure of the Earth, the rock cycle and the formation of igneous, sedimentary and metamorphic rocks, the composition of the atmosphere and the production of carbon dioxide by human activity and the impact on climate. Physics **Energy – pupils should know about** comparing energy values of different foods (from labels) (kJ), comparing power ratings of appliances in watts (W, kW), comparing amounts of energy transferred (J, kJ, kW hour), and about domestic fuel bills, fuel use and costs **Energy changes and transfers -** pupils should know about heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators. **Electricity (current and static) –** pupils should know about electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge, potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference to current. **Static -** separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects and the idea of an electric field. **Magnetism-** pupils should know about magnetic poles, attraction and repulsion, magnetic fields by plotting with compass, representation by field lines, and the Earth's magnetism, compass and navigation **Particle model -** the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition, atoms and molecules as particles **Space physics –** pupils should know about gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars, know our sun as a star, other stars in our galaxy, other galaxies, the seasons and the Earth's tilt, day length at different times of year, in different hemispheres.

	What knowledge do they need to have a successful start to Year 11?	Students are required to have a good grasp of the underlying paper one topics in order to understand the content in the paper two topics which are mainly covered on Year 11. If they have mastered the building blocks of these topics, it already leads them in good stead for a successful Year 11. The basics of forces covered in KS3 will be built upon even further in P5 Forces, therefore having a good knowledge of the basics will be advantageous to students. Students need to have a good understanding of bonding within compounds in order to apply their knowledge to C7 Organic chemistry. Sound knowledge of inheritance, chromosomes, DNA and genes covered in KS3 would be highly beneficial to apply during the topic B6 Inheritance, variation and evolution. A general knowledge of what we do to sustain our planet in terms of waste disposal, use of materials and water usage would also be useful when looking at topics C10 Using resources and B7 Ecology. Students will have covered the foundations of P6 Waves and P7 Magnetism and electromagnetism in KS3, so any recollection of this would be highly useful for these topics. Students should have now learnt what is needed from them for required practicals write ups, which will be continued to be worked on and improved during Year 11.
	How are topics spaced between unrelated topics?	Our curriculum allows us to move to unrelated content and return to it later. Biology, Chemistry and Physics topics are spaced between each other which enables knowledge to be revisited throughout the year. This gives opportunities for recalling specific learning. For example, the knowledge gained in B1 Cell Biology will be revisited and used again later on in the year in topic B2 Organisation and B4 Bioenergetics. Topic C1 Atomic Structure and Periodic Table will be referred to during topic C2 Bonding, Structure and properties of matter and P4 Atomic Structure. The Chemistry topics C1 and C2 being the topics that bind all of the Chemistry knowledge together. The techniques and skills learned within the Physics topics are revisited throughout the year e.g. mathematical skills used with topic P1 Energy and P2 Electricity. General investigative work, including required practicals, are included in most topics throughout the year, giving students the opportunity to revisit and practice these skills on a regular basis.

11	**Unit/Topic**	B5. Homeostasis and response P5. Forces	B6. Inheritance, variation and evolution C6. The rate and extent of chemical change P6. Waves	C7. Organic chemistry P7. Magnetism and electromagnetism B7. Ecology C8. Chemical analysis	C8. Chemical analysis C9. Chemistry of the atmosphere C10. Using resources P8. Space physics	

