Combined Science Year 10 Curriculum End Points and key vocabulary

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Unit of Work	1. Organisation continued 2. Bonding, Structure and the Properties of Matter 3. Particle Model of Matter	1. Organisation continued 2. Bioenergetics 3. Quantitative Chemistry 4. Atomic Structure	1. Bioenergetics continued 2. Chemical Changes 3. Forces and motion	1. Ecology 2. Chemical Changes continued 3. Forces and Motion continued	1. Ecology continued 2. Chemical Analysis 3. Forces and Motion continued	1. Infection and Response 2. Energy Changes 3. Waves
Ethos links	1. **STEM** - explaining how the body works, how tech can be used to treat coronary heart disease 2. **STEM**- how materials behave, uses of polymers, what causes the properties of a substance (melting point, conductivity etc), uses and applications of nanotechnology **Sust.** – Environmental implications of nanotechnology 3. **STEM** – explaining observations	1. **STEM** - explaining how the body works, how tech can be used to treat coronary heart disease 2. **STEM –** Understanding the human body 3. **STEM** – calculations 4. **STEM** – Theories and models developing over time due to technological advances. Radioactive decay and nuclear fusion/fission	**1. STEM –** Understanding the human body **2. STEM** – extracting metals for use. **Sust.** – Using resources from the Earth sustainably. **3. STEM –** understanding stopping distances and linking this to transport **MK** – Calculating speed of journeys around the city	1. **STEM** – waste management, using farming techniques to improve food security, the role of biotechnology in meeting demands of the growing population. **Sust.** – maintaining biodiversity, materials cycling, food security, sustainable fishing 2. **STEM** – extracting metals for use. **Sust.** – Using resources from the Earth sustainably. 3. **STEM –** understanding stopping distances and linking this to transport **MK** – Calculating speed of journeys around the city	**1. STEM** – waste management, using farming techniques to improve food security, the role of biotechnology in meeting demands of the growing population. **Sust.** – maintaining biodiversity, materials cycling, food security, sustainable fishing **2. STEM** – using instrumental methods to identify compounds in drugs testing etc. design of formulations for a purpose	**1. STEM** – preventing disease, drug development **2. STEM** – What is happening in a chemical reaction. **Sust.** Using hydrogen fuel cells **3. STEM** – using waves to detect or explore, how lenses are used to improve vision, uses of the EM in communication, medicine and investigation
Knowledge	By the end of this unit students will know and understand: <u>Organisation</u> - How cells, tissues, organs and organ systems are arranged - The structure and function of the digestive system - What enzymes are, how they work and what they are used for, and factors affecting enzymes, including carbohydrases, amylase, proteases and lipases, the products of digestion and what they are used for	By the end of this unit students will know and understand: <u>Organisation Continued</u> - How cells, tissues, organs and organ systems are arranged - The structure and function of the digestive system - What enzymes are, how they work and what they are used for, and factors affecting enzymes, including carbohydrases, amylase, proteases and lipases, the products of digestion and what they are used for	By the end of this unit students will know and understand: <u>Bioenergetics</u> - The photosynthetic reaction, both word and symbol - The factors affecting the rate of photosynthesis, and how these can be controlled to give maximum growth and maximum profit - How to measure the rate of photosynthesis - How plants use glucose - The equations for aerobic and anaerobic respiration, and the similarities and	By the end of this unit students will know and understand: <u>Ecology</u> - What an ecosystem is, and how organisms interact and compete - The biotic and abiotic factors that can affect a community in an ecosystem - How organisms are adapted to live in their habitat - The levels of organisation and how this relates to feeding relationships - How to measure the population size of a species in a habitat through sampling - How carbon and water are cycled through an ecosystem - The impact of environmental changes on the distribution of species in an ecosystem - What is meant by biodiversity and why it is important	By the end of this unit students will know and understand: <u>Ecology</u> - What an ecosystem is, and how organisms interact and compete - The biotic and abiotic factors that can affect a community in an ecosystem - How organisms are adapted to live in their habitat - The levels of organisation and how this relates to feeding relationships - How to measure the population size of a species in a habitat through sampling	By the end of this unit students will know and understand: <u>Infection and Response</u> - How diseases are caused and spread by viruses, bacteria, protists and fungi, and consequently how the spread can be reduced - The causes, symptoms, prevention and methods of spread of the viral diseases measles, HIV and tobacco mosaic virus - The causes, symptoms, prevention and methods of spread of the bacterial diseases salmonella and gonorrhoea. - The causes, symptoms, prevention and methods of spread of the fungal disease rose black spot - The causes, symptoms, prevention and methods of spread of the protist disease malaria.

