Holy Family Catholic School – Faculty of Science & Physiology

Science Autumn Half Term 1 Year 11

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
Week 1 Lesson 1 What are the properties of group 1 elements? Why do they have different properties?	Properties, Elements, Alkali metals, periodic table, groups, periods,	Chemical Reactions	Elements, compounds and the periodic table. What happens during chemical reactions. Properties of metals.	1. Recall the location of the 'alkali metals', 'halogens', and 'noble gases'. 2. Recall the properties of the alkali metals. 3. Explain this pattern in reactivity in terms of electronic configurations.	Explain why the alkali metals become more reactive as you descend group 1 (6 Marks) Lithium, Sodium and Potassium are reactive metals in group 1 of the periodic table. Explain in terms of electronic configuration, the increase in reactivity from Lithium, Sodium to Potassium (6 Marks)
Week 1 Lesson 2 (groups 1-4 only) Key Concepts in Biology Core Practicals	Enzyme Active site Denature Ethanol Nucleus DNA	Experimental and Investigative Skills Cells and Systems Biological Molecules and Processes	Cell structure, Enzyme structure Methods	1. Review extracting DNA from fruit practical 2. Review pH enzymes practical	Relevant exam questions
Week 2 Lesson 1 How do alkali metals react with water?	metal hydroxide, positive ions, electrons, electron shells, shielding, reactivity	Chemical Reactions	Structure of the atom, electrons protons and neutrons, Charges of the subatomic particles. Reactivity series.	1. Describe the reactions of lithium, sodium and potassium with water. 2. Describe the pattern in reactivity of the alkali metals, lithium, sodium and potassium, with water; and use this pattern to predict the reactivity of other alkali metals.	Two elements in group 1 of the periodic table are lithium and sodium. Very small pieces of lithium and sodium were reacted separately with water. Describe the similarities and differences in what is seen and in the products of the reactions. [6 marks]
Week 2 Lesson 2	Halogens, groups,	Chemical Reactions	Structure of the atom and	1. Recall the colours and physical states of chlorine,	Explain the trend in reactivity of the group 7 Halogens.

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How do the properties of group 7 elements change as you go down the group?	periods, boiling points, physical properties, reactants, products,		physical properties of non-metals	bromine and iodine at room temperature. 2. Describe the pattern in the physical properties of the halogens, chlorine, bromine and iodine, and use this pattern to predict the physical properties of other halogens. 3. Describe the chemical test for chlorine. 4. Describe the reactions of the halogens, chlorine, bromine and iodine, with metals to form metal halides, and use this pattern to predict the reactions of other halogens. 5. Recall that the halogens, chlorine, bromine and iodine, form hydrogen halides which dissolve in water to form acidic solutions and use this pattern to predict the reactions of other halogens.	
Week 2 Lesson 3 How can displacement reactions be used to work out the reactivity of halogens? How can	Trends, displacement, reactivity, halogens, ions, reactants, products,	Chemical Reactions	electronic configuration, words equation, reactants and products. balancing equations	1. Describe the relative reactivity of the halogens chlorine, bromine and iodine, as shown by their displacement reactions with halide ions in aqueous solution, and use this pattern to predict the reactions of	The elements chlorine, bromine and iodine are part of group 7 in the periodic table. The order of reactivity of chlorine, bromine and iodine can be determined by carrying out displacement reactions. Explain how displacement reactions can be used to

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we explain the reactivity?				astatine. **2. Explain why these displacement reactions are redox reactions in terms of gain and loss of electrons, identifying which of these are oxidised and which are reduced. (HT)** 3. Explain the relative reactivity of the halogens in terms of electronic configurations. **4. Write balanced ionic equations (HT)**	show the reactivity of these three elements. [6 marks]
Week 2 Lesson 4 Why are group 0 elements unreactive? What properties do they have that allow us to use them?	Inert, shielding, noble gases, low density, non flammable, unreactive	Chemical Reactions	electron shells and numbers of electrons in each shell.	1. Explain why the noble gases are chemically inert, compared with the other elements, in terms of their electronic configurations. 2. Explain how the uses of noble gases depend on their inertness, low density and/or non-flammability. 3. Describe the pattern in the physical properties of some noble gases and use this pattern to predict the physical properties of other noble gases.	Compare the halogens and noble gases. Discuss: Trends in melting and boiling points. Reactivity of groups How reactivity changes down the group What they look like Uses How they are structured (electrons) (6 marks)
Week 2 Lesson 5 **(group 5,6,7 only)**	Enzyme Active site Denature	Experimental and	Cell structure, Enzyme structure	3. Review extracting DNA from fruit practical Review pH enzymes practical	Relevant exam questions

