Subject Curriculum Map: BTEC National Applied Science (A level equivalent)

Exam board: Pearson Edexcel - 4 units of which 3 are mandatory and 2 are external. Mandatory content (83%). External assessment (58%).

Curriculum intent: Students completing their BTEC Nationals in Applied Science will be aiming to go on to employment, often via the stepping stone of higher education. The BTEC National qualification provides a broad introduction that gives learners transferable knowledge and skills. These qualifications are for post-16 learners who want to continue their education through applied learning. The qualifications prepare learners for a range of higher education courses and job roles related to a particular sector. They provide progression either by meeting entry requirements in their own right or by being accepted alongside other qualifications at the same level and adding value to them. This course aims to consolidate and extend learning of themes from the GCSE course and develop these further, piquing interest in new and exciting areas of skill development, with particular reference to lab skills. The course has a mandatory component of assessed practicals (and assessed lab write ups) which much satisfy exam board criteria to allow awarding of the qualification. This programme allows students to develop practical, analysis and evaluative skills whilst opening possibilities for a career in an applied aspect of Science (e.g. laboratory research).

Curriculum Implementation- the course is delivered as 9 lessons fortnightly. In Year 12 this is a 5 lesson split with a chemist who will deliver exam content and also the coursework component of unit 2. A specialist Biology teachers has 2 lessons to deliver the exam based Biology content and the same applied for Physics. The course curriculum is designed to build on and extend concepts from GCSE such as cells (cell structure, organelles and cell transport) Physiology (heart, lungs, enzymes and digestion,) Waves and electricity and Chemical structure and properties but with an introduction to complex and newer areas of Science such as Neuroscience and sub-molecular structure. The coursework nature of the course requires built in assessment points to allow feedback for students and parents on progress and address weaknesses early on in the course and put in place support if needed, and a mandatory exam (which requires a minimum grade of a pass) in SUM 1 of Year 12 acts as a progression exam to year 13.

In Year 13 Unit 3 requires students to build upon their practical knowledge that was developed in Year 12. The unit requires students to independently complete practicals as well as use statistical analysis to evaluate the accuracy of their skills in preparation for university. Topics such as energy, photosynthesis and enzymes are studied and investigated in more detail. A mandatory external exam is taken in SUM1 for this unit. Unit 13 is a chemistry based unit delivered by a specialist. This unit focuses on concepts in inorganic chemistry and develops a deep understanding of topics, most of which are also studied within the A-level Chemistry course. Again the coursework nature of the course requires built in assessment points to allow feedback for students and parents on progress.

Curriculum impact: BTECs embody a fundamentally learner-centred approach to the curriculum, with a flexible, unit-based structure and knowledge applied in project-based assessments. Students holistic progress through the course focusses on improvement of practical, interpersonal and thinking skills required to be able to succeed in employment and higher education. Achievement in the qualification requires a demonstration of depth of study in each unit, assured acquisition of a range of practical skills required for employment or progression to HE, and successful development of transferable skills. Learners achieving a qualification will have achieved across mandatory units, including external and synoptic assessment. Units are assessed using a grading scale of Distinction, Merit, Pass and Unclassified. The transferable skills that universities value include: the ability to learn independently, the ability to research actively and

methodically, being able to give presentations and being active group members. BTEC learners can also benefit from opportunities for deep learning where they are able to make connections among units and select areas of interest for detailed study. This BTEC National course provides a vocational context in which learners can develop the knowledge and skills required for particular degree courses, including: reading scientific and technical texts, effective writing, analytical skills, practical skills and preparation for assessment methods used in degrees.

