Curriculum Mapping: Science

Vision Statement

Foundations of Science 	**We provide students with the foundational knowledge to help them understand the world focusing on the specific disciplines of Biology, Chemistry and Physics.**
Intellectual Readers 	**Students will have access to high quality texts relating to Science in the real world to expand their range of vocabulary and support with reading as a whole.**
Skilled Scientists 	**Create successful students who are able to use Science to explain what is occurring, predict how things will be behave and analyse causes through the development of experimental skills and techniques.**
Science Capital 	**Inspire students to ask 'why' and develop excitement and curiosity about Science in the world which we live.**

Science	**KS3 Endpoints**	**KS4 Endpoints**
Curriculum end points:	**Students will be able to:**	
	Biology Develop an understanding of how living organisms are built and function to enable successful survival in the world. Link learning to Sport and Technology to appreciate the need for healthy living and exercise. Appreciate how features are passed from one generation to the next to shape life on earth.	**Biology** Build an in depth understanding in key biological concepts such as cellular structure and metabolism, organisation and key chemical reactions such as respiration and photosynthesis, infection and response, control of internal conditions using nerves and hormones, inheritance and the basics of DNA and genes and how this links to the theory of evolution. Apply this knowledge to examination questions and real-world phenomena.
	Chemistry Develop an awareness of the periodic table, the elements within and how they react simply. Model simply how particles behave in relation to their properties, including how to use simple practical techniques such as filtering and chromatography. Familiarisation of real-world acids and alkalis and their applications. Link learning from geography to become aware of the earth's resources and how the climate can change.	**Chemistry** Build an in depth understanding in key chemical theories linked to atomic structure, bonding, quantitative and qualitative chemistry, chemical and energy changes, rates of reaction, organic chemistry and development of the Earth's atmosphere and use of resources. Apply this knowledge to examination questions and real-world phenomena.
	Physics Develop an understanding of how the physical world works to explain real world observations such as forces, electricity and magnetism. Link learning with Geography and real-world current events to appreciate the use of resources across the world. Also link learning to technology projects to build electrical circuits and key theories.	**Physics** Build an in depth understanding of key theoretical concepts such as energy, electricity, particle model, atomic structure, forces, waves, magnetism and in separate physics space. Apply this knowledge to examination questions and real-world phenomena.
	Practical Skills Develop an awareness of safety e.g., Bunsen burner licence, and laboratory rules. Familiarisation of basic laboratory equipment and techniques, including following a method. Know how to record data and process this to form visual representations. Use given formulae with confidence to solve simple problems.	**Practical Skills** Select and use appropriate equipment to plan an investigation to obtain valid results. Process the data obtained to present outcomes appropriately and draw relevant conclusions. Link and transfer skills used to real-world applications. Recall, apply and rearrange formulae to solve more complex problems.

