

Department	SCIENCE (Combined - Trilogy)	 HeathPark EVERY PUPIL ALWAYS IN FOCUS
Key Stage	KEY STAGE 4	
Course Level	GCSE	
Exam Board	AQA	

Dates Delivered	Unit Title	End Points	Substantive Knowledge What will they learn about in this topic?	Disciplinary Knowledge What subject concepts will be developed through this topic?	Assessment Method	Key Course Guides & Reading

Year 9 Autumn Term 1	Cell Biology, Atomic structure, Energy	<p>CELL BIOLOGY</p> <ul style="list-style-type: none"> • Students should be able to demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, including the use of standard form. • Students should be able to explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, chloroplasts in plant cells and plasmids in bacterial cells are related to their functions. • Students should be able to use estimations and explain when they should be used to judge the relative size or area of sub-cellular structures. • Students should be able to explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. • Students should be able to explain the importance of cell differentiation. • Students should be able to: <ul style="list-style-type: none"> • understand how microscopy techniques have developed over time • explain how electron microscopy has increased understanding of sub-cellular structures. • Students should be able to carry out calculations involving magnification, real size and image size. They should also be able to express answers in standard form. • Students should be able to describe the stages of the cell cycle, including mitosis. • Students need to understand the three overall stages of the cell cycle and o recognise and describe situations in given contexts where mitosis is occurring. • Students should be able to describe the function of stem cells in embryos, in adult animals and in the meristems in plants. • Students should be able to explain how different factors affect the rate of diffusion. 	<p>4.1.1 Cell structure</p> <p>4.1.2 Cell division</p> <p>4.1.3 Transport in cells</p>	<p>explore how structural differences between types of cells enables them to perform specific functions within the organism.</p> <p>Students will relate scientific discoveries to the development of medical treatments</p> <p>Students will evaluate the ethics revolving around stem cell technology</p>	<p>CAT tests as per the SOW</p> <p>End of half term test</p> <p>End of Unit test</p>	
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		<ul style="list-style-type: none"> • Students should be able to calculate and compare surface area to volume ratios. • Students should be able to explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area to volume ratio. • Students should be able to explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials. • Students should be able to: use simple compound measures of rate of water uptake, use percentages, calculate percentage gain and loss of mass of plant tissue. • Students should be able to plot, draw and interpret appropriate graphs. • Students should be able to: describe how substances are transported into and out of cells by diffusion, osmosis and active transport. Also explain the differences between the three processes. <p>ATOMIC STRUCTURE</p> <ul style="list-style-type: none"> • use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and other elements in this specification • name compounds of these elements from given formulae or symbol equations • write word equations for the reactions in this specification • write formulae and balanced chemical equations for the reactions in this specification. • HT only) write balanced half equations and ionic equations where appropriate. • • describe, explain and give examples of the specified processes of separation • suggest suitable separation and 	<p>5.1.1 A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes</p>	<p>This historical context provides an opportunity for students to show an understanding of why and describe how scientific methods and theories develop over time.</p>		
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		<p>purification techniques for mixtures when given appropriate information.</p> <ul style="list-style-type: none"> • why the new evidence from the scattering experiment led to a change in the atomic model • the difference between the plum pudding model of the atom and the nuclear model of the atom. • Students should be able to use the nuclear model to describe atoms. • Students should be able to calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number. • Students should be able to relate size and scale of atoms to objects in the physical world • Students may answer questions in terms of either energy levels or shells. • explain how the position of an element in the periodic table is related to the arrangement of electrons in its atoms and hence to its atomic number • predict possible reactions and probable reactivity of elements from their positions in the periodic table. • Students should be able to describe the steps in the development of the periodic table. • explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties. • explain how the atomic structure of metals and non-metals relates to their position in the periodic table • explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number. • explain how properties of the elements in Group 0 depend on the outer shell of electrons of the atoms • predict properties from given trends down the group. 	<p>5.1.2 The periodic table</p>	<p>Safe use of a range of equipment to separate chemical mixtures.</p> <p>Use SI units and the prefix nano.</p> <p>Recognise expressions in standard form.</p> <p>Explain how testing a prediction can support or refute a new scientific idea.</p>		