BTEC Applied L3	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
1. Knowledge and understanding	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below
2. Themes and Concepts (Year 12)	Cell structure and function, Periodicity, Introduction to waves	Cell structure and microscopy, moles and calculations, Interference and stationary waves	Nervous system and action potentials, sub-molecular structure, longitudinal waves and applications	Muscles and muscle tissue, bonding and reactivity, transverse waves and applications	Preparation for the externally assessed exam	Practical investigations, preparation for Year 13
2. Themes and Concepts (Year 13)	Investigating distribution of organisms, organic chemistry	Enzymes investigations, applications of organic chemistry	Enzymes investigations, applications of organic chemistry	Factors affecting photosynthesis, applications of organic chemistry	Combustion of fuels and energy, foods, applications of organic chemistry	
3. Subject specific skills	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below	See lesson progression plan below
4. SMSC	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink	See points below highlighted in pink
5. Skills For life	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience	Practicals: Teamwork, problem solving, communication, building resilience
a. Numeracy	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green	See points below highlighted in green
b. Literacy	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow	See points below highlighted in yellow
6. FBV	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect	Working mutually with others demonstrating tolerance and respect

7. Key assessment focus, suggested assessments	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red	See assessment points highlighted in red
8. Homework/Independent Learning	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.	Homework, coursework and independent learning tasks set on a regular basis to cover multiple aspects of literacy, numeracy, exam practice and research. See points below highlighted in purple for IL.
9. Special events/ Visits/ Extra-curricular			Science week assembly			Manchester University Laboratories trip

Knowledge and Understanding:

Year 12

Biology	Additional Info	SMSC
Microscope history	•Difference between electron, scanning and light microscopes • Intro to cell theory	To understand how the development in technology has lead to scientific discoveries
Practical - use of microscope, drawing cork	• Using light microscopes •Use independently to draw cork	Develop skills when using a microscope
Practical - making microscope slides	• Prepare slides using onion and cheek cells • Draw observations	Use microscope independently to compare cells
Comparison of microscopes	• Compare the resolution and magnification of more advanced microscopes • Evaluate the advantages and disadvantages of electron, transmission and scanning	Advantages and disadvantages of each microscope
Practical - root tip squash	• Recap stages of mitosis • Onion tip practical and identify the different stages of mitosis	Use microscope independently to identify cell development stages

Practical - Magnification calculations	• Use and rearrange magnification equation • Convert units	Calculate magnification using the equation
Plant and animal cells	• Intro to new organelles and their functions • Compare differences between two cells	Compare the two cells and their functions in the body
Eukaryotic and prokaryotic	• Draw and label both cell types • Compare difference in DNA and ribosomes	Compare jobs of DNA and ribosomes
Presentation - cell structures	• Students will research and create a powerpoint on either bacteria, archea, plant or animal cell	Use ICT to create a Powerpoint presentation on a cell of their choice
Practical - Gram positive/negative bacteria	• Protocol of gram stain test • Compare difference in cell wall structures between gram positive and negative bacteria	Comparison of bacteria cells
Revision	• Recap all above topics	
TEST - B1 Content		
Practical - Specialised cells	• Identify various specialised cells - pallisade, r.h cells, red and white blood cell • Explain structure and function of each	Key words/Glossary
Gametes	• Explain how the egg and sperm are specialised	Ethical consideration of contraception and IVF
Practical - Root hair cells	• Observe root hair under microscope • Apply magnification equation	Calculate magnification using the equation
Practical - Structure of blood	• Observe microscope slides of blood • Watch video of centrifusion of blood	Use ICT to watch scientific techniques
White blood cells	• Recap about lymphocytes and phagocytes • Describe how white blood cells are adapted for their function • Explain about specific and non-specific immunity	To discuss the impact of eradicating disease on a global scale
Revision		
TEST - B2 Content		
Epithelial cells	• Create report on 4 types of tissue in humans • Describe structure and function of squamous and columnar epithelial and endothelial tissue	Report writing skills - grammar/punctuation/structure
Pulmonary system (lungs and spirometer)	• Identify parts of the pulmonary system and their functions	Method for spirometer and what readings mean in terms of lung capacity
Arteries and veins	• Describe the structure and function of blood vessels • Explain how they are adapted to their job	Description of function and job role specific to heart

