



Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Chemical analysis	<p>To understand the concept of a pure substance and how they can be distinguished.</p> <p>To be able to explain and identify formulations.</p> <p>To explain chromatography and calculate R_f values.</p> <p>To know the tests for hydrogen, oxygen, carbon dioxide and chlorine.</p> <p>4.8.3 Identification of ions by chemical and spectroscopic means. (Chemistry only)</p> <p>To identify metal ions from flame tests.</p> <p>To use sodium hydroxide solution to identify metal ions.</p> <p>To use tests to identify carbonate, halide and sulfate ion.</p> <p>To understand the advantages of instrumental methods.</p> <p>To understand the principles behind flame emission spectroscopy.</p>	<p>Pure, Purity, Element, Compound, Mixture, Formula, Formulation, Melting point, Boiling point, Chromatography, Chromatogram, Solute, Solution, Solvent, Stationary, Mobile.</p> <p>Hydrogen, Oxygen, Carbon dioxide, Chlorine, Limewater, Litmus.</p> <p>Compounds, Cation, Anion, Precipitate, Instrumental, Spectroscope, Concentrations.</p>	<p>Analysts have developed a range of qualitative tests to detect specific chemicals. The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate.</p> <p>Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. Forensic scientists and drug control scientists rely on such instrumental methods in their work.</p>	<p>Working Scientifically:</p> <p>WS 1.4 Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.</p> <p>WS 2.2 Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.</p> <p>Apply understanding of apparatus and techniques to suggest a procedure for a specified purpose.</p> <p>WS 2.3 Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment.</p> <p>WS 3.1 Presenting observations and other data using appropriate methods.</p> <p>WS 3.1 Presenting observations and other data using appropriate methods.</p> <p>WS 3.6 Presenting reasoned explanations including relating data to hypotheses.</p> <p>WS 4.1 Use scientific vocabulary, terminology and definitions.</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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Chemical Analysis				Maths Skills: 1.a. Recognise and use expressions in decimal form 1.c. Use ratios, fractions and percentages 1.d. Make estimates of the results of simple calculations 2.a. Use an appropriate number of significant figures Practical Skills: AT 8(chemistry only) Use of appropriate qualitative reagents and techniques to analyse and identify unknown samples or products including gas tests, flame tests, precipitation reactions, and the determination of concentrations of strong acids and strong alkalis (links to A-level AT d).	
Homeostasis	To be able to explain what homeostasis is and why it is important. To be able to describe the roles of the nervous system and the endocrine system in homeostasis. To be able to explain how the nervous system is adapted for its functions & explain the role of chemicals at synapses. To be able to describe the stages of a reflex action.	Accommodation Myopia Hyperopia Vasodilation Vasoconstriction Deamination Selective reabsorption ADH Thyroxine	Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors, which sense changes, and effectors that bring about changes.	Working Scientifically: WS 1.1 Understand how scientific methods and theories develop over time. WS 1.2 Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.