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		<ul style="list-style-type: none"> • Students should be able to describe the reactions of the first three alkali metals with oxygen, chlorine and water. • explain how properties of the elements in Group 1 depend on the outer shell of electrons of the atoms • predict properties from given trends down the group. • Students should be able to describe the nature of the compounds formed when chlorine, bromine and iodine react with metals and non-metals • explain how properties of the elements in Group 7 depend on the outer shell of electrons of the atoms • predict properties from given trends down the group <p>ENERGY</p> <ul style="list-style-type: none"> • Students should be able to describe all the changes involved in the way energy is stored when a system changes, for common situations. • students should be able to calculate the changes in energy involved when a system is changed • use calculations to show on a common scale how the overall energy in a system is redistributed when the system is changed • Students should be able to calculate the amount of energy associated with a moving object, a stretched spring and an object raised above ground level. • an investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. • Students should be able to give examples that illustrate the definition of power 	<p>6.1.1 Energy changes in a system, and the ways energy is stored before and after such changes</p> <p>6.1.2 Conservation and dissipation of energy</p> <p>6.1.3 National and global</p>	<p>The link between work done (energy transfer) and current flow in a circuit is covered in Work done and energy transfer</p> <p>Students should be able to recall and apply various equations</p> <p>Investigate the transfer of energy from a gravitational potential energy</p>		
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		<ul style="list-style-type: none"> • Students should be able to describe with examples where there are energy transfers in a closed system, that there is no net change to the total energy. • Students should be able to describe, with examples, how in all system changes energy is dissipated, so that it is stored in less useful ways. This energy is often described as being 'wasted'. • Students should be able to explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation. • Students should be able to describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls. • (HT only) Students should be able to describe ways to increase the efficiency of an intended energy transfer • describe the main energy sources available • distinguish between energy resources that are renewable and energy resources that are non-renewable • compare ways that different energy resources are used, the uses to include transport, electricity generation and heating • understand why some energy resources are more reliable than others • describe the environmental impact arising from the use of different energy resources • explain patterns and trends in the use of energy resources • consider the environmental issues that may arise from the use of different energy resources • show that science has the ability to identify environmental issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations. 	energy resources	<p>store to a kinetic energy store.</p> <p>Investigate thermal conductivity using rods of different materials.</p> <p>Students may be required to calculate or use efficiency values as a decimal or as a percentage.</p>		
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Year 9 Autumn term 2	Bonding and structure, Organisation	<p>BONDING AND STRUCTURE</p> <ul style="list-style-type: none"> 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 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. 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 recognise common substances that consist of small molecules from their chemical formula. 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 	<p>5.2.1 Chemical bonds, ionic, covalent and metallic</p> <p>5.2.2 How bonding and structure are related to the properties of substances</p> <p>5.2.3 Structure and bonding of carbon</p>	<p>Visualise and represent 2D and 3D forms including twodimensional representations of 3D objects.</p> <p>Recognise substances as small molecules, polymers or giant structures from diagrams showing their bonding.</p> <p>Recognise substances as metallic giant structures from diagrams showing their bonding.</p>	<p>CAT tests as per the SOW</p> <p>End of half term test</p> <p>End of Unit test</p>	
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		<ul style="list-style-type: none">• deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule.• predict the states of substances at different temperatures given appropriate data• explain the different temperatures at which changes of state occur in terms of energy transfers and types of bonding• recognise that atoms themselves do not have the bulk properties of materials• (HT only) explain the limitations of the particle theory in relation to changes of state when particles are represented by solid inelastic spheres which have no forces between them.• Students should be able to include appropriate state symbols in chemical equations for the reactions in this specification.• Students should be able to use the idea that intermolecular forces are weak compared with covalent bonds to explain the bulk properties of molecular substances.• Students should be able to recognise polymers from diagrams showing their bonding and structure.• Students should be able to recognise giant covalent structures from diagrams showing their bonding and structure.• Students should be able to explain why alloys are harder than pure metals in terms of distortion of the layers of atoms in the structure of a pure metal.• Students should be able to explain the properties of diamond in terms of its structure and bonding.• Students should be able to explain the properties of graphite in terms of its structure and bonding.				
