Curriculum Map: Year 10 Combined Science Trilogy

Half Term 1

	Biology	Chemistry	Physics
Topic	Cell Division and Reproduction	Energy Changes	Electricity
Intent	Develop understanding of stem cells and stem cell technology and how this new branch of medicine allows doctors to repair damaged organs by growing new tissue from stem cells. Understand that for an organism to grow, cells must divide by mitosis. Understand how uncontrolled cell division leads to the formation of tumours and compare benign and malignant tumours. Students will discover how cells produce gametes by meiosis and how the recombination of gametes results in variation of offspring.	Students will learn: Chemical reactions involve energy changes. Energy can be absorbed or released from a reaction. How to draw reaction profiles.	To learn the standard circuit diagram symbols and use them to construct series and parallel circuit diagrams. Develop ability to build circuits and record measurements. Investigate how the resistance of a wire is affected by different factors including length. Investigating how the current through different components is affected by the potential difference across the component.
Key Knowledge	• The process and purpose of mitosis • Steps of the cell cycle. • Location and function of stem cells both within the body and as a therapeutic medical tool. • The structure of DNA • The steps of meiosis • Differences between sexual and asexual reproduction • How tumours arise in the body and the similarities and differences between benign and malignant tumours.	• An exothermic reaction is one that transfers heat energy to the surroundings. • An endothermic reaction is one that absorbs heat energy from the surroundings. • Exothermic and endothermic reactions both have uses in everyday life such as hand warmers and sports' injury packs. • Idea of activation energy needed for a reaction to occur.	• Recall the circuit symbols of the following components:- cell, battery, lamp, switch, ammeter, voltmeter, fuse, resistor, thermistor, variable resistor, diode, LDR and LED. • A series circuit only has one pathway (loop) for the current to flow, whilst a parallel circuit has multiple pathways for current flow and so reducing resistance. • Current is the rate of flow of electrical charge. It is measured using an ammeter placed within the loop and has the units of amps (A). • Charge flow has the units of coulombs (C) • Recall the equation Q = I x t • The source of potential difference in the circuit is a cell/battery. It is measured using

			a voltmeter placed in parallel across a component. • The bigger the potential difference in a circuit, the bigger the current (directly proportional) for a fixed resistance. • The bigger the resistance in a circuit, the lower the current (inversely proportional) for a fixed potential difference. • Recall the equation V = I x R • Should be able to sketch and explain the I-V graphs for a resistor at constant temperature, diode, and filament lamp. • An ohmic conductor is a resistor at constant temperature (even at increasing currents) • For a filament lamp, a higher current causes the temperature to increase and thus increasing resistance. • For a diode, in the reverse direction, the resistance is very high and therefore no current flows. In the forward direction, resistance is low, so current increases with increasing potential difference.
Retrieval Practice	Last unit – Reactions of Metals Last year – Cells, specialised cells and microscopy	Last unit – Cell division and reproduction Last year – Periodic table	Last unit – Energy changes Last year – Energy stores and Energy resources.
Key Skills	• Through use of the relevant scientific vocabulary compose explanations and justifications. • Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments. • Comparison of mitosis and meiosis • Comparison of sexual and asexual reproduction.	• Label or construct reaction profiles for both exothermic and endothermic reactions. • Calculate temperature changes from data given or from a practical with the use of a thermometer. • Interpret graphs of time against temperature change for both endothermic and exothermic reactions. Able to explain the changes in temperature during and after the reaction.	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Recall and use equations, including rearranging and conversion of units. • Draw circuit symbols and circuit diagrams. • Construct circuits using lab equipment. Collect data from these circuits. • Plot graphs from data.

