1. CURRICULUM INTENT OVERVIEW PLAN
Key Stage 4

Subject: Science

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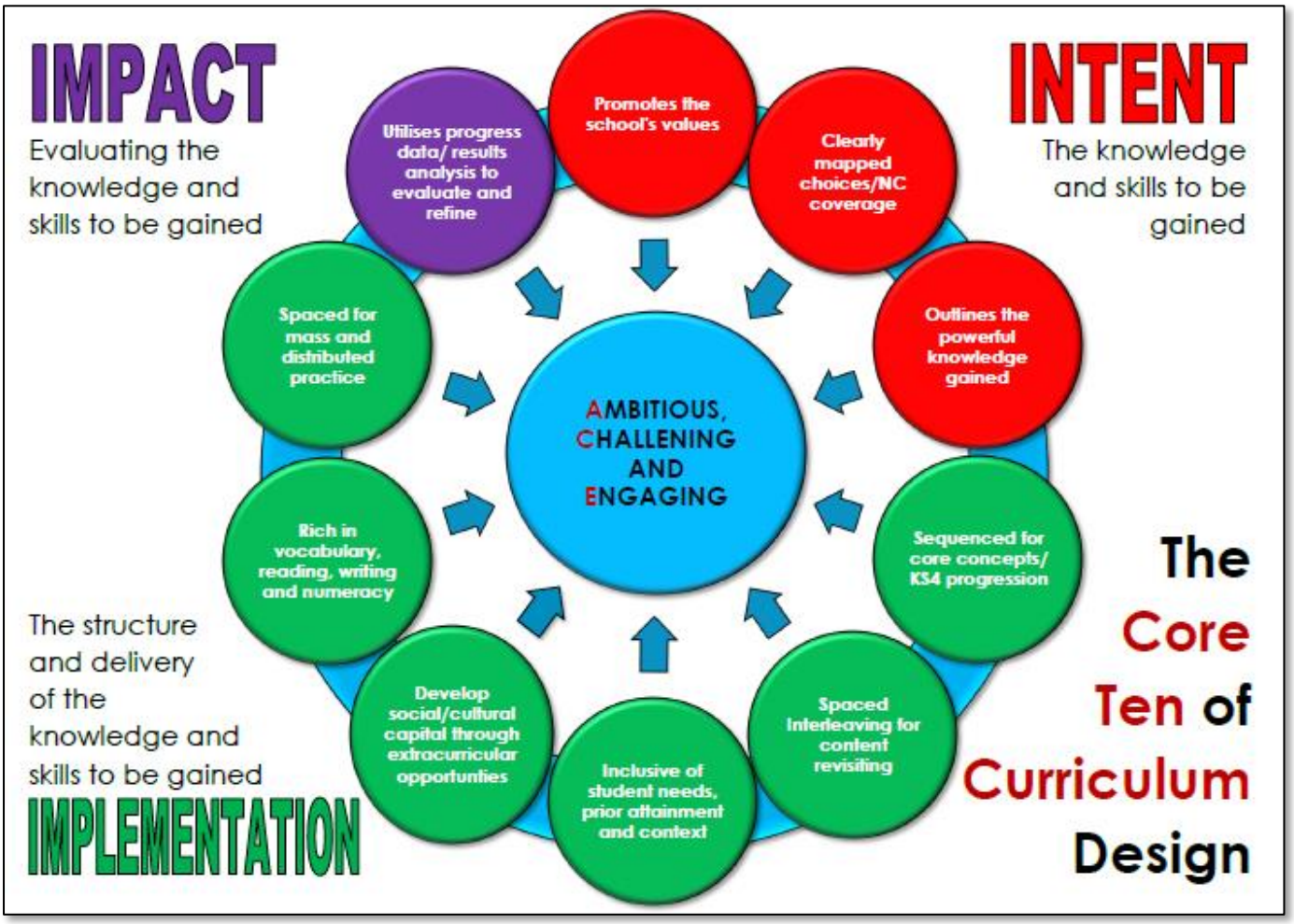

THINKING PROCESS - CURRICULUM INTENT OVERVIEW PLAN (KS4)

Intent Statement – at Landau Forte Amington, we believe learning powerful knowledge helps students achieve and creates a fairer society.
How are you trying to accomplish this, with this Programme of Study (PoS)?

DEFINITION: Powerful Knowledge is described as knowledge which enriches students' lives and creates a fairer society by providing students with intellectual power. It is knowledge which support students in engaging with the world and communicating with people regardless of background or social standing.

The science department provides an enriching, engaging and accessible curriculum for all of our students. We aim to build and development our students' skills and powerful knowledge that will enable all of our students to utilise their skills and knowledge in their everyday lives. All students will develop scientific knowledge to engage in a range of discussions about our changing world.

Aims – what do you want pupils to be able to know and do by the time they finish this Programme of Study (PoS)?