Cardiovascular and respiratory disease	• Identify main organs in the cardiovascular and respiratory system • Explain structure and function of the heart	Practical skill - Heart dissection
Sliding filament theory	• Identify the difference between fast and slow twitch fibres • Structure of myofibril and explain the roles of actin and myosin in muscle contraction	Explain function of actin and myosin using key terms
Nervous system	• Identify the main aspects of the nervous system, including different neurones involved in the reflex arc • Explain how a synapse works	Key terms/glossary - explaining nerve contraction
Myelin sheath	• Identify the structure of myelin sheath • Explain the stages of an action potential	Key terms/glossary - action potential explanation
The Brain	• Identify the 3 main parts of the brain • Describe the function of each part	Key terms/glossary - describing function
EEG traces	• Explain the uses and applications of EEG to find problems in the brain	Applications of EEG in reading illness and medical developments
Presentation - dopamine and serotonin	• Students will research and create a powerpoint on either dopamine and serotonin	Use ICT to create a PowerPoint presentation
Revision		
TEST - B3 Content		

	Additional Info	SMSC
Chemistry		
Periodic table,atomic structure,	• Structure of the atom • Groups and periods • Atomic mass, proton number • Calculating electron number	To understand the contributions of scientists with different nationalities working together
Electronic structure	• Electronic structure of atoms • Loading electron orbitals - s, p, d and f orbitals including spin • Energy levels for electron shells	Calculate electron number and load electron shells correctly
Ionic bonding	• How ionic bonds are formed • Electrostatic attraction and atomic radius/shielding • Giant ionic lattice	Describe how ionic bonds are formed and the impact of atomic radius on electron shielding

Covalent bonding	• How covalent bonds are formed • Dative covalent bonds and lone electrons • Covalent bonding in organic compunds including methane	Calculate and draw covalent bonds
Metallic bonding	• How metallic bonds are formed • Properties based on delocalised electrons • Non- polar and polar molecules	To understand how structure of a metal relates to it's properties and uses in everyday life
Practical - Bonding classification		Working together as a team to gather accurate results
Intermolecular forces	• Explain dipoles (London dispersion forces) with examples • Dipole - dipole (van der Waals) with examples • Hydrogen bonding	Description of dipoles and intermolecular forces
Balancing equations	• Explain how to write word and symbol equations • Balance simple equations	Correctly balance symbol equations
Moles and molar masses	• Explain the quantity of a mole • Use Avogadro's constant • Explain molar mass and relative formula mass • Calculate RFM for basic molecules	Use Avogadro's constant and calculate RFM for basic molecules
Molarity	• Explain how to calculate molecular formulae • Look at reacting quantities during titrations - explain how molarity can be calculated	Calculate molarity from titrations
Calculating quantities	• Introduce the term stoichiometry (working out how much product!) •Explain how to calculate the yield during a reaction • Calculate yield and percentage yield	Calculate yield and percentage yield
Presentation - application and uses of substances	• Students create and present on the substance of their choice - • Metal oxides, metal salts, sodium chloride, sulfates	Use ICT to create a powerpoint presentation
Revision		
TEST - A1 content		
Arrangement of periodic table and electron shielding	• Look at arrangement of the periodic table • Identify patterns related to characteristics and groups • Draw atoms and discuss radius of each atom. Link this to electron shielding	Describe patterns in periodic table and link to properties