	Specification/ Assessment Objective	4.5.1 Homeostasis 4.5.2 The human nervous system 4.5.2.2 The brain 4.5.2.3 The eye 4.5.2.4 Control of body temperature 4.5.3.1 Human endocrine system 4.5.3.2 Control of blood glucose concentration 4.5.3.3 Maintaining water and nitrogen balance in the body 4.5.3.3 Hormones in human reproduction 4.5.3.4 Contraception 4.5.3.5 The use of hormones to treat infertility 4.5.3.6 Feedback systems **4.5.4 Plant hormones** **4.5.4.1 Control and coordination** **4.5.4.2 Use of plant hormones** .5.1.1 scalar and vector quantities 6.5.1.2 Contact and non-contact forces 6.5.1.3 Gravity	4.6.1.1 Sexual and asexual reproduction 4.6.1.2 Meiosis **4.6.1.3 Advantages and disadvantages of sexual and asexual reproduction** 4.6.1.3 DNA and the genome **4.6.1.5 DNA structure** 4.6.1.4 Genetic inheritance 4.6.1.5 Inherited disorders 4.6.1.6 Sex determination 4.6.2.1 Variation 4.6.2.2 Evolution 4.6.2.3 Selective breeding 4.6.2.4 Genetic engineering **4.6.2.5 Cloning** **4.6.3.1 Theory of evolution** **4.6.3.2 Speciation** **4.6.3.3 The understanding of genetics** 4.6.3.1 Evidence for evolution 4.6.3.2 Fossils 4.6.3.3 Extinction 4.6.3.4 Resistant bacteria 4.6.4 Classification of living organisms	5.7.1.1 Crude oil, hydrocarbons and alkanes 5.7.1.2 Fractional distillation and petrochemicals 5.7.1.3 Properties of hydrocarbons 5.7.1.4 Cracking and alkenes **4.7.2.1 Structure and formulae of alkenes** **4.7.2.2 Reactions of alkenes** **4.7.2.3 Alcohols** **4.7.2.4 Carboxylic acids** **4.7.3.1 Addition polymerisation** **4.7.3.2 Condensation polymerisation** **4.7.3.3 Amino acids (HT only)** **4.7.3.4 DNA (deoxyribonucleic acid) and other naturally occurring polymers** 4.7.1.1 Communities 4.7.1.2 Abiotic factors 4.7.1.3 Biotic factors 4.7.1.4 Adaptations 4.7.2.1 Levels of organisation 4.7.2.2 How materials are cycled **4.7.2.3 Decomposition**	Emphasis on 6 mark questions relating to the core practicals 5.9.1.1 The proportions of different gases in the atmosphere 5.9.1.2 The Earth's early atmosphere 5.9.1.3 How oxygen increased 5.9.1.4 How carbon dioxide decreased 5.9.2.1 Greenhouse gases 5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the Atmosphere 5.9.2.3 Global climate change 5.9.2.4 The carbon footprint and its reduction 5.9.3.1 Atmospheric pollutants from fuels 5.9.3.2 Properties and effects of atmospheric pollutants 5.10.1.1 Using the Earth's resources and sustainable development 5.10.1.2 Potable water	

		6.5.1.4 Resultant forces 6.5.2 Work done and energy transfer 6.5.3 Forces and elasticity **4.5.4 Moments, levers and gears** **4.5.5.1 Pressure in a fluid** **4.5.5.1.2 Pressure in a fluid 2** **4.5.5.2 Atmospheric pressure** 6.5.4.1.1 Distance and displacement 6.5.4.1.2 Speed 6.5.4.1.3 Velocity 6.5.4.1.4 The distance-time relationship 6.5.4.1.5 Acceleration 6.5.4.2.1 Newton's First Law 6.5.4.2.2 Newton's Second Law 6.5.4.2.3 Newton's Third Law 6.5.4.3.1 Stopping distance 6.5.4.3.2 Reaction time 6.5.4.3.3 Factors affecting braking distance 1	5.6.1.1 Calculating rates of reactions 5.6.1.2 Factors which affect the rates of chemical reactions 5.6.1.4 Catalysts 5.6.2.1 Reversible reactions 5.6.2.2 Energy changes and reversible reactions 5.6.2.3 Equilibrium 5.6.2.4 The effect of changing conditions on equilibrium 5.6.2.5 The effect of changing concentration 5.6.2.6 The effect of temperature changes on equilibrium 5.6.2.7 The effect of pressure changes on equilibrium 6.6.1.1 Transverse and longitudinal wave 6.6.1.2 Properties of waves **4.6.1.3 Reflection of waves** **4.6.1.4 Sound waves** **4.6.1.5 Waves for detection and exploration** 6.6.2.1 Types of electromagnetic waves	**4.7.2.4 Impact of environmental change** 4.7.3.1 Biodiversity 4.7.3.2 Waste management 4.7.3.3 Land use 4.7.3.4 Deforestation 4.7.3.5 Global warming 4.7.3.6 Maintaining biodiversity **4.7.4.1 Trophic levels** **4.7.4.2 Pyramids of biomass** **4.7.4.3 Transfer of biomass** **4.7.5.1 Factors affecting food security** **4.7.5.2 Farming techniques** **4.7.5.3 Sustainable fisheries** **4.7.5.4 Role of biotechnology** 6.7.1.1 Poles of a magnet 6.7.1.2 Magnetic fields 6.7.2.1 Electromagnetism 6.7.2.2 Fleming's left-hand rule 6.7.2.3 Electric motors **4.7.2.4 Loudspeakers** **4.7.3.1 Induced potential** **4.7.3.2 Uses of the generator effect**	5.10.1.3 Waste water treatment 5.10.1.4 Alternative methods of extracting metals 5.10.2.1 Life cycle assessment 5.10.2.2 Ways of reducing the use of resources **4.10.3.1 Corrosion and its prevention** **4.10.3.2 Alloys as useful materials** **4.10.3.3 Ceramics, polymers and composites** **4.10.4.1 The Haber process** **4.10.4.2 Production and uses of NPK fertilisers** 5.8.1.1 Pure substances 5.8.1.2 Formulations 5.8.1.3 Chromatography 5.8.2.1 Test for hydrogen 5.8.2.2 Test for oxygen 5.8.2.3 Test for carbon dioxide 5.8.2.4 Test for chlorine **4.8.3.1 Flame tests** **4.8.3.2 Metal hydroxides**	