	• Comparison of benign and malignant tumours • Analysis of data and provide reasoning for trends.	• Evaluate given methods whilst suggesting and explaining potential improvements. • Identifying variables in an investigation. • Calculate mean, range, and uncertainty of given data. • Devise a method to investigate how a given variable affects the temperature change of a reaction. • Calculate energy change using bond enthalpy data (HT only)	• Understand the terms directly proportional and inversely proportional and recognise these relationships from data given. • Write a risk assessment for the resistance of a wire practical • Devise a method to investigate the effect of changing the length of wire on the resistance of a wire. • Sketch I-V graphs for an ohmic conductor, filament lamp and diode.
Key Vocabulary	Stem cells, mitosis, meiosis, replicate, DNA, differentiate, specialised, embryo, phase, meristem, therapeutic, DNA, double helix, chromosomes, genome, gamete, tumours, mutations, uncontrolled, cell division, benign, malignant, secondary, explain.	Endothermic, exothermic, energy profile, absorb, release, surroundings, energy transfer, activation energy	Series, parallel, cell, LED, ammeter, voltmeter, lamp, fuse, switch, diode, current, amperes, potential difference, resistance, circuit, coulombs, conductor, directly proportional, components, inversely proportional, ohmic conductor.
Key Reading	CGP revision guide BBC bitesize GCSE Combined Science Biology	BBC Bitesize: combined Science Trilogy CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide
End Point	Students are competent in answering structured and longer response exam style questions. Exam phrasing comparing processes of mitosis and meiosis, sexual and asexual reproduction as well as benign and malignant tumours. Analysis of data and provide reasoning for trends.	Students are competent in answering structured and longer response exam style questions. Students are competent in answering maths, data, and graph-based questions. Students can plot and analyse line graphs. Students can devise a method to investigate temperature change.	Students are competent in answering structured and longer response exam style questions and recall the scientific equations.
Form of Assessment	Exam ready questions	Exam ready questions	Exam ready questions
Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers.		

	Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject! Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.

Curriculum Map: Year 10 Combined Science Trilogy			
Half Term 2			
	Biology	Chemistry	Physics
Topic	Enzymes	Rate of Reaction	Waves
Intent	Students will develop a deeper knowledge of the action of enzymes in terms of the 'lock and key' model as well as factors affecting enzyme activity.	Students will learn: That the rate of reaction can vary depending on the reactivity of a chemical. The rate of reaction can be influenced by changing factors. How the collision theory and activation energy help scientists understand more about controlling the rate of a reaction. How to use formulae, data, and graphs to determine the rate of reaction.	Students will learn: The differences between transverse and longitudinal waves. How to calculate the frequency, wavelength, and velocity of waves.
Key Knowledge	• Products of digestion linked to each type of enzyme. • The "Lock and Key Theory" of enzyme activity. • Enzyme specificity • Describe and explain the effect of temperature and pH on enzyme activity. • Enzyme-pH required practical.	Reactions can only occur when particles collide and with sufficient energy (activation energy). The rate of a reaction can be changed by changing the temperature, concentration, pressure, surface area of the reactants or by adding a catalyst. Explain how each factor affects the rate of reaction in terms of the collision theory and the effect of changing the factor on the final product.	• A wave transfers energy without transferring particles. • A transverse wave is where particles vibrate (oscillate) perpendicular to the direction of energy transfer. Examples are water waves and light. • A longitudinal wave is where particles vibrate (oscillate) parallel to the direction of energy transfer. Example is sound. • Compressions are areas on a longitudinal wave where the particles are closer together and rarefaction are where the particles are further apart. • Frequency is the number of waves per second measured in Hertz (Hz).