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		<ul style="list-style-type: none"> • Students should know that graphite is similar to metals in that it has delocalised electrons. • Students should be able to explain the properties of graphene in terms of its structure and bonding • recognise graphene and fullerenes from diagrams and descriptions of their bonding and structure • give examples of the uses of fullerenes, including carbon nanotubes. <p>ORGANISATION</p> <ul style="list-style-type: none"> • Students should be able to relate knowledge of enzymes to Metabolism • Students should be able to describe the nature of enzyme molecules and relate their activity to temperature and pH changes. • Students should be able to carry out rate calculations for chemical reactions. • Students should be able to use the 'lock and key theory' as a simplified model to explain enzyme action. • Students should be able to recall the sites of production and the action of amylase, proteases and lipases. • Students should be able to understand simple word equations but no chemical symbol equations are required • use qualitative reagents to test for a range of carbohydrates, lipids and proteins. • investigate the effect of pH on the rate of reaction of amylase enzyme. • Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values. 	<p>4.2.1 Principles of organisation</p> <p>4.2.2 Animal tissues, organs and organ systems</p> <p>4.2.3 Plant tissues, organs and systems</p>	<p>Students should be able to develop an understanding of size and scale in relation to cells, tissues, organs and systems.</p> <p>Students should be able to use other models to explain enzyme action.</p> <p>Observing and drawing blood cells seen under a microscope.</p> <p>Evaluate risks related to use of blood products.</p>		
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		<ul style="list-style-type: none"> • Students should know the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange. • Students should be able to explain how the structure of these vessels relates to their functions • Students should know the functions of each of these blood components. • Students should be able to recognise different types of blood cells in a photograph or diagram, and explain how they are adapted to their functions. • Students should be able to evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant • Students should be able to describe the relationship between health and disease and the interactions between different types of disease. • Students should be able to translate disease incidence information between graphical and numerical forms, construct and interpret frequency tables and diagrams, bar charts and histograms, and use a scatter diagram to identify a correlation between two variables. • Students should understand the principles of sampling as applied to scientific data, including epidemiological data • discuss the human and financial cost of these noncommunicable diseases to an individual, a local community, a nation or globally • explain the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. • Students should be able to understand the principles of sampling as applied to scientific data in terms of risk factors. 		<p>Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment.</p> <p>Interpret data about risk factors for specified diseases.</p> <p>Observation and drawing of a transverse section of leaf.</p> <p>Measure the rate of transpiration by the uptake of water.</p> <p>Investigate the distribution of stomata and guard cells.</p> <p>Process data from investigations involving stomata and transpiration rates to find</p>		
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		<ul style="list-style-type: none"> • Students should be able to translate information between graphical and numerical forms; and extract and interpret information from charts, graphs and tables in terms of risk factors. • Students should be able to use a scatter diagram to identify a correlation between two variables in terms of risk factors. • Students should be able to describe cancer as the result of changes in cells that lead to uncontrolled growth and division. • Students should be able to explain how the structures of plant tissues are related to their functions • Students should be able to explain how the structure of root hair cells, xylem and phloem are adapted to their functions. • Students should be able to explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration. • Students should be able to understand and use simple compound measures such as the rate of transpiration. • translate information between graphical and numerical form • plot and draw appropriate graphs, selecting appropriate scales for axes • extract and interpret information from graphs, charts and tables. • Students should be able to describe the process of transpiration and translocation, including the structure and function of the stomata. 		<p>arithmetic means, understand the principles of sampling and calculate surface areas and volumes.</p>		
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Year 9 Spring 1	Electricity, Quantitative chemistry,	<p>ELECTRICITY</p> <ul style="list-style-type: none"> • Students should be able to draw and interpret circuit diagrams. • use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. • 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. • explain the design and use of a circuit to measure the resistance of a component by measuring the current through, and potential difference across, the component • draw an appropriate circuit diagram using correct circuit symbols. • Students should be able to use graphs to explore whether circuit elements are linear or non-linear and relate the curves produced to their function and properties. • use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. • use circuit diagrams to construct and check series and parallel circuits that include a variety of common circuit components • describe the difference between series and parallel circuits • explain qualitatively why adding resistors in series increases the total resistance whilst adding resistors in parallel decreases the total resistance • explain the design and use of dc series circuits for measurement and testing purposes 	<p>6.2.1 Current, potential difference and resistance</p> <p>6.2.2 Series and parallel circuits</p> <p>6.2.3 Domestic uses and safety</p> <p>6.2.4 Energy transfers</p>	<p>Students should be able to recall and apply various equations.</p> <p>Investigate the relationship between the resistance of a thermistor and temperature.</p> <p>Investigate the relationship between the resistance of an LDR and light intensity</p>	<p>CAT tests as per the SOW</p> <p>End of half term test</p> <p>End of Unit test</p>	