Ionic and atomic radius' and electronegativity	• Draw atoms from different groups and discuss radius' • Explain shielding and link to atomic radius • Describe how transition metals linking to electron shells • Define electronegativity and describe which elements are the most electronegative • Link shielding to electronegativity and the trends for each group	Define electronegativity Describe how electron shells affect transition metals
Ionisation and electron affinity	• Define ionisation and periodicity • Sketch graph and discuss the shape • Describe the pattern in each group based on outer electrons and shielding • Discuss how proton number and which electrons are most likely to be removed. • Define electron affinity • Describe patterns within each group	Draw and explain a graph
Physical and chemical properties - period 1 and 2	• Discuss the potential properties period 1 and 2 based on previous lessons • Demo period 1 properties • Students complete practical to describe properties of period 2 including melting/boiling point, conductivity, malleability and ductility	Working as a team to identify and describe the type of bonding between elements in period 1 and 2
Physical and chemical properties - period 3	• Discuss the potential properties period 3 based on previous lessons • Students complete practical to describe properties of period 3	Develop practical skills while working independently
Bonding	• Recap types of bonding • Discuss how electronegativity affects bonds formed • Describe polarity and the effect on bond type	Describe electronegativity and polarity
Metals and acids	• Recap word equations from Aim A • Complete practical observing the reactions of metals with different acids • Put metals in order of reactivity • Write word and symbol equations for each reaction	Balance symbol equations for various reactions
Metals and water and air	• Complete practical observing the reactions of metals when burnt in oxygen • Put metals in order of reactivity • Write word and symbol equations for each reaction • Repeat above when metals are put into water	Balance symbol equations for various reactions
Reactivity series	• Recap findings from experiments in the previous lessons • Discuss the reactivity series • Describe how evidence from experiments is used	Analyse and use evidence to describe reactivity

Oxidation and Reduction	• Define redox and reduction and oxidation states • Describe what might happen during reduction and oxidation • Complete half equations for basic reactions • Explain how to assign oxidation states • Describe catalysts and the function	Identify catalysts that are used in industries to reduce their carbon footprint
Displacements of halogens	• Recap displacement reactions • Write out full equations for displacement reactions • Describe patterns for displacement of halogens as oxidising agents	Write out and balance displacement equations
Presentation - properties of substances	• Students complete presentation on the uses of a substance covered within Aim B	
Revision		
TEST - A2 content		

	Additional Info	SMSC
Physics		
Prefixes	• Recap on standard form from GCSE Maths • Discuss prefixes and how to convert • Practice converting units from various prefixes unsing a calculator • Rearrange equations using the triangle	Prefixes and rearranging equations
Wave and frequency equation	• Define the terms: oscillation, frequency, period, displacement, wavelength and amplitude • Discuss what a wave is and label the key points • Recap the wave equation and the frequency equation and how to use it	Calculations using wave equation
Practical - Transverse and longitudinal	• Recap the two types of waves from GCSE • Students label and compare diagrams of transverse and longitudinal • Students use the ripple tank and standing wave generator to find wave speed	Writing method for experiment
Phase difference	• Discuss oscillating systems and sketch a graphical representation • Introduce phase difference and what it means • Students calculate phase difference from a graph • Compare displacement-time and displacement-distance graphs	Calculate phase difference

Superposition of waves	• Define the terms: interference, superposition, path difference, coherent • Explain what happens when waves are added, interfere and are coherent • Give examples of coherent light sources and evidence of photons • Link to phase difference and frequency	Understanding how waves can be used in society
Refraction	• Recap refraction from GCSEs • Draws diagrams for wave propagation and wave fronts • Use ripple tanks to investigate how waves interact and diffract with different size gaps • Calculate the refractive index of the block	Follow method for diffraction and refraction
Practical - Total internal reflection	• Define total internal reflection • Complete practical to determine the TIR of two blocks • Use Snells Law to calculate refractive index and critical angle • Link to fibre optocs	Use Snell's Law to calculate refractive index and critical angle
Practical - Diffraction	• Discuss diffraction and how this may affect waves • Students complete diffraction practical • Introduce the equation for diffraction • Students complete worked examples and calculate wavelength of laser	Calculate wavelength of laser
Applications of diffraction	• Students research the applications of diffraction in real life situations • Advantages and disadvantages of each	Understand the use of endoscopy in medicine
Emission spectra	• Define energy level, quantum theory and ground state • Describe the emission spectra graph and energy levels • Calculate the specific frequency for each element • Explain how to use the emission spectra to find elements in a star	Calculate frequency and use emission spectra to find energy levels
Nodes and Antinodes	• Define nodes, antinodes and stationary waves • Demo stationary waves and draw diagrams of each wave • Discuss the effect of coherence and interference on waves	Key words/glossary
Resonance	• Define resonance, forcing frequency and natural frequency • Link to practical covered in previous lesson • Discuss real life applications of resonance and frequency (bridges, car suspension)	Key words/glossary