			• Use the equation T = 1/frequency • Time period is the time for one complete wave. • Wavelength is the distance from the point on one wave to the same exact point on the next wave and is measured in metres (m). • Wave speed is the speed at which a wave travels in a medium/material and is measured in m/s. • Recall the equation: ○ wave speed = frequency x wavelength • For the same wave speed, frequency is inversely proportional to the wavelength. • Amplitude is the maximum disturbance of the wave from the middle (height of a wave) and is measured in metres (m).
Retrieval Practice	Last unit – Electricity Last year – Digestive system	Last unit – Enzymes Last year – mixtures and chemical analysis	Last unit – Rate of reaction Last year - Radioactivity
Key Skills	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Descriptive writing. • Data interpretation and plotting graphs. • Enzyme-pH required practical – data analysis and evaluation of methods.	• Calculate the rate of reaction from given data. • Calculate average/mean rate of reaction from a graph. • Calculate the rate of reaction at a specific time using a tangent and gradient (HT only) • Plot a graph, including an appropriate best fit line. • Identify variables. • Pick a suitable method for measuring the rate of reaction based on a symbol equation. • Devise a method investigate the effect of a given factor on the rate of reaction. • Calculate the surface area, volume, and surface area : volume ratio of given solids.	• Use scientific vocabulary, terminology and definitions confidently in both written and spoken work. • Label both transverse and longitudinal waves. • Work out wavelength, amplitude, time period and frequency from wave diagrams/graphs. • Recall and use equations, including rearranging and conversion of units. • Describe a method to measure the speed of sound in air using speed = distance/time. • Describe a method to measure the wavelength and frequency of ripples in a tank and use this to calculate the wave speed. • Describe a method to obtain standing waves, as well as measuring the wavelength

			and frequency of these waves in order to calculate the wave speed. • Calculate mean, range and uncertainty of data given.
Key Vocabulary	Protease, carbohydrase, amylase, substrate, products, active site, denatured, kinetic energy, collisions, optimum, specificity.	Particle, collide, frequency, activation energy, reactant, product, temperature, concentration, pressure, surface area, catalyst.	Transverse, longitudinal, oscillation, compression, rarefaction, displacement, velocity, wavelength, frequency, energy, perpendicular, parallel, time period, hertz, medium, amplitude.
Key Reading	CGP revision guide BBC bitesize GCSE Combined Science Biology	BBC Bitesize: combined Science Trilogy CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide
End Point	Students are competent in answering structured and longer response exam style questions. Data analysis of enzyme-temperature and enzyme-pH graphs.	Students are competent in answering structured and longer response exam style questions. Students are competent in answering maths, data, and graph-based questions. Able to structure comparative sentences. Can recall practical methods. Students can plot and analyse line graphs. Draw tangents to calculate means.	Students are competent in answering structured and longer response exam style questions. Students are competent in answering maths, data, and graph-based questions. Can recall practical methods.
Form of Assessment	Exam ready questions	Exam ready questions	Exam ready questions
Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers. Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.		
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even		

	more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject! Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.

Curriculum Map: Year 10 Combined Science Trilogy

Half Term 3

	Biology	Chemistry	Physics
Topic	Fighting Disease Drug Testing	Ionic and Covalent	Internal Energy
Intent	Understand the first and second line of human defence systems and begin to explore the workings of the immune system. Students are able to explain the process of vaccination and evaluate the global use of vaccination in the prevention of disease. To learn how other common drugs work to kill pathogens or relieve symptoms. Explore the development of new drugs from concept to use. Make links between the discovery of new drugs and the importance of the conservation of the planet.	Students will learn: To describe and explain the structure and properties of ionic compounds. How to use diagrams to represent ionic bonding. To describe and explain the structure and properties of simple covalent structures. To use diagrams to represent simple covalent structures.	Students will learn the idea of internal energy and how the heating/cooling of a substance is affected by the specific heat capacity and latent heat of a substance.
Key Knowledge	• The non-specific human defences. • Functions of white blood cells. • Process of vaccination. • Function and examples of antibiotic, painkillers, and antivirals. • Process of drug development. • Understand that the results of testing and trials are published only after scrutiny by peer review.	• An atom turns into an ion but gaining or losing electrons. • Ionic bonding involves metal and non-metal atoms transferring electrons. • Ionic compounds have high melting points due to being giant lattices that have strong electrostatic forces of attraction between oppositely charged ions. • Ionic compounds do not conduct electricity when solid as the ions are fixed but can conduct when molten or dissolved in water as the ions can move. • Covalent bonding is the sharing of a pair of electrons between non-metal atoms.	• Internal energy is the total kinetic and potential energy of a substance. • The kinetic energy is due to the movement of the particles. The higher the temperature, the higher the kinetic energy of the particles. • The potential energy is based on the spacing between the particles. The potential energy changes when a substance changes state. Melting/boiling increase potential energy whilst freezing/condensing decrease potential energy.