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		<ul style="list-style-type: none"> • Students should be able to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices. • calculate the currents, potential differences and resistances in dc series circuits • solve problems for circuits which include resistors in series using the concept of equivalent resistance. • Students should be able to explain the difference between direct and alternating potential difference. • Explain that a live wire may be dangerous even when a switch in the mains circuit is open • Explain the dangers of providing any connection between the live wire and earth. • Students should be able to explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time: • Students should be able to explain how the power of a circuit device is related to: <ul style="list-style-type: none"> • the potential difference across it and the current through it • the energy transferred over a given time. • Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use. • Students should be able to explain why the National Grid system is an efficient way to transfer energy. • Students should be able to select and use the equation: potential difference across primary coil x current in primary coil = potential difference across secondary coil x current in secondary coil 				
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		<p>QUANTITATIVE CHEMISTRY</p> <ul style="list-style-type: none"> • Students should understand the use of the multipliers in equations in normal script before a formula and in subscript within a formula. • Students should be able to calculate the percentage by mass in a compound given the relative formula mass and the relative atomic masses. • Students should be able to explain any observed changes in mass in non-enclosed systems during a chemical reaction given the balanced symbol equation for the reaction and explain these changes in terms of the particle model • Students should be able to: <ul style="list-style-type: none"> • represent the distribution of results and make estimations of uncertainty. Also use the range of a set of measurements about the mean as a measure of uncertainty. • Students should understand that the measurement of amounts in moles can apply to atoms, molecules, ions, electrons, formulae and equations, • Students should be able to use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa. • calculate the masses of substances shown in a balanced symbol equation • calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product. • Students should be able to balance an equation given the masses of reactants and products. • Students should be able to change the subject of a mathematical equation. 	<p>5.3.1 Chemical measurements , conservation of mass and the quantitative interpretation of chemical equations</p> <p>5.3.2 Use of amount of substance in relation to masses of pure substances</p>	<p>Opportunities within investigation of mass changes using various apparatus.</p> <p>Recognise and use expressions in decimal form.</p> <p>Recognise and use expressions in standard form.</p> <p>Use an appropriate number of significant figures.</p> <p>Change the subject of an equation.</p> <p>Understand and use the symbols: =, <>, >, α, ~</p> <p>Use ratios, fractions and percentages.</p>		
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		<ul style="list-style-type: none">• Students should be able to explain the effect of a limiting quantity of a reactant on the amount of products it is possible to obtain in terms of amounts in moles or masses in grams.• calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution• (HT only) explain how the mass of a solute and the volume of a solution is related to the concentration of the solution.		<p>Change the subject of an equation.</p> <p>Substitute numerical values into algebraic equations using appropriate units for physical quantities.</p>		
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		<p>copper with water or dilute acids and where appropriate, to place these metals in order of reactivity</p> <ul style="list-style-type: none"> • explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion • deduce an order of reactivity of metals based on experimental results. • interpret or evaluate specific metal extraction processes when given appropriate information • identify the substances which are oxidised or reduced in terms of gain or loss of oxygen. • write ionic equations for displacement reactions • identify in a given reaction, symbol equation or half equation which species are oxidised and which are reduced. • explain in terms of gain or loss of electrons, that these are redox reactions • identify which species are oxidised and which are reduced in given chemical equations. • predict products from given reactants • use the formulae of common ions to deduce the formulae of salts. • Students should be able to describe how to make pure, dry samples of named soluble salts from information provided. • preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. • describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution 	<p>5.4.2 Reactions of acids</p> <p>5.4.3 Electrolysis</p>	<p>investigate pH changes when a strong acid neutralises a strong alkali.</p> <p>measure the pH of different acids at different concentrations</p> <p>investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis.</p>		
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		<ul style="list-style-type: none">• use the pH scale to identify acidic or alkaline solutions• use and explain the terms dilute and concentrated (in terms of amount of substance), and weak and strong (in terms of the degree of ionisation) in relation to acids• describe neutrality and relative acidity in terms of the effect on hydrogen ion concentration and the numerical value of pH (whole numbers only).• Higher Tier students should be able to write half equations for the reactions occurring at the electrodes during electrolysis, and may be required to complete and balance supplied half equations.• Students should be able to predict the products of the electrolysis of binary ionic compounds in the molten state.• Students should be able to predict the products of the electrolysis of aqueous solutions containing a single ionic compound.				