We want our students to have gained a good understanding of the main principles in science and its worldly applications and to have gained the necessary skills to aid them in their future learning and careers.
We want all students to be able to communicate their knowledge and skills they have learnt in a variety of ways.
Students will gain knowledge about cells, the structure of a variety of organisms, a range of science techniques, why chemicals react, energy in all its stores from electromagnetic radiation to kinetic.

Academy Values – at Landau Forte Amington, we want students to be ambitious, brave and kind. How are these values promoted in this PoS?

Our students will need to be brave when completing new learning, accepting they will make mistakes and learn from them. Our students will be ambitious by always trying to increase the amount of detail in their answers and increase their knowledge. Our students will also need to be kind and supportive of other students, accepting of other people's mistakes and supporting others learning through helping in group tasks and sharing their ideas with the class

KS4 Specification Choices – what topics are taught and does it ensure breadth and depth, as well as meet the requirements of the exam specification?
(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what is taught)
Note – Triple content is highlighted in bold

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	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 6.3.2.3 Changes of state and specific latent heat	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 reactant or product is a gas	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	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** **4.5.2.2 Fuel cells**

		6.2.3.2 Mains electricity 6.2.4.1 Power 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**	6.3.3.1 Particle motion in gases 4.3.3.2 Pressure in gases 4.3.3.3 Increasing the pressure of 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 6.4.2.3 Half-lives and the random nature of radioactive decay	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 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	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

				6.4.2.4 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**	
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 6.5.1.4 Resultant forces	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	

		6.5.2 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	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** **4.7.3.3 Microphones**	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**	

		6.5.5.1 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**	**4.7.3.4 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**	

Exam specification content missing from this PoS and why?	Content taught in addition to the exam specification and why?
No content is missing.	Each topic will highlight the relevance of the science being taught. Linking to science in the news where appropriate, therefore giving relevant examples. 4.3.1.2 - SARS-CoV-2 will be the example used. Energy and climate are consistent themes in the course and therefore examples such as flooding in the UK and Forest fires in Australia will be discussed.

Powerful Knowledge Choices – what powerful knowledge is included in this PoS? Consider what knowledge is it important for our students to know, so that when they leave school they can engage in and lead discussions, with people from the most advantaged backgrounds? ***(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what powerful knowledge is gained)***

YEAR	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6

10	**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 transfer or	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 should be able to draw dot	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 due to gravity. The	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.

		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 • work out the empirical formula	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: live wire – brown	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 shows the ions in the structure. Students should be able to:		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 several forces lead	

		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 • deduce the molecular formula of a substance from a given	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.	• 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. The three states of matter are solid, liquid and gas. Melting and freezing take place at the melting point,		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. Work done against the frictional forces acting on an object	

		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 equation: charge flow = current × time The current (I) through a component		boiling and condensing take place at the boiling point. **These particles, including nanoparticles, have specific sizes and properties**		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. Displacement includes both the distance an object	

		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. 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.				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. The average acceleration of an object can be	

		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.				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.	

	Why it is important to know	Students will develop an understanding of how bacteria can be altered in order to make human insulin and therefore they would be able to be involved in genetic engineering at the ethics. Students need to shape discussion of how their generation uses genetic modification. Have an understanding of the atom will enable students to understand why we use certain materials and students will develop the skills for them to select materials and be able to work effectively in an industrial setting. Students who wish to pursue a career as an electrician will learn the vital knowledge needed. Students will have the ability to design	Students will have the knowledge to interact effectively with health professionals in order to discuss their own health and that of others. Students will develop an understanding on how their lifestyle choices have a direct link with health and disease. Students have the opportunity to carry out lab work which will allow them to understand some of the organs of the human body. Students will develop an understanding of different diseases and how each type is transmitted. This is important as it can give students the knowledge on how to stay healthy and take precautionary measures to avoid transmission. It will also give them the understanding on why healthcare professionals want to reduce the use of antibiotics. Students will be able to evaluate the global use of vaccination in	Students will gain an understanding of new innovations, such as, new types of man-made polymers and smart materials, such as, nanotubes. Why does the same chemical but bonded differently behave differently? – Links to the materials Royal Royce uses such a turbine blades being grown as one crystal of metal! Students will gain an understanding of how scientists calculate the exact amount of chemicals needed to produce a certain chemical reaction or chemical product. For example, a food scientist. In short how does a chemist work alongside an accountant in order to make a profit. 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.	Students will learn that Engineers use these principles of s,l, g when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. How can specific heat capacity be important for future homes storing heat energy? Why and how are particular elements chosen to perform specific tasks, such as, being used for water pipes om our homes. A plumber need to understand that specific metals can only be used because of their structure. Advancements in materials used in a range of industries. 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	Students will be able to understand how plants play an important part in the creation of life. An appreciation for the impact human activity has in the atmosphere so students can engage in the debate for future changes we need to make. Eg population size, energy production, use of land 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 use their prior knowledge of cells to help explain why cells need to maintain its conditions. Understanding how the body regulates conditions. Students will have the knowledge to interact effectively with health professionals in order to discuss their own health and that of others. Students will gain an understanding of how to alter the rate of a reaction. The applications are wise and varied, simply any reaction than is taking place uses this science. Students will gain skills to analyse graphs. A vital skill in any sector of employment. Radioactive materials are widely used in medicine, industry, agriculture and power generation. This knowledge would be very important for students wanting to take any of these