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Homeostasis	<p>To be able to explain what homeostasis is and why it is important.</p> <p>To be able to describe the roles of the nervous system and the endocrine system in homeostasis.</p> <p>To be able to explain how the nervous system is adapted for its functions & explain the role of chemicals at synapses.</p> <p>To be able to describe the stages of a reflex action.</p>	<p>Cerebral cortex</p> <p>Medulla</p> <p>Cerebellum</p> <p>MRI</p> <p>Accommodation</p> <p>Myopia</p> <p>Hyperopia</p> <p>Vasodilation</p> <p>Vasoconstriction</p> <p>Deamination</p> <p>Selective reabsorption</p> <p>ADH</p> <p>Thyroxine</p>	<p>Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors, which sense changes, and effectors that bring about changes.</p>	<p>Working Scientifically:</p> <p>WS 1.1</p> <p>Understand how scientific methods and theories develop over time.</p> <p>WS 1.2</p> <p>Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</p> <p>WS 1.3</p> <p>Appreciate the power and limitations of science and consider any ethical issues which may arise.</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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Homeostasis	<p>To be able to describe the functions of specific parts of the brain and describe the techniques used to map areas of the brain to their functions. (Biology Only)</p> <p>To be able to describe how the eye changes to focus on near and distant objects.</p> <p>Complete simple ray diagrams to show normal vision, long-sightedness and short-sightedness. (Biology only)</p> <p>To be able to explain how body temperature is monitored and controlled. (Biology Only)</p> <p>To be able to describe the endocrine system and define the term hormone.</p> <p>To be able to relate hormone release and hormone action to the negative feedback control system.</p> <p>To be able to describe how blood glucose concentration is monitored and controlled.</p> <p>To be able to explain the cause, effects, treatment and problems associated with Type 1 diabetes. To be able to evaluate modern methods of treating diabetes .</p>	<p>Cerebral cortex</p> <p>Medulla</p> <p>Cerebellum</p> <p>MRI</p> <p>Accommodation</p> <p>Myopia</p> <p>Hyperopia</p> <p>Vasodilation</p> <p>Vasoconstriction</p> <p>Deamination</p> <p>Selective reabsorption</p> <p>ADH</p> <p>Thyroxine</p>	<p>In this section, we will explore the structure and function of the nervous system and how it can bring about fast responses.</p> <p>We will also explore the hormonal system, which usually brings about much slower changes.</p> <p>Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle.</p> <p>An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs, which can increase fertility.</p>	<p>WS 1.3 Appreciate the power and limitations of science and consider any ethical issues which may arise.</p> <p>WS 1.4 Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.</p> <p>WS 1.5 Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.</p> <p>Maths Skills:</p> <p>2.c. Construct and interpret frequency tables and diagrams, bar charts and histograms</p> <p>4.a Translate information between graphical and numeric form</p>	



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Homeostasis	<p>To be able to explain how the body responds to different temperature and osmotic challenges in terms of sweat and urine release. (Biology only).</p> <p>To be able to explain, with the aid of a diagram, how ADH controls the concentration of the blood using a negative feedback mechanism (Biology only).</p> <p>To be able to explain how a kidney machine works & evaluate the use of kidney transplants and dialysis to treat kidney failure. (Biology only).</p> <p>Describe the menstrual cycle and fertility including the role of hormones</p> <p>To be able to explain the control mechanisms for release of thyroxine and adrenaline.</p> <p>Describe how plant shoots and roots respond to light and gravity. (Biology Only)</p> <p>To be able to describe the uses of growth hormones. (Biology only)</p>	<p>ADH</p> <p>Adrenaline</p> <p>Thyroxine</p>			