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<p>Year 9 Summer 1</p>	<p>Particle model of matter</p> <p>Bioenergetics</p>	<p>PARTICLE MODEL OF MATTER</p> <ul style="list-style-type: none"> Students should be able to recognise/draw simple diagrams to model the difference between solids, liquids and gases. Students should be able to explain the differences in density between the different states of matter in terms of the arrangement of atoms or molecules. use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects, and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometre or Vernier callipers. Students should be able to describe how, when substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved. Students should be able to distinguish between specific heat capacity and specific latent heat. explain how the motion of the molecules in a gas is related to both its temperature and its pressure explain qualitatively the relation between the temperature of a gas and its pressure at constant volume. 	<p>6.3.1 Changes of state and the particle model</p> <p>6.3.2 Internal energy and energy transfers</p> <p>6.3.3 Particle model and pressure</p>	<p>Students should be able to recall and apply this equation to changes where mass is conserved.</p> <p>Students should be able to apply this equation, which is given on the Physics equation sheet, to calculate the energy change involved when the temperature of a material changes.</p> <p>Perform an experiment to measure the latent heat of fusion of water.</p>	<p>CAT tests as per the SOW</p> <p>End of half term test</p> <p>End of Unit test</p>	
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		<p>BIOENERGETICS</p> <ul style="list-style-type: none"> • Students should be able to describe cellular respiration as an exothermic reaction which is continuously occurring in living cells. • Students should be able to compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred. • Students should be able to explain the importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids. 	<p>4.4.1 Photosynthesis</p> <p>4.4.2 Respiration</p>	<p>Investigations into the effect of exercise on the body.</p>		
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<p>Year 9 summer 2</p>	<p>Atomic structure Energy changes</p>	<p>ATOMIC STRUCTURE</p> <ul style="list-style-type: none"> • Students should be able to relate differences between isotopes to differences in conventional representations of their identities, charges and masses. • Describe why the new evidence from the scattering experiment led to a change in the atomic model • Describe the difference between the plum pudding model of the atom and the nuclear model of the atom. • Students should be able to apply their knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation. • Students should be able to use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay. • Students should be able to explain the concept of half-life and how it is related to the random nature of radioactive decay. • Students should be able to determine the half-life of a radioactive isotope from given information. • (HT only) Students should be able to calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives. • Students should be able to compare the hazards associated with contamination and irradiation. • Students should understand that it is important for the findings of studies into the effects of radiation on humans to be published and shared with other scientists so that the findings can be checked by peer review. 	<p>6.4.1 Atoms and isotopes</p> <p>6.4.2 Atoms and nuclear radiation</p> <p>6.4.2.2 Nuclear equations</p>	<p>Students should be able to recognise expressions given in standard form.</p> <p>This historical context provides an opportunity for students to show an understanding of why and describe how scientific methods and theories develop over time.</p>	<p>CAT tests as per the SOW</p> <p>End of half term test</p> <p>End of Unit test</p>	
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		<p>ENERGY CHANGES</p> <ul style="list-style-type: none"> • distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings • evaluate uses and applications of exothermic and endothermic reactions given appropriate information • draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions showing the relative energies of reactants and products, the activation energy and the overall energy change, with a curved line to show the energy as the reaction proceeds • use reaction profiles to identify reactions as exothermic or endothermic • explain that the activation energy is the energy needed for a reaction to occur. • Students should be able to calculate the energy transferred in chemical reactions using bond energies supplied. 	<p>5.5.1 Exothermic and endothermic reactions</p>	<p>An opportunity to measure temperature changes when substances react or dissolve in water.</p> <p>investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.</p>		
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