	- The role of bile in digestion - The structure of the heart and lungs, including adaptations - The three different types of blood vessel and how their structure relates to function - The composition of blood and the function and adaptation of each component - The causes of coronary heart disease and how this can be treated - Causes of ill health (communicable and non-communicable disease and lifestyle factors) and how different types of disease interact - Types of cancer and how lifestyle factors can affect risk - Plant tissues and how the structure is related to the function <u>Bonding, Structure and the Properties of Matter</u> - How atoms form chemical bonds through transfer or sharing of electrons - How ionic, covalent and metallic bonds are formed - The properties of ionic compounds and how these relate to the structure - The properties of solids, liquids and gases and how these relate to the strength of forces between the particles of the substance - How to use state symbols in an equation	- The role of bile in digestion - The structure of the heart and lungs, including adaptations - The three different types of blood vessel and how their structure relates to function - The composition of blood and the function and adaptation of each component - The causes of coronary heart disease and how this can be treated - Causes of ill health (communicable and non-communicable disease and lifestyle factors) and how different types of disease interact - Types of cancer and how lifestyle factors can affect risk - Plant tissues and how the structure is related to the function <u>Bioenergetics</u> - The photosynthetic reaction, both word and symbol - The factors affecting the rate of photosynthesis, and how these can be controlled to give maximum growth and maximum profit - How to measure the rate of photosynthesis - How plants use glucose - The equations for aerobic and anaerobic respiration, and the similarities and differences between them. Including the fermentation of yeast. - How the body responds to exercise in terms of	differences between them. Including the fermentation of yeast. - How the body responds to exercise in terms of heart rate, breathing rate and breath volume - How the body metabolises lactic acid (HT) - What is meant by metabolism, and the importance of sugars, amino acids, fatty acids and glycerol. <u>Chemical Changes</u> - The reactions of metal with oxygen, including the terms oxidation and reduction - The reactivity series and how this relates to a metal's tendency to form a positive ion and their reactions with water and acid. - The extraction of metals by reduction of oxides - Oxidation and reduction in terms of electrons (HT) - How acids react with metals, forming salt and hydrogen - The neutralisation of acids to produce a salt and water, or a salt, water and carbon dioxide - How to make soluble salts - The pH scale, including the ions present in acids and alkalis, and how they react with each other - The difference between strong and weak acids, and some examples of each (HT)	- How waste is managed to reduce pollution - The effects of human population on land use, leading to deforestation and global warming - Strategies to maintain biodiversity - How we can fish sustainably - The role of biotechnology in meeting the demands of the growing population <u>Chemical Changes</u> - The reactions of metal with oxygen, including the terms oxidation and reduction - The reactivity series and how this relates to a metal's tendency to form a positive ion and their reactions with water and acid. - The extraction of metals by reduction of oxides - Oxidation and reduction in terms of electrons (HT) - How acids react with metals, forming salt and hydrogen - The neutralisation of acids to produce a salt and water, or a salt, water and carbon dioxide - How to make soluble salts - The pH scale, including the ions present in acids and alkalis, and how they react with each other - The difference between strong and weak acids, and some examples of each (HT) - How electrolysis works, including molten and aqueous compounds, predicting the products formed, as well as how it is used to extracted metals - How to represent the reactions of electrolysis with half equations <u>Forces and Motion</u> - The difference between scalar and vector quantities, and some examples of each - Contact and non-contact forces, and some examples of each - The force of weight and how it is calculated	- How carbon and water are cycled through an ecosystem - How temperature, water and oxygen affect