Practical - harmonics	• Discuss harmonics and why instruments make different sounds • Link to frequency and resonance • Discuss how pressure would affect sound within a pipe (e.g flute) • Calculate the wave speed and fundamental harmonics • Draw diagrams to represent first, second and third harmonics	Calculations using wave equation
Presentation - instruments	• Student pick an instrument and create a presentation explaining how harmonics works	Use ICT to create a powerpoint presentation
TIR in optical fibres	• Discuss uses of optical fibres in medicine and carrying data • Explain how analogue and digital signals are converted • Compare broadband and multimode fibre	Understanding the importance of fibres to provide communities with broadband
EM waves	• Recap EM waves from GCSE • Identify trends in regions of EM spectrum • Describe relationship between frequency and wavelengths • Compare uses of each and how they are regulated	Comparison of EM waves
Practical - Inverse square law	• Describe the inverse square law • Complete practical • Use equation to calculate intensity	Calculations of intensity
Presentation - communication	• Create and present on optical fibre uses in medicine or communication	Use ICT to create a powerpoint presentation

Revision		
TEST - C1 content		

Year 13

Enzymes

Lesson	Content	SMSC
1	• Describe primary, secondary and tertiary structures of proteins • Explain the importance of hydrogen bonding and disulfide bridges in maintaining the 3D structure of protein molecules	Key words/glossary

2	• Describe enzymes as protein molecules with an active site that fits a particular substrate molecule • Explain lock and key model) and that proteins can be denatured by changes in temperature and pH.	Key words/glossary
3 4 5	• Discussion of the skills needed when planning a practical investigation including hazards and risks, variables, choice of equipment, method and how to record results and observations. • Relate the discussion to the egg albumen practical. • Learners plan and carry out an investigation to show the effects of temperature and pH on egg albumen. • Produce a table to show their results and observations and write a conclusion.	Practical investigation - graph plotting, mean calculation
6	• Explain collision theory and the factors that can affect rates of chemical reactions. • Describe how catalysts speed up reactions by lowering the activation energy. • Explain how enzymes catalyse reactions by formation of enzyme-substrate complexes. Each enzyme will only catalyse one substrate.	Key words/glossary - explanation of key theory
7	• Research and explain fermentation of glucose by the action of zymase enzymes in yeast.	Use ICT to research information
8 9 10	• Write a hypothesis and plan an investigation involving changing substrate concentration in the enzyme-catalysed reaction of catalase on hydrogen peroxide solution. • Carry out the practical and record the results. • Discussion as to how to present, analyse and evaluate results. Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Practical investigation - graph plotting, mean calculation, standard deviation
11-12	• Plan an investigation to find the effect of temperature on the action of protease on milk • Carry out the practical, analyse the results and evaluate the method.	Experimental write-up layout

Diffusion		
Title	Content	SMSC

Effect of concentration gradient on diffusion	• Recap diffusion from GCSE • Discuss impact of concentration on diffusion • Explain how diffusion is important in the body to keep us alive	Understand the importance of cell function to life on Earth
Practical investigation - concentration	• Discuss method for investigating effect of concentration on diffusion • Students plan and complete practical • Full experimental write-up completed including plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method.	Full experimental write-up
Effect of molecule shape and size	• Discuss how different molecules have different shapes • Discuss the states of matter and how this would impact diffusion • Explain how collisions affect diffusion • Explain and predict the impact of shape on diffusion	Key terms/glossary
Practical - Effect of molecule shape and size	• Discuss method for investigating effect of surface area on diffusion • Carry out the practical and record the results. • Discussion as to how to present, analyse and evaluate results. • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Practical investigation - graph plotting, mean calculation
Effect of temperature	• Discuss the effect temperature has on molecule energy • Explain why sometimes temperature is not increased and link to catalysts • Devise a method for a practical investigation	Key terms/glossary Writing a method