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<p>The rate and extent of chemical change.</p>	<p>To be able to find, measure and calculate the rate of a reaction given appropriate data.</p> <p>Calculate gradients from tangents to a curve. (HT)</p> <p>Explain the factors that affect the rate of a reaction.</p> <p>Understand the principles behind collision theory and activation energy.</p> <p>To understand how catalysts function.</p> <p>To understand that reactions can be reversible.</p> <p>To explain energy changes in reversible reactions.</p> <p>To understand the term equilibrium.</p> <p>To be able to explain the effects of changing conditions on equilibrium. (HT)</p>	<p>Rate</p> <p>Reaction</p> <p>Mass</p> <p>Volume</p> <p>Quantity</p> <p>Concentration</p> <p>Tangent</p> <p>Graph</p> <p>$\text{g/s, cm}^3/\text{s}$</p> <p>Activation energy</p> <p>Collision</p> <p>Theory</p> <p>Surface Area</p> <p>Pressure</p> <p>Equilibrium</p> <p>Reversible</p> <p>Le Chatelier's Principle</p> <p>Endothermic</p> <p>Exothermic</p> <p>Moles</p>	<p>Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down.</p> <p>Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product.</p> <p>Understanding energy changes that accompany chemical reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way.</p>	<p>Working Scientifically</p> <p>WS 1.2</p> <p>Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</p> <p>Maths Skills:</p> <p>1.a. Recognise and use expressions in decimal form</p> <p>1.c. Use ratios, fractions and percentages</p> <p>1.d. Make estimates of the results of simple calculations</p> <p>4.a Translate information between graphical and numeric form</p> <p>4.b. Understand that $y = mx + c$ represents a linear relationship</p> <p>4.c. Plot two variables from experimental or other data</p> <p>4.d. Determine the slope and intercept of a linear graph</p> <p>4.e. Draw and use the slope of a tangent to a curve as a measure of rate of change</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
<p>The rate and extent of chemical change (Continued)</p>				<p>Maths Skills: 5.c Calculate areas of triangles and rectangles, surface areas and volumes of cubes</p> <p>Practical Skills: AT 5 Measurement of rates of reaction by a variety of methods including production of gas, uptake of water and colour change of indicator.</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
Waves		Amplitude Black body Compression (longitudinal wave) Diffuse reflection Electromagnetic waves Focal length Frequency Lens Longitudinal wave Magnification Period Rarefaction (longitudinal wave) Real image Reflection Refraction Seismic waves Specular reflection Transverse wave Ultrasound Virtual image Wavelength	<p>Wave behaviour is common in both natural and man-made systems.</p> <p>Waves carry energy from one place to another and can also carry information.</p> <p>Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves.</p> <p>Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.</p>	<p>Working Scientifically:</p> <p>WS 1.1 Understand how scientific methods and theories develop over time.</p> <p>WS 1.2 Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</p> <p>WS 1.4 Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.</p> <p>WS 1.5 Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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<p>Waves (Continued)</p>				<p>Working Scientifically:</p> <p>WS 2.2</p> <p>Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.</p> <p>Apply understanding of apparatus and techniques to suggest a procedure for a specified purpose.</p> <p>WS 2.3</p> <p>Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment.</p> <p>WS 2.4</p> <p>Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.</p> <p>WS 2.6</p> <p>Make and record observations and measurements using a range of apparatus and methods.</p> <p>WS 2.7</p> <p>Evaluate methods and suggest possible improvements and further investigations.</p>	



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Waves (Continued)				Working Scientifically: WS 3.1 Presenting observations and other data using appropriate methods. WS 3.5 Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.	