		6.5.4.3.4 Factors affecting braking distance 2 6.5.5.1 Momentum is a property of moving objects (HT) 6.5.5.2 Conservation of momentum **4.5.7.3 Changes in momentum**	6.6.2.2 Properties of electromagnetic waves 1 6.6.2.3 Properties of electromagnetic waves 2 6.6.2.4 Uses and applications of electromagnetic waves **4.6.2.5 Lenses** **4.6.2.6 Visible light** **4.6.3.1 Emission and absorption of infrared radiation** **4.6.3.2 Perfect black bodies and radiation**	**4.7.3.3 Microphones** **4.7.3.4 Transformers** **4.8.1.1 Our solar system** **4.8.1.2 The life cycle of a star** **4.8.1.3 Orbital motion, natural and artificial satellites** **4.8.2 Red-shift** 5.8.1.1 Pure substances 5.8.1.2 Formulations 5.8.1.3 Chromatography 5.8.2.1 Test for hydrogen 5.8.2.2 Test for oxygen 5.8.2.3 Test for carbon dioxide 5.8.2.4 Test for chlorine **4.8.3.1 Flame tests** **4.8.3.2 Metal hydroxides** **4.8.3.3 Carbonates** **4.8.3.4 Halides** **4.8.3.5 Sulfates** **4.8.3.6 Instrumental methods** **4.8.3.7 Flame emission spectroscopy**	**4.8.3.3 Carbonates** **4.8.3.4 Halides** **4.8.3.5 Sulfates** **4.8.3.6 Instrumental methods** **4.8.3.7 Flame emission spectroscopy**	

	Powerful Knowledge	Students will understand the roles of the two types of cell division. One for growth, one for new life. A force is a push or pull that acts on an object due to the interaction with another object. How forces affect movement and a range of examples for moving objects. The braking distance of a vehicle can be affected by adverse road and weather conditions and poor condition of the vehicle.	It is important in industry to choose materials based on their particular product students will gain an insight into how these properties could be tested. Pharmacists need to have a good understanding of how chemicals, such as, acids and alkalis react when dispensing medicines to patients Students will learn about how crude oil was created, how it is extracted and how we separate out fraction (separating techniques from term 1) Crude oil is a finite resource found in rocks. What do we have to replace it? Electromagnetic waves are transverse waves that transfer energy from the source of the waves to an absorber. Going from long to short wavelength (or from low to high frequency) the groups are: radio,	Students should be able to explain how organisms are adapted to live in their natural environment. Humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste. Students should be able to describe some of the biological consequences of global warming. Chromatography can be used to separate mixtures and can give information to help identify substances. The test for hydrogen. The test for oxygen. The test for carbon dioxide.	Chromatography can be used to separate mixtures and can give information to help identify substances. The test for hydrogen. The test for oxygen. The test for carbon dioxide. Students will learn about theories about what was in the Earth's early atmosphere and how the atmosphere was formed have changed and developed over time. Natural resources, supplemented by agriculture, provide food, timber, clothing and fuels. Potable water is not pure water how do we ensure diseases don't spread through dirty water? The reduction in use, reuse and recycling of materials by end users reduces the use of limited resources, use of energy sources, waste and environmental impacts.		