		components and build electric circuits, all of which can be transferred to careers involving electronics. Links to term 1 for energy stores. Understand how the national grid works will enable discussion on how we make our electricity. Students will have the knowledge about where our main sources of energy come from. Students will know how to reduce their energy consumption and the decisions they will need to make about how energy is produced. Each method has its advantages and disadvantages. Students will have the ability to link the use of energy to global warming, and therefore causing them to think about how they can reduce their energy use. Heating engineers and car	the prevention of disease. Link their knowledge to SARS-CoV-2. Why and how are particular elements chosen to perform specific tasks, such as, being used for water pipes om our homes. A plumber need to understand that specific metals can only be used because of their structure. Advancements in materials used in a range of industries. Numeracy in understanding scale will be useful throughout their lives.	The braking distance of a vehicle can be affected by adverse road and weather conditions and poor condition of the vehicle.	conditions and poor condition of the vehicle.		career paths. Students will have the understanding about the social, environmental and economical impacts that a nuclear accident can have on society. This could aid careers in journalism or as a historian looking into previous nuclear disasters. MSci degree at Birmingham University to train radiation scientists for working/dismantling nuclear power plants in the UK.

		manufacturers will use this work. Will fusion be our ultimate source?					

11	**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, microwave, infrared,	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. Students should be able to explain how	[redacted]

			visible light (red to violet), ultraviolet, X-rays and gamma rays. Electromagnetic waves have many practical applications, students need to know examples for each.		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.	

	Why it is important to know	Students will have the understanding of how a species evolved and the behind the scenes processes involved with the making of life. Students will learn about controversial topics such as genetic modification and be able to apply debating skills and express their own opinions on such matters. Links to motor sport showing the range of careers within this industry. Any moving objects. Careers in HS2. How do we change transport needs? How does disease affect plans for public transport?	Students will gain understanding about where Crude oil comes from and how we use it for its multitude of uses. Separating techniques apply to ensure purity in a range of industries, such as food and medicines. Students will read the debate on how we reduce the reliance on crude oil. Students will gain an understanding of scientists can carry out tests. It is also important to the food industry. Certain tests have to be carried out to make sure that food products are safe for human consumption. Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves. Students will have the knowledge that many industries make use of electromagnetic waves, such as the	Students will gain an understanding of how our atmosphere of our planet has changed over time and how certain human activities are contributing towards a continued change. This is important for a meteorologist who is studying the weather or a Geologist who is studying how our planet is changing. What will be the future careers to reduce our impact? Students will gain an understanding of how resources are used on our planet and how water is made safe for us to use and drink. This is important to anyone who works at a water treatment plant. They need to have a strong understanding of how to make water safe for people to drink. Do we do enough to ensure clean water around the planet?	Students will have a greater understanding of the importance of how ecosystems provide essential services that support human life and continued development. Students will engage with the environment in a sustainable way, and understand that we are directly threatening biodiversity as well as the natural systems that support it. This will enable students to assess their own lifestyles and make them consider that actions need to take to ensure our future health, prosperity and well-being. Students will understand that engineers can use the techniques in this section and use them in systems that involve control or communications. For example, in a speaker or microphone. How this technology is used for the next generation of cars.	

			police force using infrared cameras. Links to the research at Southampton University regarding sound		Research employment at JLR and how they are using this technology.	

How does the Curriculum Intent 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 Curriculum Intent?

Content is revisited throughout KS4. Topics follow in a logical sequence.
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:

- KS4 Curriculum content changes;
- Powerful knowledge 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. Students will be completing their KS3 curriculum in three years (this shift started to happen this academic year (moving current Y8 towards a 3 year KS3). This will allow students to gain the practical skills required for GCSE as well help students to link topics.
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 be continue to gain knowledge and skills.
Assessments have changed to assess practical skills, knowledge, and the depth of these.
Staff have been working on practical skills in their CPD – the department had previously reduced the amount of practical work that the students had been completing. Staff have now planned complete practical assessments in KS3 that link with the KS4 practicals that are being planned over the coming weeks.
A CPD programme is being drawn up for the inexperienced teachers that will be joining in the next academic year.

1. Delivery – Feedback to staff from early learning walks
2. Content – Areas for staff subject knowledge to be developed. Audit of new staff first
3. Practical investigation – A weak area to support staff in their planning and delivery of practicals
4. Exam analysis – We will use resources used by examiners to support staff in understanding how to maximise exam marks

Currently there are 3 different publishers that we are reviewing their resources to insure there are suitable materials to support the teaching and learning