the rate of decay of biological material (triple only) - The impact of environmental changes on the distribution of species in an ecosystem - What is meant by biodiversity and why it is important - How waste is managed to reduce pollution - The effects of human population on land use, leading to deforestation and global warming - Strategies to maintain biodiversity - How we can fish sustainably - The role of biotechnology in meeting the demands of the growing population <u>Chemical Analysis</u> - What pure substance and formulations are - What chromatography is and how it works - How to test for hydrogen, oxygen, carbon dioxide and chlorine gas <u>Force and Motion continued</u> - The difference between scalar and vector quantities, and some examples of each - Contact and non-contact forces, and some examples of each - The force of weight and how it is calculated - What is meant by resultant force and how to calculate it and represent it with a free body diagram	- Human defence systems such as skin, nose, trachea, bronchi, stomach, and how white blood cells help to defend against pathogens by phagocytosis, antibodies and antitoxins - The use of vaccination and antibiotics to prevent and treat disease, alongside painkillers which can treat symptoms of disease. - The stages of discovery and development of new drugs, from plants and microorganisms (digitalis, aspirin, penicillin) and synthesis in the pharma industry. <u>Energy Changes</u> - The terms endothermic and exothermic, how temperature changes and some examples of each type of reaction - What is meant by activation energy, and how this is represented on a reaction profile of an exothermic and endothermic reaction - How energy is transferred when breaking or making bonds, and how this results in the overall energy change <u>Waves</u> - The properties of transverse and longitudinal waves and their motion - What is meant by frequency and period of a wave, and how to calculate frequency, period and speed of a wave - The electromagnetic spectrum, and how electromagnetic waves travel and refract and the properties and uses of some electromagnetic waves -

	- The properties of simple covalent structures and how these relate to the structure - How polymers are formed and how their structure is represented by a diagram - The properties of diamond, graphite and silicon dioxide, and how these relate to their structure - The properties of metals and alloys and how these relate to their structure - The properties and uses of graphene ad fullerenes, and how these relate to their structure - Uses and properties of nanoparticles <u>Particle Model of Matter</u> - What is meant by density, how to calculate it and how to find the density of regular and irregular objects - The conservation of mass when applied to changes of state - Internal energy and how this is changes with temperature - What is meant by specific heat capacity and how it is calculate - What is meant by specific latent heat and how it is calculated - Particle motion in solids, liquids and gases -	heart rate, breathing rate and breath volume - How the body metabolises lactic acid (HT) - What is meant by metabolism, and the importance of sugars, amino acids, fatty acids and glycerol. <u>Quantitative Chemistry</u> - The conservation of mass - Relative formula mass and how to calculate percent by mass - Why reactions might appear to involve a change in mass - What is meant by a mole and how this relates to atoms, molecules, ions, compounds and equations (HT) - What is represented in a balanced symbol equation (HT) - How the amount of reactant/product in a reaction is calculated (HT) - What is meant by limiting reactant and why they are used - What is meant by concentration - <u>Atomic Structure (phys)</u> - The structure of an atom and its approximate size - How to calculate the number of protons, neutrons and electrons in an atom - What is meant by isotope, and how ions are formed - The development of the model of the atom and what led to the changes	- How electrolysis works, including molten and aqueous compounds, predicting the products formed, as well as how it is used to extracted metals - How to represent the reactions of electrolysis with half equations <u>Forces and Motion</u> - The difference between scalar and vector quantities, and some examples of each - Contact and non-contact forces, and some examples of each - The force of weight and how it is calculated - What is meant by resultant force and how to calculate it and represent it with a free body diagram - What is