			microwave, infrared, visible light (red to violet), ultraviolet, X-rays and gamma rays. Electromagnetic waves have many practical applications, students need to know examples for each.		Students should be able to explain how organisms are adapted to live in their natural environment. Humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste. Students should be able to describe some of the biological consequences of global warming. Students will know how to use momentum and magnetic fields to create electricity and create movement using electricity and a magnetic field. Cover a range of uses for this and link back to energy stores.		
	Mass Practice	End of topic assessment for P5. Forces and B5 Homeostasis	End of topic assessment for B6. Inheritance, variation and evolution P6. Waves B7. Ecology	End of topic assessment for C7. Organic chemistry End of topic assessment for P7. Magnetism and electromagnetism	End of topic assessment for C8. Chemical analysis, C9. Chemistry of the atmosphere C10. Using resources **P6. Space**	Paper 1 mock assessment Paper 2 mock assessment	

	Distributed Practice	Quick quizzes and example exam questions for B5 and P5. E.g. quick check starter questions on puberty and the menstrual cycle in B5. Required practical write up on reaction time and plant responses in B5 Starters and plenaries throughout each topic that reviews previous learning., a hot seat questioning plenary on Newton's first, second and third laws in P5. Required practical write up on Force and extension in P5 – writing hypotheses, identifying independent/dependent/controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures.	Quick quizzes and example exam questions for B6, B7and P6. Starters and plenaries throughout each topic that reviews previous learning. DNA wave speed calculation in P6. Starters and plenaries throughout each topic that reviews previous learning. E.g. quick check starter questions abiotic and biotic factors in B7. E.g. quick check starter questions abiotic and biotic factors in B7 Required practical write up on Decay in B7 . Required practical write up on Radiation and Absorption in P6 – writing hypotheses, identifying independent/dependent /controlled variables, writing a method, making a conclusion based on graphical and numerical data,	Quick quizzes and example exam questions C8 and C7 and P7. Starters and plenaries throughout each topic that reviews previous learning. E.g. plenary quick quiz style questions on fractional distillation to check understanding in C7 throughout each topic that reviews previous learning – writing hypotheses, identifying independent/dependent/controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures Review exercise on the motor effect in P7. Required practical write up on Chromatography in C8 Reflection of learning – pupils given opportunities throughout the	Quick quizzes and example exam questions for C8, C9 and C10. Starters and plenaries throughout each topic that reviews previous learning. Tests for gases in C8. Starters and plenaries. E.g. a SPLAT plenary activity on the evolution of the atmosphere in C9, and a starter recap question on waste water treatment in C10. Required practical write up on Water purification in C10 – writing hypotheses, identifying independent/dependent /controlled variables, writing a method, making a conclusion based on graphical and numerical data, evaluating procedures. Reflection of learning – pupils given opportunities throughout the	Quick quizzes and example exam questions for all topics Starters and plenaries throughout each of the revision lesson that focuses on students' weaker areas of knowledge and iron out any misconceptions. Reflection of learning – pupils given opportunities to think about how to improve their knowledge and exam technique, using quick quizzes and marked example exam questions to help. Stretch opportunities with extended writing tasks e.g. QWC 6 mark exam questions and exam questions that require a longer response.	

		Reflection of learning – pupils given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked	evaluating procedures. Reflection of learning – pupils given opportunities throughout the topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam questions Stretch opportunities with extended writing	topics to revisit previous learning and also think questions Stretch opportunities with extended writing tasks e.g. QWC 6 mark exam question on the	topics to revisit previous learning and also think about how to improve, using quick quizzes and marked example exam about how to improve, using quick quizzes and marked example exam questions Stretch opportunities with extended writing tasks e.g. QWC 6 mark exam question.		
	What are the key concepts to be covered?	The different types of forces that exist and Newton`s Laws. The structure and uses of Hydrocarbons, including Alkanes, Alkenes and Alcohols. The terms `inheritance`, `evolution` and `variation` and the way that humans, for example, have evolved through inheriting different characteristics and features that cause variation. Methods used, by scientists, to analyse and identify chemicals using reagents and chemical reactions. The Electromagnetic spectrum and the features and structure of the different types of waves. The structure of our atmosphere and how it has changed over time and is continuing to change due to changes in atmospheric gasses. How resources are obtained, produced and used effectively such as Aluminium to make Aluminium cans. How magnetism works and how electromagnets are made, including their uses. The study of organisms and their habitats and the ecosystem that they live in.					
	What knowledge do they need to have a successful start to Year KS5?	A good knowledge of the basics will ensure a successful start to KS5. Biology - Living organisms, Biodiversity, Exchange and transport, Cells, Biological molecules, Ecosystems, Control systems, Genetics and evolution and Energy for biological processes. Chemistry - Formulae, equations and amounts of substance, Atomic structure, Bonding and structure, Energetics, Kinetics, Equilibria, Redox, Inorganic chemistry and the periodic table, Organic chemistry and Modern analytical techniques. Physics - Vectors and scalars, Mechanics, Mechanical properties of matter, Electric circuits, Waves, Matter, Quantum and nuclear physics and Fields					