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Responsive Curriculum Key Concepts in Biology Core Practicals	Ethanol Nucleus DNA	Investigative Skills Cells and Systems Biological Molecules and Processes	Methods		
Week 3 Lesson 1 What has to happen for two particles to react? How do we determine the rate of a chemical reaction?	chemical reaction, rate of reactions, reactants, products.	Energy and Rates	signs of a chemical reaction,	1. Explain how reactions occur when particles collide and that rates of reaction are increased when the frequency and/or energy of collisions is increased. 2. Suggest practical methods for determining the rate of a given reaction. 3. Interpret graphs of mass, volume or concentration of reactant or product against time	Marble chips react with dilute hydrochloric acid to produce carbon dioxide gas. The rate of this reaction can be changed by changing the size of the marble chips. Describe how you could investigate what effect using smaller marble chips has on the rate of this reaction. Predict and explain the effect of using smaller marble chips on the reaction rate. [6 marks]
Week 3 Lesson 2 What are the factors that affect the rate of reaction?	Collision theory, surface area, temperature , catalyst, concentrati on, pressure	Energy and Rates	reactants and products, particle theory	Explain the effects on rates of reaction of changes in temperature, concentration, surface area to volume ratio of a solid, and pressure (on reactions involving gases) in terms of frequency and/or energy of collisions between particles.	Describe the factors that affect the rate of a reaction use the collision theory in your answer. (6 Marks)
Week 3 Lesson 3	Dependent variable,	Energy and Rates	How particles in a gas	To investigate the effect on the rate of reaction of changing	Evaluation of practical work

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Core Practical: Investigating reaction rates – gases. (2 lessons)	independent variable, control variable, temperature surface area, pressure, rates of reaction, collision theory		behave, Arrangement of particles gas.	the surface area of solids and the concentration of solutions, by measuring the production of a gas.	
Week 3 Lesson 4 Core Practical: Investigating reaction rates – gases. (2 lessons)	Dependent variable, independent variable, control variable, temperature surface area, pressure, rates of reaction, collision theory	Energy and Rates	How particles in a gas behave, Arrangement of particles gas.	To investigate the effect on the rate of reaction of changing the surface area of solids and the concentration of solutions, by measuring the production of a gas.	Evaluation of practical work
Week 3 Lesson 5 (groups 1-4 only) **Responsive Curriculum**	Electron Shell Atomic mass	Particles and Matter	PEN numbers Atomic structure	1. Describing electron configuration 2. Calculating RFM/RAM 3. Calculating % by mass.	Relevant exam questions

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Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
Chemistry: atoms and calculation					
Week 4 Lesson 1 Core Practical: Investigating reaction rates – gases. (2 lessons)	Dependent variable, independent variable, control variable, temperature surface area, pressure, rates of reaction, collision theory	Energy and Rates	How particles in a gas behave, Arrangement of particles gas.	To investigate the effect on the rate of reaction of changing the surface area of solids and the concentration of solutions, by measuring the production of a gas.	Evaluation of practical work
Week 4 Lesson 2 Core Practical: Investigating reaction rates – colour changes. (2 lessons)	Dependent variable, independent variable, control variable, temperature surface area, pressure, rates of reaction, collision theory	Energy and Rates	How particles in a gas behave, Arrangement of particles gas.	To investigate the effect of changing the temperature on the rate of reaction between sodium thiosulfate and hydrochloric acid, by observing a colour change in the solutions.	Evaluation of practical work
Week 4 Lesson 3	Dependent variable,	Energy and Rates	How particles in a gas		Evaluation of practical work