Practical - effect of temperature on diffusion	• Complete practical varying temperatures •Full experimental write-up completed including plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method.	Practical investigation - graph plotting, mean calculation
Effect of distance	• Demo - gas jar of bromine and gas jar of air placed above it. • Students devise a method of testing the effect of distance on diffusion • Complete as class and discuss findings • Discuss relevance of this in everyday life	Understand the need for changing diffusion rates in everyday life
Effect of surface area	• Recap surface area from GCSE • Link to heat transfer and animal adaptations • Calculate surface area of variety of shapes • Explain how surface area can increase diffusion	Understand how animals are adapted to survive
Effect of surface area	• Complete practical varying surface area •Full experimental write-up completed including plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method.	Practical investigation - graph plotting, mean calculation
Random movement of molecules	• Explain Brownian motion and Kinetic theory • Discuss the effect of temperature on movement and energy of molecules. • Explanation of dynamic equilibrium, referring back to bromine experiment, showing that diffusion takes place along a concentration gradient until dynamic equilibrium is reached.	Key terms/glossary
Diffusion until equilibrium	• Plan and complete practical on diffusion until equilibrium • Measure diffusion circles on agar plates and record results. • Use these results to analyse and evaluate the practical.	Practical investigation - graph plotting, mean calculation

Plants

Title	Content	SMSC
Factors affecting plants	• Recap photosynthesis from GCSE • Discuss factors that affect the rate of photosynthesis • Explain how plants are adapted • Discuss the impact we are having on plant survival and extinction	Understand the impact humans are having on the world
Factors affecting - humans	• Research the impact humans are having on plant survival • Students present findings on the following: Deforestation, disease spreading, selective breeding, pollution	PowerPoint presentation and research
Factors affecting - pH and aeration	• Recap photosynthesis equation • Plan and complete a practical on the effect of pH • Predict what you expect to happen the plants as they grow (results gathered in 2 weeks time)	Key terms/glossary Writing a method
Factors affecting -Light intensity	• Discuss the impact of light on photosynthesis • Complete practical investigating impact of light on photosynthesis rate • Discussion as to how to present, analyse and evaluate results. • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Key terms/glossary Writing a method
Factors affecting - temperature	• Discuss how plants grow in terms of the seasons. • As a class, devise a suitable practical to investigate the effect of temperature • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Practical investigation - graph plotting, mean calculation

Factors affecting - moisture and rainfall	• Set up experiment in preparation and plan how to vary the rainfall • Collect results from pH practical • Discuss findings and explain the results • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up on pH	Key terms/glossary Experimental write-up
Factors affecting - Mineral ions	• Explain the need and use of each mineral ion in the function of plant growth • Devise a method as a class on how to limit each factor when growing plants • Set up experiment for results collection in a weeks time • Complete full experimental write-up of findings from moisture investigation	Key terms/glossary Experimental write-up
Sampling - quadrats	• Discuss how the variety of plants may change depending on the environment • Explain how to use a quadrat as a sampling method • Complete quadrat practical • Measure the field and calculate the frequency of each species in total • Explain results linking to competition and a plants needs to grow and reproduce	Practical investigation - graph plotting, mean calculation
Sampling - transects and point frames	• Explain how a transect could be used to investigate the impact of specific areas e.g. buildings, hedgerows • Discuss the importance of sample size • Analyse some example data, describing any patterns • Complete practical for transects and point frames • Full experimental write-up of findings for quadrats, point frames and transects	Practical investigation - graph plotting, mean calculation

Energy

Title	Content	SMSC
Energy types	• Recap non-renewable and renewable energy from GCSE • Discuss the global impact of fossil fuels • Analyse data on the energy usage and CO2 emissions and discuss importance of reducing fossil fuels	Understand the global impact of using fossil fuels as an energy source