	How are topics spaced between unrelated topics?	Our curriculum allows us to move to unrelated content and return to it later. Biology, Chemistry and Physics topics are spaced between unrelated topics. Each other which enables knowledge to be revisited throughout the year. This gives opportunities for recalling specific learning. For example, the knowledge gained in C7 Organic Chemistry will be utilised again later on in the year in topic C9 Chemistry of the atmosphere and C10 Using resources. Content covered in the Biology topic B7 Ecology is also revisited in C9 Chemistry of the atmosphere. The techniques and skills learned within the Physics topics are revisited throughout the year e.g. mathematical skills used with topic P5 Forces and P6 Waves. General investigative work, including required practicals, are included in most topics throughout the year, giving students the opportunity to revisit and practice these skills on a regular basis.

IMPLEMENTATION – STUDENT NEEDS AND SUPPORT

How is student learning supported below so as to ensure the following:

- extracurricular/career opportunities which develop social and cultural capital
- key vocabulary, reading, writing and numeracy opportunities
- support for SEND and students with Low Prior Attainment, as well as challenge for students with High Prior Attainment

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
10	**Social/ Cultural Capital**	**Visit to a Power Plant or Hydroelectric plant to see how energy is harnessed**	Visit to the Science museum in London to look at the structure of the human body	Joint project with DT to build circuit boards	Fil Club to watch Contagion and appreciate how devastating an impact a virus or bacterium can have on the human population	Joint project with PE to look at the impact of sport/respiration on the human body	Joint project with History to look at the historical view about the atom

	Tier 2/3 Vocabulary	B2. Organisation B2 – Homework – Some tier 2/3 vocabulary from 8A for the first homework. This term will focus on tier 2/3 vocabulary for food–based tests required practical P2. Electricity P2 – Required practical in P2 to investigate I–V characteristics. Review tier 2 words from last term's required practical and use 7J tier 3 vocabulary.	B3. Infection and response, C3. Quantitative chemistry P3. Particle model of matter B3 – will use some tier 3 words from 8D, the focus is to ensure correct tier 3 words are used to explain the differences between fungi, bacteria, and viruses. P3 – Revise key words from 7G particle model. Explore how these can be used scientifically through the reading task. Practical tier 2 words for density required practical.	C2. Bonding, structure, and the properties of matter. C2 – Start with recap of tier 2/3 vocabulary from 8F Introduce new tier 2/3 vocabulary related to atomic bonds. C3 – requires few additional tier 3 vocabulary (Avogadro and mole) P4. Atomic structure P4 – New tier 3 vocabulary for radiation. DNA to cover 7H tier 3 vocabulary.	B4. Bioenergetics C4. Chemical changes C5. Energy changes. B4 – first homework is tier 3 words from 8B and 8C. Recap tier 2 vocabulary for light intensity required practical. P5. Forces P5 – Link back to 9I with these definitions to be set for homework. New key words for 2nd lesson DNA – scalar and vector. Apply these in the writing task	C4 – is heavily reliant on tier 3 words from 9F, 7F, and P2 (opportunity to return to P2 understanding of current and voltage). Set this for homework and DNA. C5 – is a small topic. Two tier 3 words. Exothermic and endothermic. Recap tier 2 vocabulary for heat energy required practical.	B5. Homeostasis and response, C6. The rate and extent of chemical change B5 – Revisit tier 2+3 vocabulary for the required practical Tier 3 words given for a writing activity for nervous system. C6 – first homework to complete definitions for 9F. DNA to repeat those from C2.
	Reading	B2 - Reading for research for the organelles within eukaryotic and prokaryotic cells. P2 – Reading for analysis for the atomic structure. P1 – Reading to reinforce the tier 3 vocabulary that will be used throughout the energy topic	B2 – Reading for analysis in order to link the cell functions back to cell structure from the previous term C2 - Concentrate on why and how questions after reading the text in order to support the students in explaining the different types of bonding	B3 - Reading for research on bacteria and virus focusing on how each affects health C3 – Reading to focus on steps to complete calculations. P3 – Reading on practical steps to be taken. Questions to focus on assessing this knowledge	B4 – Reading for analysis. Read how trees affect the amount of oxygen and carbon dioxide (not always positive for the atmosphere) P4 - Teacher led reading through text to analysis how matter is made up. C4 – Reading to focus on steps to complete calculations.	C5 – Reading to focus on steps to complete calculations. B5 - Reading for research for the processes of how the body regulates blood sugar, water levels, and body temperature	P5 – Big picture question regarding transport. Use news article to unpick tier 2 words to support students in their responses.