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Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
Core Practical: Investigating reaction rates – colour changes. (2 lessons)	independent variable, control variable, temperature surface area, pressure, rates of reaction, collision theory		behave, Arrangement of particles gas.		
Week 4 Lesson 4 What are exothermic and endothermic reactions?	Endothermic reaction, Exothermic reactions, energy profiles	Energy and Rates	Law of conservation of energy, How we can measure a change in energy.	1. Recall that changes in heat energy accompany: salts dissolving in water, neutralisation reactions, displacement reactions, and precipitation reactions . 2. Recall that when these reactions take place in solution, temperature changes can be measured to reflect the heat changes. 3. Describe an exothermic and endothermic changes.	You are provided with four solids which are soluble in water. Some of them dissolve during an exothermic reaction, and some dissolve during an endothermic reaction. Describe how you would identify which dissolving process absorbs and releases the most energy. Your description should include a list of apparatus or a labelled diagram, how you will make the investigation a fair test, and how you would interpret the results. [6 marks]
Week 4 Lesson 5 **(group 5,6,7 only)** **Responsive Curriculum**	Electron Shell Atomic mass	Particles and Matter	PEN numbers Atomic structure	4. Describing electron configuration 5. Calculating RFM/RAM Calculating % by mass.	Relevant exam questions

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Chemistry: atoms and calculation					
Week 5 Lesson 1 How can exothermic and endothermic reactions be modelled and explained?	Activation energy Endothermic reaction, Exothermic reactions, energy profiles	Energy and Rates	Law of conservation of energy, How we can measure a change in energy.	1. Recall that the breaking of bonds is endothermic and the making of bonds is exothermic/ 2. Recall that the overall heat energy change for a reaction is: a) exothermic if more heat energy is released in forming bonds in the products than is required in breaking bonds in the reactants b) endothermic if less heat energy is released in forming bonds in the products than is required in breaking bonds in the reactants 3. Explain the term activation energy 4. Draw and label reaction profiles for endothermic and exothermic reactions, identifying activation energy	Compare exothermic and endothermic reactions. In your answer, explain the differences between exothermic and endothermic reactions and give examples of each type of reaction. [6 marks]
Week 5 Lesson 2 How are energy changes in reactions calculated? (HT)	Bond energy, reactants, products, energy released, energy taken	Energy and Rates	Chemical reactions, examples of endothermic and exothermic reactions	**Calculate the energy change in a reaction given the energies of bonds (in kJ mol–1)**	Calculate the energy released when making 5 mol of HCL? Calculate the total energy required to break all the bonds in 1 mol of CO2

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	in, endothermic, exothermic				
Week 5 Lesson 3 What is the structure of the heart and how does it work?	Ventricle Atrium Artery Vein Valve	Health, Disease and Body Systems	function and adaptations of blood vessels	1. Recall the parts of the heart. 2. Describe the flow of blood through the heart. 3. Explain how the heart is adapted for its function.	Describe the pathway blood follows through the circulatory system. [6 marks]
Week 5 Lesson 4 What is the structure of the heart and how does it work? (PART 2)	Scalpel Dissection Observation	Health, Disease and Body Systems Experimental and Investigative Skills	Structure and function of the heart and its blood vessels	1. Follow written method to carry out an investigation. 2. Draw a biological diagram of a heart. 3. Evaluate your observations of the heart.	a) <u>Why is the left ventricle wall much thicker than the right</u> b) What is the purpose of the valves? c) Sometimes there are large deposits of fat on the surface of a heart. Do you think the fat matters?
Week 5 Lesson 5 (groups 1-4 only) **Responsive Curriculum** Physics: Radioactivity and radiation	EM spectrum Ionising properties	Waves and Radiation	Atomic structure, radioactive particles, EM spectrum	1. Describe EM spectrum 2. Explain properties and uses of EM spectrum 3. Explain properties and uses of radioactivity	Appropriate exam questions
Week 6 Lesson 1 How does temperature affect	Respiration Variable Prediction	Thinking Like a Scientist	Aerobic and anaerobic respiration	1. Follow written method to carry out an investigation.	Draw an appropriate graph of your data Evaluate your experiment.