meant by work done - The equation linking force with spring constant and extension and how to use it - What causes pressure in fluids and how it is calculated using p=F/A and p=hρg - What causes atmospheric pressure - Distance and displacement and use them to calculate speed and velocity - The distance-time relationship and how this is shown on a graph - Acceleration and how to use equations linking to it (a=Δt/v) and v^2-u^2=2as - Velocity time graphs and calculations to find acceleration and distance travelled	- What is meant by resultant force and how to calculate it and represent it with a free body diagram - What is meant by work done - The equation linking force with spring constant and extension and how to use it - What causes pressure in fluids and how it is calculated using p=F/A and p=hρg - What causes atmospheric pressure - Distance and displacement and use them to calculate speed and velocity - The distance-time relationship and how this is shown on a graph - Acceleration and how to use equations linking to it (a=Δt/v) and v^2-u^2=2as - Velocity time graphs and calculations to find acceleration and distance travelled - Newton's first law and how this affects motion - Newton's second law and the equation F=ma - Newton's third law - What is meant by stopping distance and factors affecting it - What momentum is and how to calculate it -	- What is meant by work done - The equation linking force with spring constant and extension and how to use it - What causes pressure in fluids and how it is calculated using p=F/A and p=hρg - What causes atmospheric pressure - Distance and displacement and use them to calculate speed and velocity - The distance-time relationship and how this is shown on a graph - Acceleration and how to use equations linking to it (a=Δt/v) and v^2-u^2=2as - Velocity time graphs and calculations to find acceleration and distance travelled - Newton's first law and how this affects motion - Newton's second law and the equation F=ma - Newton's third law - What is meant by stopping distance and factors affecting it - What momentum is and how to calculate it	

			- Why some atoms are radioactive, and how this is measured - The three types of nuclear radiation; alpha, beta and gamma, and their range in air, penetrative ability and ionising power - How to write nuclear equations showing alpha and beta decay - Half life, and how to determine it from given information, including graphs - Radioactive contamination and irradiation -		- Newton's first law and how this affects motion - Newton's second law and the equation F=ma - Newton's third law - What is meant by stopping distance and factors affecting it - What momentum is and how to calculate it -								
Key vocabulary	Enzyme Artery Vein Capillary Plasma Communicable Immune system Cancer Mesophyll Xylem Phloem Meristem Stomata	Ionic Covalent Metallic Alloy Chemical bond Nanoparticle Fullerene Diamond Graphite Silicon dioxide Giant lattice	Photosynthesis Limiting Factor Respiration Aerobic Anaerobic Fermentation Metabolism	Relative formula mass Mole Concentration Equation Volume Uncertainty Percentage yield Atom economy Titration	Photosynthesis Limiting Factor Respiration Aerobic Anaerobic Fermentation Metabolism	Acid Alkali Electrolysis Oxidation Reduction Displacement Ion Titration Anode Cathode Anion Cation	Community Ecosystem Abiotic Biotic Extremophile Decomposition Biodiversity Peat Trophic Biomass Biotechnology Mycoprotein Decomposer	Acid Alkali Electrolysis Oxidation Reduction Displacement Ion Titration Anode Cathode Anion Cation	Resultant force Scalar Vector Velocity Acceleration Displacement Elasticity Moments Levers Pressure Momentum	Community Ecosystem Abiotic Biotic Extremophile Decomposition Biodiversity Peat Trophic Decomposer Biomass Biotechnology Mycoprotein	Formulation Qualitative Quantitative Spectroscopy Precipitation Chromatography	Virus Bacteria Protist Fungi Pathogen Phagocytosis Antibiotic Antibodies Monoclonal Symptom	Exothermic Endothermic Reaction Profile Activation energy Catalyst Fuel cell	Transverse Longitudinal Compression Rarefaction Amplitude Frequency Period Wavelength Seismic Electromagnetic Concave Convex Black body Infrared
		Particle Latent heat Internal energy pressure	Alpha Beta Gamma Isotope Radioactive Irradiation Fusion Fission Decay Half-life		Resultant force Scalar Vector Velocity Acceleration Displacement Elasticity Moments Levers Pressure Momentum					Resultant force Scalar Vector Velocity Acceleration Displacement Elasticity Moments Levers Pressure Momentum				