		• Simple covalent molecules have low melting points as they are small molecules with weak intermolecular forces between them.
		• Simple covalent molecules do not conduct electricity as they do not have delocalised electrons.
			• Increasing the internal energy of a substance can lead to either an increase in temperature or change of state.
			• Specific heat capacity is the energy required to change the temperature of 1kg of a substance by 10C.
			• Use the equation…
			  o Energy = mass x SHC x temp. change
			• Specific latent heat is the energy required to change the state of 1kg of a substance with no change in temperature.
			• Use the equation…
			  o Energy = mass x specific latent heat

Retrieval Practice	Last unit – Waves Last year – Communicable diseases	Last unit – Fighting disease Last year – Periodic Table and Quantitative Chemistry	Last unit – Ionic and covalent Last year – Particle model of matter and density
Key Skills	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Graph skills. • Descriptive writing. • Describe and explain specified examples of the technological applications of science. • Describe and evaluate, with the help of data, methods that can be used to tackle problems caused by human impacts on the environment.	• Draw diagrams to represent ionic and covalent bonding. • Comparison of the structure and bonding in ionic and covalent substances.	• Use scientific vocabulary, terminology and definitions confidently in both written and spoken work. • Plot cooling and heating curves based on data given. • Label the different states of matter on a heating/cooling curve. • Identify the changes of state on a heating/cooling curve. • HT only - Explain heating/cooling curves in terms of specific heat capacity and specific latent heat. • Recall and use equations, including rearranging and conversion of units. • Use of standard form.
Key Vocabulary	Communicable, immune, pathogen, bacteria, virus, fungi, transmission, infectious, toxin, neutralise, symptom,	Atoms, ions, electrons, transfer, gaining, losing, positive, negative, molten, electrostatic, lattice,	Solid, liquid, gas, condensing, freezing, boiling, specific heat capacity, , thermal, specific latent

	vector, antigen, antibody, antitoxin, phagocytosis, vaccine, vaccination, toxicity, efficacy, dose, clinical, trial, stimulate, antibiotics, resistant, strains, placebo.	weak intermolecular forces, sharing electrons, full outer shell, delocalised.	heat, internal energy, kinetic energy, potential energy, intermolecular forces,
Key Reading	CGP revision guide BBC bitesize GCSE Combined Science Biology	BBC Bitesize: combined Science Trilogy CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide
End Point	Students are competent in answering structured and longer response exam style questions. Able to structure evaluations. Can interpret diagrams and flow charts.	Students are competent in answering structured and longer response exam style questions.	Students are competent in answering structured and longer response exam style questions. Can recall practical methods Students are competent in answering maths, data and graph-based questions. Students can plot and analyse line graphs.
Form of Assessment	Exam ready questions	Exam ready questions	Exam ready questions
Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers. Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.		
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject! Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.		

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Curriculum Map: Year 10 Combined Science Trilogy