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Organic chemistry	<p>To describe crude oil as the remains of ancient biomass and as a mixture of a large number of compounds. Mostly hydrocarbons.</p> <p>To recognise alkanes as having the formula of C_nH_{2n+2}.</p> <p>To describe and explain fractional distillation.</p> <p>To write balanced symbol equations for the combustion of hydrocarbons.</p> <p>To have a knowledge of the trends in properties of hydrocarbons.</p> <p>To describe the conditions for catalytic and steam cracking.</p> <p>(Chemistry only) To recognise alkenes as having the general formula C_nH_{2n}.</p> <p>(Chemistry only) To describe the reactions of alkenes with water, hydrogen and halogens, including structural formulae.</p> <p>(Chemistry only) To represent alcohols and describe their reactions with sodium, oxygen, water and their reactions with oxidising agents.</p>	<p>Crude oil, biomass, plankton, compound, mixture, hydrocarbon, alkane, homologous, methane, ethane, propane, butane.</p> <p>Fraction, fractional distillation, petrol, diesel, kerosene, LPG, solvent, lubricant, polymer, detergent, evaporation, condensation, natural, synthetic, boiling point, viscosity, flammability.</p> <p>Cracking, catalytic, alkene, bromine water, ethene, propene, butene, pentene, double bond, addition reaction.</p> <p>Methanol, ethanol, propanol, butanol.</p>	<p>The chemistry of carbon compounds is so important that it forms a separate branch of chemistry.</p> <p>A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds. This branch of chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels, which are a major source of feedstock for the petrochemical industry.</p> <p>Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents.</p>	<p>Working Scientifically:</p> <p>WS 1.2 Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</p> <p>WS 4.1 Use scientific vocabulary, terminology and definitions.</p> <p>Maths Skills:</p> <p>5.b Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects</p> <p>Practical Skills:</p> <p>AT 2 Safe use of appropriate heating devices and techniques including use of a Bunsen burner and a water bath or electric heater (links to A-level AT b).</p> <p>AT 5 Making and recording of appropriate observations during chemical reactions including changes in temperature and the measurement of rates of reaction by a variety of methods such as production of gas and colour change (links to A-level AT a and l).</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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Organic chemistry	<p>(Chemistry only) To represent carboxylic acids and describe what happens when they react with carbonates and alcohols and dissolve in water.</p> <p>(Chemistry only) To draw diagrams to represent the formation of addition and condensation polymers.</p> <p>(Chemistry only) To describe how amino acids react by condensation polymerisation to form polypeptides.</p> <p>(Chemistry only) To describe DNA as a naturally occurring polymer and to name the monomers from which they are made.</p>	<p>Methanoic acid, ethanoic acid, propanoic acid, butanoic acid, weak acid, ionisation, pH, esters, ethyl ethanoate.</p> <p>Addition polymerisation, condensation polymerisation, polymer, monomer, functional group, repeating unit, amino acid, polypeptide, proteins, DNA, nucleotides, starch, cellulose.</p>		<p>Practical Skills:</p> <p>AT 6 Safe use and careful handling of gases, liquids and solids, including careful mixing of reagents under controlled conditions, using appropriate apparatus to explore chemical changes and/or products (links to A-level AT a and k).</p>	
Magnetism and electromagnetism.	<p>Permanent and induced magnetism, magnetic forces and fields.</p> <p>To understand the principles behind permanent and induced magnets.</p> <p>To describe, draw and explain the concepts of magnetic fields.</p>	<p>Magnet, Poles, Attract, Repel, Non-contact force, Permanent, Induced, Magnetic field, Iron, Nickel, Cobalt</p>	<p>Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this.</p>	<p>Working Scientifically:</p> <p>WS 1.4 Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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	<p>To explain how a magnetic field, a solenoid and an electromagnet can be formed.</p> <p>Explain how the strength of an electromagnet can be increased.</p> <p>Interpret diagrams of electromagnetic devices. (Physics only)</p> <p>To explain the motor effect using Fleming's left-hand rule. (HT)</p> <p>To be able to calculate force, magnetic flux density, current and length. (HT)</p> <p>Explain the principles of an electric motor. (HT)</p> <p>Explain how loudspeakers and headphones use the motor effect.</p> <p>4.7.3 Induced potential, transformers and the national grid. (Physics only) (HT)</p> <p>To understand and explain the generator effect.</p> <p>To be able to explain the uses of the generator effect.</p> <p>To explain the principles of a transformers and carry out appropriate calculations.</p>	<p>Electromagnetism, Current, Amps, Solenoid, Core, Motor,</p> <p>Flemming's left-hand rule,</p> <p>Force, Magnetic flux density, Loudspeaker, Headphones, Pressure, Variations, Sound waves</p> <p>Conductor, Generator, Alternator, Dynamo, A.C., D.C., Microphones, Transformer, Coil, Potential difference, Step-up, Step-down, Primary, Secondary, Efficient, Power, Watts, Ratio, Turns, Transmission</p>		<p>Working Scientifically:</p> <p>WS 2.2 Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.</p> <p>Apply understanding of apparatus and techniques to suggest a procedure for a specified purpose.</p> <p>Maths Skills:</p> <p>1.c Use ratios, fractions and percentages</p> <p>3.b Change the subject of an equation</p> <p>3.c Substitute numerical values into algebraic equations using appropriate units for physical quantities</p>	<p>This will be set as either a Vocabulary test or as consolidation questions on a weekly basis.</p>



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Revision	To improve upon areas of weakness	Vocabulary will vary dependent upon identified by class teacher	Improve upon areas of weakness identified for the class.	Linked learning will vary dependent upon identified by class teacher	Homework will be tailored towards the weaknesses of the students in the class to further aid progress.



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