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the rate of respiration?	Evaluation Conclusion	Experimental and Investigative Skills Analysis and Evaluation Biological Molecules and Processes		2. Record results in an appropriate table 3. Draw an appropriate graph of your data 4. Evaluate your experiment.	
Week 6 Lesson 2 How does temperature affect the rate of respiration?	Respiration Variable Prediction Evaluation Conclusion	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation Biological Molecules and Processes	Aerobic and anaerobic respiration	1. Follow written method to carry out an investigation. 2. Record results in an appropriate table 3. Draw an appropriate graph of your data 4. Evaluate your experiment.	Draw an appropriate graph of your data Evaluate your experiment.
Week 6 Lesson 3 What are circuits, how do we draw them?	series circuits, parallel circuits, electrons, current, potential	Electricity	Structure of atom, circuit symbols	1. Describe the structure of the atom. 2. Draw and use electric circuit diagrams representing them with the conventions of positive and negative terminals, and the correct symbols.	Describe the structure of an atom, including properties of its subatomic particles. [6 marks] Explain the difference between a series and parallel circuit.

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Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
	difference, voltage, ammeter, voltmeter, cell, battery			3. Describe the differences between series and parallel circuits	
Week 6 Lesson 4 How is current measured? What happens to current as it passes around a circuit?	Charge, current, electrons, ammeter, charges	Electricity	Charges of subatomic particles, Circuit symbols	1. Recall that a voltmeter is connected in parallel with a component 2. Recall that an ammeter is connected in series with a component 3. Describe that when a closed circuit includes a source of potential difference there will be a current in the circuit 4. Recall that current is conserved at a junction in a circuit	Explain why the current in the steel wire is different to the current in a single aluminium wire
Week 6 Lesson 5 **(group 5,6,7 only)** **Responsive Curriculum** Physics: Radioactivity and radiation	EM spectrum Ionising properties	Waves and Radiation	Atomic structure, radioactive particles, EM spectrum	4. Describe EM spectrum 5. Explain properties and uses of EM spectrum Explain properties and uses of radioactivity	Appropriate exam questions
Week 7 Lesson 1 What is the connection between current and charge?	Coulombs Amps, electrons, charge	Electricity	series and parallel circuits.	1. Explain that potential difference (voltage) is the energy transferred per unit charge passed and hence that the volt is a joule per coulomb	A current of 20 A flows in a circuit. How long does it take for 5000 C of charge to flow?

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				2. Recall and use the equation: E = Q × V 3. Explain that an electric current as the rate of flow of charge and the current in metals is a flow of electrons 4. Recall and use the equation: Q = I × t	
Week 7 Lesson 2 What is resistance?	Ohms, resistance, variable resistor, fixed resistor, ohms law, current, potential difference,	Electricity	Potential difference and current	1. Explain the effect of changing the resistance in a circuit 2. Recall and use the equation: V = I × R 3. Explain why, if two resistors are in series, the net resistance is increased, whereas with two in parallel the net resistance is decreased 4. Calculate the currents, potential differences and resistances in series circuits 5. Explain the design and construction of series circuits for testing and measuring	Sketch a graph of current against p.d. to show the relationship when the resistance is fixed. Calculate the resistance in a circuit when the potential difference is 9 V and the current is 0.3 A.
Week 7 Lesson 3 How does PD affect current and resistance in different components?	voltage, potential difference, Voltmeter	Electricity	Current calculations, series and parallel circuits	1. Explain how current varies with potential difference for the following devices and how this relates to resistance a) filament lamps b) diodes c) fixed resistors 2. Describe how the resistance of a light-dependent resistor (LDR)	Explain the method a student could use to investigate how the resistance of a single lamp changes with potential difference across the lamp