Half Term 4

	Biology	Chemistry	Physics
Topic	Respiration and Metabolism	Giant Covalent and Metallic	Energy and Motion Graphs
Intent	Students will learn about the process of aerobic and anaerobic respiration. Students will understand the effects of exercise on respiration. Students will link their knowledge from other topics to consolidate their knowledge of metabolism.	Students will learn: To describe and explain the structure and properties of simple covalent structures. To use diagrams to represent simple covalent structures. To describe and explain the structure and properties of giant covalent structures. The uses of giant covalent structures and link this to their properties. About the structure and uses of graphene and fullerenes. To explain and describe the properties of metallic substances. How to use diagrams to represent metallic bonding. To explain how alloys alter the properties of metals to make them harder. To explain and describe the properties of polymers.	To learn about how forces interact with objects. A further study of Hooke's law and learning about the graphical representation will be completed. Students will learn about distance-time graphs and velocity-time graphs.
Key Knowledge	• Aerobic respiration equation. • Anaerobic respiration equation for animals, plants, and yeast. • Recall what is energy needed for. • Describe the effect of exercise on the body.	• Giant covalent structures are giant lattices that have lots of strong covalent bonds causing them to have high melting points. • Diamond and graphite are examples of giant covalent structures that are carbon allotropes that have different structures and properties.	• Recall and use the following equations.... o $E_k = 0.5 \times mass \times speed^2$ o $E_p = mass \times g \times height$ • Use the following equation.... o $E_e = 0.5 \times spring\ constant \times extension^2$

	• Define oxygen debt. • Describe what metabolism includes.	• Graphite is soft as it has layered structure where the layers can slide over each other, whilst diamond is hard due to each carbon atom connected to 4 other carbon atoms in a tetrahedral structure with no layers. • Graphite can conduct electricity due to delocalised electrons. • Graphene and fullerenes are also allotropes of carbon. • Metals are giant structures that have positive metal ions surrounded by delocalised electrons that allow electricity and thermal conductivity. • Metallic substances have high melting and boiling points as it is a giant lattice with strong electrostatic forces of attraction between the positive metal ions and delocalised electrons. • Alloys are mixtures of metals with atoms of different sizes distorting the layered structure of atoms causing the atoms to not be able to slide over each other, making the alloy harder than the pure metal. • Polymers are long molecules of monomers joined together and therefore have stronger intermolecular forces and a high boiling point	• Hooke's Law is the idea that force applied on a spring is directly proportional to its extension as long as the limit of proportionality is not reached. • Recall and use the equation…. o Force = spring constant x extension • Elastic deformation is when a force is removed from an object, and it returns to its original shape and length. • Inelastic deformation is when a force is removed, and the object does not return to its original shape and length. • Recall and use the following equations…. • Distance = speed x time • Acceleration = change in velocity/time • Use the following equation…. • V2 – u2 = 2 x a x s • The gradient of a distance-time graph is speed. • Speed is how fast something is moving and is a scalar quantity. • Velocity is sped in a given direction and is a vector quantity. • The gradient of a velocity-time graph is acceleration. • The area under a velocity-time graph is the distance travelled.
Retrieval Practice	Last unit – Internal Energy Last year – Photosynthesis	Last unit – Respiration and Metabolism Last year – Ionic and covalent	Last unit – Giant Covalent and Metallic Last year – Forces and Energy
Key Skills	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Comparisons. • Data interpretation.	• Use scientific vocabulary, terminology and definitions confidently in both written and spoken work. • Comparisons.	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Recall and use equations, including rearranging and conversion of units. • Understand the term directly proportional. • Plot both D-T and V-T graphs.

	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Oracy.		• Calculate the gradient of a straight line. • HT Only - Calculate the gradient of a curve using a tangent. • Work out the distance travelled under a V-T graph by either estimation or calculating the area of simple mathematical shapes. • Devise a method to investigate the spring constant of a spring.
Key Vocabulary	Respiration, aerobic, anaerobic, exothermic, lactic acid, yeast, fermentation, heart rate, breathing rate, oxygen debt, metabolism, reaction.	Sea of delocalised electrons, free electrons, electrical charge, layers, distorted, alloy, full outer shell, strong covalent bonding, polymer, monomer, graphene, fullerenes.	Kinetic, gravitational potential, elastic, gravitational field strength, extension, spring constant, acceleration, scalar, vector, speed, velocity, directly proportional.
Key Reading	CGP revision guide BBC bitesize GCSE Combined Science Biology	BBC Bitesize: combined Science Trilogy CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide
End Point	Students are competent in answering structured and longer response exam style questions.	Students are competent in answering structured and longer response exam style questions. Able to structure comparative sentences.	Students are competent in answering structured and longer response exam style questions and recall the scientific equations. Required practical: Investigate the relationship between force and extension for a spring. (10.2.18)
Form of Assessment	Exam ready questions	Exam ready questions	Exam ready questions
Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers. Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.		
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject!		

	Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.

Curriculum Map: Year 10 Combined Science Trilogy

Half Term 5

	Biology	Chemistry	Physics
Topic	Homeostasis Nervous System	Quantitative Chemistry	Newton's Laws of Motion Stopping Distance Momentum (HT only)
Intent	Students to understand the need to control a constant environment in the human body. Understand the role of the nervous system in homeostasis. Understand the structure and function of the reflex arc.	Students will learn: The law of conservation of mass. How to balance equations. How to use mathematical formulae and the periodic table to calculate the amount of substance.	Students to understand Newton's Laws of Motion and apply this to falling objects and other scenarios. Students will also learn about factors that affect the stopping distance of a car. HT students will learn about momentum and conservation of momentum.
Key Knowledge	• Definition of homeostasis • General structure of a stimulus, receptor, co-ordinator, effector, and response in homeostasis • Importance of reflexes in terms of survival • Structure of a reflex arc • Define and label a synapse. • Comparison of how information is transmitted across a neuron and a synapse.	• Calculate relative formula mass (molecular mass) using the periodic table and given formulae. • Conservation of mass is the idea that the mass before a reaction is equal to mass after a reaction. • Mass in a reaction will appear to increase if a reactant is gas that is not measured before the reaction. • Mass in a reaction will appear to decrease if a product is gas that escapes into the surroundings. • Understand the idea that concentration is the mass in a given volume and has the units of g/dm^3. • Recall and use the concentration equation. • HT only – understand that the mole is a measurement of chemical amount where 1 mole contains an Avogadro's constant of particles. • HT only – recall and use the mole equation.	• Newton's 1st Law states that object with no resultant force will stay stationary or move at constant speed. For the object to accelerate, decelerate or change direction, it must have a resultant force. • Newton's 2nd Law states that the acceleration of an object is directly proportional to its force and inversely proportional to the mass of the object. • Recall and use the equation…. ○ Resultant Force = mass x acceleration • Newton's 3rd Law states that when 2 objects interact, they exert an equal and opposite force on each other. • A falling object will initially accelerate as the downward weight force is greater than the upwards air resistance. As the object falls faster, the air resistance increases until both weight and air resistance are equal, causing the object to fall a maximum terminal velocity.

		• HT only – understand the term limiting reactant and excess	• A parachute would increase the air resistance above the weight force, causing the object to decelerate. As the object decelerates, air resistance decreases so that weight is now equal to air resistance again and object falls at a lower constant velocity. • Stopping distance = thinking distance + braking distance. • Thinking distance is the distance the car moves during a driver's reaction time. It is affected by alcohol, distractions, age, drugs, and speed. • Braking distance is the distance the car moves whilst the brakes are being applied. It is affected by the road conditions, weather, tyres conditions, brake conditions, speed, and the mass of the car. • HT only - Momentum is a vector quantity as it is a product of mass and velocity. • HT only - Recall and use the equation…. ○ Momentum = mass x velocity • HT only - Law of conservation of momentum states that the momentum before a collision will equal the momentum after the collision.
Retrieval Practice	Last unit – Energy and Motion Last year – Non-communicable disease	Last unit – Homeostasis Last year – Quantitative chemistry	Last unit – Quantitative Chemistry Last year - Forces
Key Skills	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Comparisons. • Interpret diagrams. • Reaction time practical – analyse data in terms of median, mean, range and uncertainty.	• Calculate relative formula mass (molecular mass) using the periodic table and given formulae. • Balance given symbol equations. • Use a symbol equation to work out apparent changes in mass. • Work out the mass of reactants and products using the idea of conservation of mass.	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Recall and use equations, including rearranging and conversion of units. • Draw force diagrams using information given.