Combustion	• Describe combustion and incomplete combustion • Write word and symbol equations • Discuss impact of combustion and incomplete combustion on the environment • Link to catalysts and the importance of car emissions tests	Understand the importance in car maintenance in reducing emissions
Fuels and their properties	• Complete practical - burning fules • Flammability of fuels compared and products of combustion discussed, harmful effect and sources of fuels discussed • Decide which would be the best suited to a variety of situations e.g camping and link to observations from practical	Key terms/glossary Comparison of fuels
Specific heat capacity	• Recap specific heat capacity and the definition • Complete practice calculations • Discuss how to reduce heat loss during an investigation	Calculations of SHC
SHC investigation	• Discuss method for investigating SHC of different metals • Carry out the practical and record the results. • Discussion as to how to present, analyse and evaluate results. • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Practical investigation - graph plotting, mean calculation
Energy content of food	• Discuss method for investigating energy in foods • Carry out the practical and record the results. • Discussion as to how to present, analyse and evaluate results. • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Key terms/glossary Experimental write-up

Electricity

Circuit symbols and types	• Recap circuit symbols from GCSE • Discuss the different types of circuit and the rules for each • Calculate the current and voltage in various circuits • Build a basic circuit and find voltage/current	Using and rearranging equations

I-V graphs	• Discuss how a circuit can be used for plotting a I-V graph • Students set up a circuit to measure current and voltage for a fixed resistor. • Plot a graph of results and calculate resistance • Discuss where main sources of error occur	Plotting a graph accurately
V = IR	• Recap resistance rules from GCSE • Discuss the effect of diodes and bulbs on resistance and why this occurs • Practice calculations on V= IR • Students complete practical, plotting I-V graph for a bulb and diode	Plotting a graph accurately
Resistance	• Discuss the effects of total resistance when in series and parallel • Students complete practical on resistors in series and parallel. • Compare experimental and theoretical values • Discuss findings and explain the results • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Using and rearranging equations
Thermistor	• As a class plan an investigation as to how the resistance of a thermistor varies with temperature • Discuss findings and explain the results • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up	Key terms/glossary Experimental write-up
Power	• Define power and the uses in every day life • Use the equation to calculate power transferred • Complete practical calculating the power transferred to a variety of bulbs • Use this to calculate energy used and discuss which lightbulb is the most energy efficient	Understand the individual and global impact of using energy efficient lightbulbs
Work done	• Define work done • Explain situations where work is done • Use the equation to calculate work done in a variety of situations • Link to energy loss	Using and rearranging equations

Energy use of appliances	• Discuss the energy uses of different appliances • Students use the computer to investigate 5 different appliances in the home and analyse the energy use • Students chose which model they will choose to purchase based on their findings	Understand the individual and global impact of reducing energy consumption
SHC metal block	• Students repeat practical investigation to find the specific heat capacity of a metal; this time measuring current and voltage every minute to find the power. • Calculate energy transfer • Plotting a suitable line graph, identifying and accounting for anomalies, writing a conclusion with reference to the hypothesis, evaluating conclusion and method, and suggesting improvements to the method. • Complete full experimental write-up on pH	Key terms/glossary Experimental write-up

Unit 4

Lesson No.	Title and content	Additional Info	Curriculum Plan Links
Ass C - Trans Metals			
1	Intro to Unit 13, and intro to Ass C	Assignment sheets, expectations	
2	Intro to Trans Metals	Definition of a Trans Metal and complex	Using key terms correctly
C/W 1C	C/W Definition list		
3	Comparison of Hg and V	IT lesson -research	
C/W 2C	C/W - Hg and V comparison		Research using V as a trans metal
4	Trans Metal Complex ions	Writing formulae, charges of ions	Calculation of charges
5	Trans Metal Complex ions (2)	Shapes, using molymods and drawing	Drawing shapes, showing 3D
C/W 3C	C/W Drawings of TM complexes		Uses of complex ions in cancer treatment/catalysts
6	Practical(1) - Reactions of TM	See BTEC method sheet	Describing chemical reactions
7	Practical(2) - Reactions of TM	Produce results table, observation sheet	Describing chemical reactions
C/W 4C	C/W Results of Practical		
8	Theory of equations for practical	Link observations with chemical formulae	Writing chemical formulae
C/W 5C	C/W Equations x 2 for additional reactions		
9	Discussion of reaction scheme	In order to save chemicals, using logic	Cutting down use of chemicals