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				varies with light intensity 3. Describe how the resistance of a thermistor varies with change of temperature (negative temperature coefficient thermistors only) 4. Explain how the design and use of circuits can be used to explore the variation of resistance.	
Week 7 Lesson 4 Core practical: Investigating Resistance (2 lessons)	Fixed resistor, variable resistor, ammeter, voltmeter,	Electricity	Dependent variable, independent variable, control variable, Reliable, accurate, Resistance	To investigate the relationship between potential difference, current and resistance for a resistor and a filament lamp.	Bob has been asked to produce a fuse that has 3.2 ohms of resistance. He cannot change the thickness of the wire but can change its length. Explain in detail how bob could work out what length of wire to use. You will need to describe the experiment he will need to carry out, any hazards and any variables involved. (6 Marks)
Week 7 Lesson 5 (groups 1-4 only) **Responsive Curriculum** Biology: Health and disease review.	Bacteria Virus Fungi Vectors Blind Double blind trials	Health, Disease and Body Systems	Pathogens Barriers to pathogens Investigative skills.	1. Describe common infections. 2. Describe how pathogens are spread. 3. Describe how new medicines are made.	Appropriate exam questions
Week 8 Lesson 1 Core practical: Investigating Resistance (2 lessons)	Fixed resistor, variable resistor, ammeter, voltmeter,	Electricity	Dependent variable, independent variable, control variable, Reliable,	To investigate the relationship between potential difference, current and resistance for a resistor and a filament lamp.	Bob has been asked to produce a fuse that has 3.2 ohms of resistance. He cannot change the thickness of the wire but can change its length. Explain in detail how bob could work out what length of wire to use. You will need to describe the experiment he will need to carry out, any hazards and any variables involved. (6 Marks)

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			accurate, Resistance		
Week 8 Lesson 2 How is energy transferred around circuits?	dissipated, thermal energy, energy transfer	Electricity	conservation of energy, energy transfer	1. Recall that, when there is an electric current in a resistor, there is an energy transfer which heats the resistor 2. Explain that electrical energy is dissipated as thermal energy in the surroundings when an electrical current does work against electrical resistance 3. Explain the energy transfer as the result of collisions between electrons and the ions in the lattice 4. Explain ways of reducing unwanted energy transfer through low resistance wires 5. Describe the advantages and disadvantages of the heating effect of an electric current 6. Use the equation: $E = I \times V \times t$	Describe the heating effect when a current flows in a wire.
Week 8 Lesson 3 What is power and what units are used to measure it?	Power, watts, energy transfer, current, potential difference	Electricity	Recall and use the equation: $P=E/t$	1. Describe power as the energy transferred per second and recall that it is measured in watts 2. Recall and use the equation $P = E/t$ 3. Explain how the power transfer in any circuit device is related to the potential difference across it and the current in it	It takes 50 kJ of work for a crane to lift a storage container and place it on top of another. The storage container is in the air for 50 s, calculate the power of the crane. State the units of your answer. (4 Marks)

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Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
				4. Recall and use the equations P = I × V and P = I2 × R	
Week 8 Lesson 4 How is electricity transferred around circuits?	alternating current, direct current, voltage, domestic supply, domestic appliance, current	Electricity	National grid and mains electricity	1. Describe how, in different domestic devices, energy is transferred from batteries and the a.c. mains to the energy of motors and heating devices 2. Explain the difference between direct and alternating voltage 3. Describe direct current (d.c.) as movement of charge in one direction only and recall that cells and batteries supply direct current (d.c.) 4. Describe that in alternating current (a.c.) the movement of charge changes direction 5. Recall that in the UK the domestic supply is a.c., at a frequency of 50 Hz and a voltage of about 230 V 6. Describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use	An electric current has a heating effect. Explain the cause of the heating effect. State the advantages and disadvantages of the heating effect (6 marks)
Week 8 Lesson 5 **(group 5,6,7 only)** **Responsive Curriculum**	BacteriaVirus Fungi Vectors Blind	Health, Disease and Body Systems	Pathogens Barriers to pathogens Investigative skills.	4. Describe common infections. 5. Describe how pathogens are spread.	Appropriate exam questions

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Biology: Health and disease review.	Double blind trials			6. Describe how new medicines are made.	