	• Evaluate methods designed to measure reaction time. • Devise a method to investigate the effect of a given factor on reaction time.	• Use the concentration, mass, and volume equation. • Convert cm^3 into dm^3 and vice versa. • Convert other units of mass into grams. • HT only - Use the mole equation, including the idea of reacting masses. • HT only - Use given information to work out the limiting reactant of a chemical reactions. • HT only – Use moles of reactants and products to produce a balanced symbol equation.	• Understand the terms directly proportional and inversely proportional and recognise these relationships from data given. • Devise a method to investigate how the acceleration of an object is dependent on the resultant force or mass of the object. • Calculate mean. Range and uncertainty of data given. • Evaluate setup of methods given and suggest improvements in order to collect valid data. • Identify variables in an investigation. • HT only – apply the laws of conservation of momentum to given scenarios.
Key Vocabulary	Homeostasis, nervous, stimulus, receptor, co-ordination (processing) centre, effector, response, neuron, sensory, relay, motor, muscle, reflex arc, synapse, neurotransmitter, chemical, electrical, myelin sheath, axon.	Avogadro's number, moles, ratio, amount, mass, relative formula mass, mass number, concentration, volume, conservation of mass,	Effector, response, coordinator, ovary, testes, follicle stimulating hormone, luteinising hormone, oestrogen, progesterone, ovulation, menstrual cycle, uterus, contraception, In vitro fertilisation, embryo, reflex, sensory, motor neurone.
Key Reading	CGP revision guide BBC bitesize GCSE Combined Science Biology	BBC Bitesize: combined Science Trilogy CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide
End Point	Students are competent in answering structured and longer response exam style questions. Students are competent in analysing given data. Students can calculate the median, mean, range and uncertainty of given data. Able to structure comparative sentences.	Students are competent in answering structured and longer response exam style questions. Students are competent in answering maths, data, and graph-based questions.	Students are competent in answering structured and longer response exam style questions. Able to structure evaluations. Can interpret diagrams and flow charts.
Form of Assessment	Exam ready questions	Exam ready questions	Exam ready questions

Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers. Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject! Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.

Curriculum Map: Year 10 Combined Science Trilogy			
Half Term 6			
	Biology	Chemistry	Physics
Topic	Ecology	Organic Chemistry Chemistry of the Atmosphere	
Intent	Students will develop their appreciation of ecology, learning about how all species live together in ecosystems made up of complex communities of animals and plants that depend on each other and how they are affected by both abiotic and biotic factors. Students will learn how to sample habitats and determine distribution and abundance of organisms.	Students will learn: About carbon compounds as fuel and feedstock. The manufacture of alkanes and alkenes from crude oil using the processes of fractional distillation and cracking. The composition and evolution of the Earth's atmosphere. About greenhouse gases and the impact of human activity.	
Key Knowledge	• Structural, behavioural and functional adaptations • Extremophiles • Structure of food chains • Define community, population, habitat and ecosystem. • Describe what organisms compete for. • Abiotic factors • Biotic factors • Understand the idea of random sampling and when to use transects.	• Crude oil is formed from dead plankton buried under mud over millions of years. • Coal is formed in a similar way to crude oil but from the remains of dead trees. • Fractional distillation is used to separate the fractions of crude oil based on their length/boiling point. • Fractional distillation is where crude oil is heated into a vapour and passed into a column where it is cooler at the top and hotter at the bottom. The vapour rises up the column and the different fractions cool and condense based on their boiling points/carbon length. • Increasing carbon chain length increases the boiling point, decreases flammability, and decreases viscosity.	