10	Pupils to produce reaction scheme	IT lesson - in PPT	Research on reaction schemes
C/W 6C	C/W Reaction scheme		
C/W Ass C All	Finishing off Ass C - Final Hand In		
Ass A Acids & Bases	**Title and content**	**Additional Info**	**Curriculum Plan Links**
11	Introduction to acids and bases	What chemicals make acids and bases	
12	Calculation of pH	Using logs to calculate	Calculations involving logs
C/W 1A	pH Calculations w/sh AP		Complete pH W/Sh
C/W 2A	pH calculation Part A from BTEC		Complete Part A W/Sh from BTEC
13	Calculations using pH and Kw	Using Kw to then find pH	Calculations - algebra
C/W 3A	Calculation w/sh Kw Test Y 3		Test Yourself 3 W/Sh
C/W 4A	Additional Question on Kw		Calculations on Kw
14	Strong or Weak Acid?	Calculations involving Ka	Descriptions of strong and weak acids
C/W 5A	Part B - Calculations with a Known pH (BTEC)		Complete part B W/Sh from BTEC
C/W 6A	Calculation w/Sh Ka Test Y 4		Test yourself 4 W/sh
15	Practical session on different indicators	Microscale pH range	Working as part of a team - practical
C/W 7A	Write up of practical on different indicators		Practical write up
16	What indicator to use in titrations	Drawing graphs of pH curves	Graph drawing by hand
C/W 8A	Notes and graphs showing pH curves		Produce Notes and graphs
17	Practical BTEC method on finding Ka	See practical sheet	Working as part of a team
18	Calculations to find Ka from practical	See practical sheet	
C/W 9A	Write up of practical to find Ka and calcs		Complete practical write up
19	Practical - Titration with pH meter	Using BTEC practical sheet	
20	Drawing pH curve from titration	Done using Excel graphs	
C/W 10A	Practical write up and IT graphs		Graph drawing using IT
21	Discussion of 3 types of titrations	pH meter, indicators, autotitrator	
22	Research of 3 types of titration.	How the 3 types are used in industry	Comparing the 3 titrations giving sims and difs
C/W 11A	Report on the 3 types of titration		
23	Practical - making a buffer	Examine how adding acid/base affects it	Use of buffers in the body
C/W 12A	Write up of buffer practical		
C/W Ass A All	Finishing off Ass A - Final hand in		

	Title and Content	Additional Info	Curriculum Plan Links
24	Redox reactions	Definitions used with redox	
C/W 1B	Report on definitions used in redox		
25	Working out oxidation numbers	Using set of redox rules, find Ox no. in ion	Charges of ions
C/W 2B	BTEC w/sh on oxidation and reduction		
26	Practical - BTEC Measuring cell potentials	Measure voltage produced of 3 cells	
27	Writing half and redox equations of prac		Calculating oxidation nos and electrons
C/W 3B	Practical report on cell potentials	to include equations linked to practical	
28	Practical iron tablets - redox titration		Use of iron tablets
29	Theory lesson calculations	Finding the iron content of iron tablets	Titration Calculations - amount of Fe
C/W 4B	Practical report on iron tablets		
30	Practical lesson - oxidising an aldehyde	Using acidified potassium dichromate	
C/W 5B	Practical report - on aldehydes		
31	Practical - vitamin C tablets analysis	Redox titration - using thio	
C/W 6B	Practical report on Vitamin C		Use of vitamin C tablets vs good diet
32	Research Evaluation of titrations in industry		Research IT on analysis in industry
33	Research Evaluation of titrations in industry		Research IT on analysis in industry
C/W 7B	Report on evaluation of titrations		
C/W Ass B All			

Key:

SMSC		Mathematical		Assessment point	
Literacy		Independent learning		PSE/Connect	