	Writing	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (B2) (P2) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the different methods of how substances are transported across a membrane in B2, and the advantages and disadvantages of biofuels in P2 as renewable sources to generate electricity. Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this.	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (B2) (C2) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the circulatory system and the heart in B2 and discussing the properties of the allotropes of carbon in C2. Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (P3) (C3) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the similarities and differences in parallel and series circuits in P2 and identifying why substances are gases or solids at room temperature based on their bonding and structure in C2. Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this (P2)	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (P3) (C3) (B3) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the stages for the development of a drug in B3, and how to measure the density of an irregular object in P3. Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this (P3)	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (B4) (C4)(C5) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the rate of photosynthesis and the factors that affect it in B4, the reactivity series and how to carry out an experiment to determine reactivity in C4, describing the progress of a reaction using reaction profiles in C5. Writing a scientific report as part of the GCSE required practicals. Writing frames and	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (P5) (C6)(B5) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question on the reflex arc and pathway of electrical impulses in B5, describing half-life using calculations in P4, and describing reversible reactions whilst applying Le Chatelier's Principle in C6. Writing a scientific report as part of the GCSE required practicals. Writing frames and

						examples given to support this (B4)(C4)	examples given to support this (B5)(C6)
	Numeracy	B2 – Prefixes centi, milli, micro, nano P1 - Prefixes centi, milli, micro, nano P2 - Using equations for electricity. Rearranging skills and steps to complete each time	B2 - Students should understand the principles of sampling as applied to scientific data, including epidemiological data. C2 – Patterns in the numbers of electrons to predict reactions	B3 – Appreciation of scale C3 – Steps to complete equations. Cover scientific notation. Avogadro's constant 6 x 1023 mol-1 P3 – Appreciation of how numerator and denominator will change the figure for density	B3 – Appreciation of scale C3 – Steps to complete equations. Cover scientific notation. Avogadro's constant 6 x 1023 mol-1 P4 – Appreciation of atomic scale and application to two different models to explain the atom structure	B4 – Appreciation for the scale of the atmosphere. C4 Steps to complete equations. Cover scientific notation. P5 - Using equations for electricity.	B5 – Estimate how long it takes for a nerve impulse to travel C5 – Steps to complete equations. Cover scientific notation. P5 - Using equations for electricity.
	How does the PoS support students with SEND needs?	All sessions will be differentiated for all students within the learning session including those with SEND needs. Teaching strategies for SEND students may include repetition of key words or ideas, modelling processes or theories to enable all students to grasp the fundamental ideas, revisiting of previous content to ensure full knowledge and understanding has been maintained and to eliminate any content misconceptions. Further strategies will include identifying students who are struggling, after the completion of assessments, and then providing appropriate intervention for them to enhance their learning. This intervention may include one to one learning sessions or small group working sessions where more time can be spent using bespoke strategies for that particular student to help them to improve. Consistent tracking updates and intervention conversations will be provided for all SEND students so that they fully understand where they are and what they need to do to improve.					
	How does the PoS support students with low prior attainment/challenge those with high prior attainment?	All sessions have stretch and challenge activities built into the sessions. Students will always be prompted to access those tasks/questions that will provide that extra challenge for them. HPA students may also be given additional extension activities to extend and strengthen their knowledge. When homework is set, HPA students may be given a differentiated activity to stretch their knowledge and understanding further. This activity may consist of using tier 3 vocabulary words in extended writing pieces or more comprehensive questions. The activities will also be activities whereby students' needs to use higher level thinking skills and use and understand higher level command words such as `compare` or `discuss`. Appropriate and suitable AQA exemplar exam questions will be used to give students practice with the types of questions (Higher thinking questions) they will experience when sitting their examination assessment.					