		• Shorter chain alkanes are used as fuels but the supply of these is lower than the demand. Therefore, longer chain alkanes are broken down into shorter chain alkanes and alkenes by cracking (thermal or catalytic).
		• A hydrocarbon is a compound containing only hydrogen and carbon atoms.
		• Alkenes are unsaturated hydrocarbons that have C=C bonds and are used to make polymers/plastics.
		• Alkanes are saturated hydrocarbons that have only single C-C bonds and have the general formula C_nH_{2n+2}.
		• Bromine water is used to test for alkenes as it turns from orange to colourless with alkenes.
		• Recall of the first 4 alkanes
		  o Methane (CH_4)
		  o Ethane (C_2H_6)
		  o Propane (C_3H_8)
		  o Butane (C_4H_{10})
		• Recalling the names and percentages of the gases in today's atmosphere
		• Explaining how the atmosphere has evolved over time.
		• Recall the 3 greenhouse gases.
		• Explain how the greenhouse effect causes short wavelength infrared radiation from the Sun to penetrate through the atmosphere and be absorbed by the Earth's surface. The Earth then reflects different longer wavelength infrared radiation that is absorbed by the greenhouse gases causing an increase in average global temperatures.
		• Describe and explain the consequences of climate change.	

		• Carbon footprint is the total amount of carbon emitted during the production and lifetime of a product. • Describe the formation and negative effects of the following pollutants:- carbon dioxide, carbon monoxide, carbon particulates, nitrogen oxides and sulfur dioxide.	
Retrieval Practice	Last unit – Newton's Laws Last year – Biology from year 9	Last unit – Ecology Last year – Chemical Changes	
Key Skills	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Interpretation of situations in relation to competition and environmental factors. • Working out areas of common shapes • Calculate the mean, mode and median of given data. • Using standard form. • Devise a method to investigate the population of a species using the idea of random sampling. • Devise a method to instigate the effect of a biotic/abiotic factor on the distribution and abundance of a species.	• Use scientific vocabulary, terminology, and definitions confidently in both written and spoken work. • Drawing displayed formulae for the first 4 alkanes • Comparisons of data and the effect of different sources of fuel. • Data interpretation and evaluation.	
Key Vocabulary	Community, population, distribution, interdependence, competition, ecosystem, abiotic, biotic, habitat, territory, predator, prey, breed, transect, quadrat, abundance, mean, median, mode, random sampling.	Crude oil, finite, fossil fuel, hydrocarbon, alkane, methane, ethane, propane, butane, alkene, polymer, plastic, fraction, fractional distillation, volcanic activity, plankton, carbonates, sedimentary rocks, combustion, greenhouse gas, global warming, acid rain, bromine water, acid rain, photosynthesis, cracking, catalytic, infrared, wavelength, carbon footprint.	
Key Reading	CGP revision guide	BBC Bitesize: combined Science Trilogy CGP revision guide	

	BBC bitesize GCSE Combined Science Biology		
End Point	Students are competent in answering structured and longer response exam style questions.	Students are competent in answering structured and longer response exam style questions. Students are competent in answering graph-based questions. Able to structure comparative sentences.	
Form of Assessment	Exam ready questions	Exam ready questions	
Enrichment Opportunities	Use of outdoor classroom. As Universities start to offer science-based workshops again Y10 will be given the opportunity to take part in trips to local Universities to gain insights into scientific courses and careers. Linked with Duke of Edinburgh there is an opportunity for some students to gain hands on experience in a science career with a Science technician as part of their skills or volunteering section. British Science Week Link to science careers.		
Leadership Opportunities	Year 10 provides a fantastic opportunity for a student to embrace the role of a subject leader which will meet regularly with a teacher from the subject. They will talk to other pupil about the subject and share your views with teachers. They will think about how you can make the subject even more interesting than it is already, as well as examining ways in which students learn effectively. They will tell students and other groups of people what is great about the subject! Students will also be offered to take place in open evening giving them an opportunity to show what skills and knowledge they have developed over the course. Chances to formally present within lessons and take ownership of that process. Student examples to demonstrate good quality work. Group work.		