	How does the PoS offer contextual content appropriate to Amington students?	The content covered allows students to see a wide range of uses and careers for science and students will review some of the careers that could be open to them. Students are going to appreciate the role of science in local employment to include water treatment (Minworth). Cement (tarmac in Solihull and across Derby). HS2 (apprenticeship in Birmingham). Cells (fertility clinic in Tamworth) Transient employment or low paid jobs is high for the parents of our students. Students will cover work on digestion and muscles and therefore we will support students in being healthier.					
11	**Social/ Cultural Capital**	Making sweets using esters made using organic materials with DT department	Visit to a University Laboratory or a Forensics lab to see how to test for substances such as drugs.	Science film club to watch, for example, The day after tomorrow- to learn about the impact of climate changes and changes to our atmosphere	Visit to a Nature reserve or a joint trip with Geography to study an ecosystem		
	Tier 2/3 Vocabulary	B5 Homeostasis B5 – Revisit tier 2+3 vocabulary for the required practical Tier 3 words given for a writing activity for nervous system. P5. Forces, P5 – Link back to 9I with these definitions to be set for homework. New key words for 2nd lesson DNA – scalar and vector. Apply these in the writing task.	B6. Inheritance, variation and evolution P6. Waves B6 – 1st homework is to complete definitions of the tier 3 words from 9A – Recap of tier 3 vocabulary from 7E. Students to revisit tier 2 and 3 vocabulary for planning of practicals to support required practical. P6 – Recap tier 2/3 vocabulary from 7L + 8J. Plan required practical with new tier 2/3 vocabulary given such as period, wavelength, transverse, longitudinal.	P7. Magnetism and electromagnetism B7. Ecology P7 – Recap of P2 vocabulary. Homework to define the P2 tier 2/3 vocabulary. Opportunity to revisit electricity core concepts too by linking to P2 tier 2/3 vocabulary. B7 – First homework to complete 7D ecosystems tier 2/3 words. Link back to tier 2/3 words from B4. Writing tasks students will have all B7 tier 2/3 words	C7 – will use DNA for tier 3 naming convention for alkanes and alkenes C7. Organic chemistry. C8. Chemical analysis Use tier 3 words in extended writing tasks C8	Revision – Revisit tier 2 and 3 words with the focus on how we can use these in exam questions C9. Chemistry of the atmosphere C10. Using resources C9 – Link the tier 2/3 vocabulary from B4 (relating to photosynthesis) to C9. Opportunity to revise the equation from B4 topic. C10 – Fewer tier 3 vocabulary in this short topic. Work on tier 2/3 vocabulary with extended writing on water cycle and recycling.	

	Reading	P5 – Big picture question regarding transport. Use news article to unpick tier 2 words to support students in their responses.	B6 – Students to select a text on variation and evolution. Research and then why questions. P6 - Analysis task checking that students know how to carry out the steps for waves practical	P7 – Teacher led to support the logical explanation of how electricity is made. B7 - Use texts to develop summarising skills on ecosystems C7 - Research work on how oil refineries work	C8 – Teacher led reading through text to analysis the steps for gas tests C9 - Concentrate on why and how questions after reading the text in order to support the students in explaining how the atmosphere has evolved. C10 - Concentrate on why and how questions after reading the text in order to support the students in explaining the water cycle.	Use texts for students to support their 6 marks questions. Focus on Why questions	

	Writing	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (P5) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support, and describing a parachutists jump from a plane in P5 Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this (P5)	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (B6) (P6) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support e.g. QWC 6 mark exam question evaluating the advantages and disadvantages of embryonic screening in B6 and describing EM waves and their uses in P6. Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this (P6) (B6)	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (C7) (P7) (B7) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support Writing a scientific report as part of the GCSE required practicals. Writing frames and examples given to support this (B7) e.g. QWC 6 mark exam question describing the process of fractional distillation and cracking in C7 e.g. QWC 6 mark exam question describing the processes in the carbon cycle in B7, and explaining how to carry out a	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers (C8) (C9) (C10) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support E.g. describing how to identify an unknown sample via chromatography in C8 e.g. QWC 6 mark exam question on the greenhouse effect in C9, and comparing the difference in the life cycle assessments of glass and plastic bottles in C10. Writing a scientific report as part of the GCSE required practicals. Writing frames and	Answering QWC example assessment questions. Opportunity to fix it after teacher feedback, and comparing with peers. (all topics covered during KS4) Answering example GCSE extended writing exam questions, using key words, example answers to similar questions, and writing frames available for support (all topics covered during KS4)	

				demonstration using compasses to show the directions of magnetic fields in P7.	examples given to support this (C10)		
	Numeracy	P5 - Using equations for electricity. Rearranging skills and steps to complete each time	B6 – Appreciation of scale (cell and DNA) C8 – Ratios for chromatography P6 – Scientific notation. Using a calculator to support this.	B7 – Mean, median, mode. Why do we have these 3 measures? P7 - Rearranging skills and steps to complete each time C7 – Patterns in the make up of alkanes and alkenes	C9 – Percentages. Eg How many CO_2 molecules are there in 100000 molecules of air if it makes up 0.03% C10 – Balancing ionic charge (+2 how many electrons to form the atom)		
	How does the PoS support students with SEND needs?	All sessions will be differentiated for all students within the learning session including those with SEND needs. Teaching strategies for SEND students may include repetition of key words or ideas, modelling processes or theories to enable all students to grasp the fundamental ideas, revisiting of previous content to ensure full knowledge and understanding has been maintained and to eliminate any content misconceptions. Further strategies will include identifying students who are struggling, after the completion of assessments, and then providing appropriate intervention for them to enhance their learning. This intervention may include one to one learning sessions or small group working sessions where more time can be spent using bespoke strategies for that particular student to help them to improve. Consistent tracking updates and intervention conversations will be provided for all SEND students so that they fully understand where they are and what they need to do to improve.					
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How does the Implementation Plan meet the ACE curriculum design?

Ambitious	Students are able to access the content and their appropriate level and the content allows for all students to be stretched in their development of new skills, knowledge, and application. Students learn through a range of activities, including practical work. All students will be stretched through the various forms of new learning and assessment.
Challenging	They will have a range of learning activities to stretch their knowledge. The curriculum builds on their prior knowledge and students will need to link prior learning from a range of topics. Assessments test knowledge, new skills, and their application in order for students to understand their weaknesses and strengths.
Engaging	Links to the world around us, the impact that we have on the world through application are used to demonstrate why science is important. Students see a range of practical applications for the science and careers where these are useful.

What are the current strengths of the Implementation Plan?

Content is revisited throughout KS4. Topics follow in a logical sequence and allow interleaving. These topics follow on from prior learning from KS3.

Eg Organs can't be taught until cell biology has been taught. Infection and the bodies response to this can't be taught until students understand cell biology and organs to appreciate how they will be affected.

Only when students understand bioenergetics can they explain regulation of the body (homeostasis and response).

A link to the applications of the science taught.

A range of activities to include practical work.

Using a range of skills in the lesson and therefore linking learning from other curriculum areas. Time for students to explain their understanding through open activities.

What specific actions have to be taken in response to the above? Please consider:

- Core concept changes;
- Space interleaving changes;
- Modifications to ensure an ACE curriculum design;
- CPD for teachers in your subject area;
- Additional research you have to consider as part of this review.

By moving to the AQA specification it is allowing us to link to a revised KS3 curriculum.

The previous curriculum within the department did not allow students to develop deeper understanding of the content. The previous curriculum covered the contents in two years and didn't engage students and develop skills in the same level of depth.
Using the What, why, how and links to particular applications or careers will give students the powerful knowledge to continue to gain knowledge and skills. Assessments have changed to assess practical skills, knowledge, and the depth of these.

The topics that we are using are the same as those given by AQA. There is no reason to move away from these, the topics build on prior knowledge from previous topics. These have been interleaved to allow space to revisit content. The interleaving will also allow the students to complete a Paper 1 assessment by the end of Year 10.

A CPD programme has been drawn up for the inexperienced teachers that will be joining in the next academic year. Work will cover a review of our blended learning. A continual focus on practical work (staff developing confidence in how to carry out an experiment and support for training technicians) Our teach first, unqualified, and NQT teachers will not have carried out each of these practicals. An audit of subject knowledge for inexperienced staff will direct the CPD for subject knowledge. Other sessions will include developing literacy and numeracy skills. CLM will develop teacher knowledge on how students should answer the AQA questions and how to support students in this.