Science	Year 7	HT1	HT2	HT3	HT4	HT5	HT6
	Curriculum Related Expectation	**Biology** Students can recall the parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Students to understand the role of muscles and joints in movement and use diagrams to predict the result of contraction or relaxation of muscles. **Keywords** Joints, bone marrow, ligaments, tendons, cartilage, antagonistic, muscle pair.	**Biology** Students can recall that all multicellular organisms are made up of cells. Students to compare the structure of plant and animal cells and the function of different structures within them. Students to study a select few specialised cells and their function within the organism. Students to learn the key parts of a microscope and use to observe cells. **Keywords** Cell, multi-cellular, organ, structural adaptations, nucleus, mitochondria, chloroplast, cell membrane, vacuole, cell wall, cytoplasm, immune system, digestive system, respiratory system, reproductive system, circulatory system, muscular skeletal system.		**Biology** Students to understand that organisms in a food web depend on each other and can describe how a species' population changes as its predator or prey population changes and what factors can affect this such as disease and competition for resources. **Keywords** Food web, food chain, ecosystem, environment, population, producer, consumer, decomposer.	**Biology** Students to label reproductive organs in plants and describe how plants reproduce both sexually and asexually. Students introduced to the gametes in plants and what happens during fertilisation. Students to describe the different methods of seed dispersal, the importance of dispersal and adaptations of the plants. **Keywords** Pollen, ovules, pollination, fertilisation, seed, fruit, carpel.	
		Chemistry Students can use the particle model to describe how particles are arranged and the changes which occur when moving between the three states of matter. Students to make observations of changing state and describe in terms of energy. Students to apply their knowledge to unfamiliar situations including gas pressure and real-life examples. **Keywords** Gas pressure, density, evaporate, boil, condense, melt, particle, freeze, particle model, sublime, diffusion.	**Chemistry** Students to use knowledge of particle diagrams to distinguish between pure substances and mixtures and identify the correct method to separate the mixture based on the physical properties. Students to use separation techniques using basic laboratory apparatus to separate mixtures. **Keywords** Solute, solvent, solution, dissolve, solubility, soluble, mixture, pure substance, distillation, filtration, chromatography, evaporation.	**Chemistry** Students to compare the properties of metals and non-metals. Students to recall the only magnetic elements are iron, nickel and cobalt and the only elements which are liquids at room temperature are mercury and bromine. Students to describe the different chemical reactions including oxidation and displacement. **Keywords** Metals, non-metals, displacement, oxidation.		**Chemistry** Students to become familiar with the pH scale and ability to identify the pH of acids, alkalis and neutral solutions including the observations made using universal indicator and associated colours for each acidic, alkaline and neutral substances. Students to describe how a neutral solution can be made via neutralisation reactions and applications of neutralisation reactions. **Keywords** pH, indicators, base, concentration.	**Chemistry** Students to describe the layers of the Earth and the different types of rocks which can be linked through the rock cycle. Students to explain properties of rocks linked to structures and provide examples as well as applications. Students to describe the different methods of weathering and erosion. **Keywords** Rock cycle, weathering, erosion, minerals, sedimentary rock, igneous rock, metamorphic rock, strata.
		Physics Students are to demonstrate an understanding of resultant forces to allow them to describe how the speed of an object varies. Students to use the formula (speed = distance / time) to calculate speed and illustrate using distance-time graphs. **Keywords** Acceleration, speed, average speed, relative motion.		**Physics** Students can describe the difference between mass and weight and calculate weight dependant on the gravitational field strength which changes on different planets. Students to explore how their weight or the weight of a fictional character changes on the moon and other planets however their mass remains constant as it is a measure of the amount of matter present. **Keywords** Weight, mass, non-contact force, gravitational field strength.	**Physics** Students to define current, potential difference and resistance and apply to electrical circuits. Students to draw circuit diagrams using the correct symbols and compare series and parallel circuits for particular uses. Students to use models and analogies to support the understanding of concepts such as resistance. **Keywords** Potential difference, charged up, resistance, electrostatic force, electrical conductor, electrical insulator, current, series, parallel, electrons.		**Physics** Students to compare energy content in food and energy transferred by different activities and the difference in energy requirements by individuals. Students to define renewable and non-renewable resources providing examples of each and advantages and disadvantages relating to cost, reliability and any detrimental effects on the environment. **Keywords** Power, energy resource, renewable, non-renewable, fossil fuels.
	Application of knowledge (Assessment)	**HT1 Summative assessment**		**HT3 Summative assessment**			**HT6 Summative assessment**
	Revision Strategy	• Flashcards • Mind-mapping for each topic • Look, cover, write, check					
	Wider links		World Science Day for Peace and Development National Tree Week	International Day of Women and Girls in Science	British Science Week World Water Day	Earth Day International Day for Biological Diversity	World Ocean's Day

Science	Year 8	HT1	HT2	HT3	HT4	HT5	HT6
	Curriculum Related Expectation	**Biology** Students to know that there is variation within individuals of the same species. Students to describe there are two types of variation, inherited and environmental and classify characteristics accordingly. Students will be introduced to the terms continuous variation and discontinuous and give examples. **Keywords** Species, variation, continuous variation, discontinuous variation.	**Biology** Students to label reproductive organs in humans and describe the stages in the development of a foetus. Students to identify stages within the menstrual cycle and explain where fertilisation is most likely to occur and what happens following fertilisation including the role of the placenta and transfer of substances from mother to baby. **Keywords** Gamete, fertilisation, ovary, testicle, oviduct, uterus, ovulation, menstruation, reproductive system, penis, vagina, foetus, gestation, placenta, amniotic fluid, umbilical cord.	**Biology** Students to build on their knowledge of organ systems and delve deeper into the respiratory system to describe the physical mechanism of breathing and the changes which occur during inhalation and exhalation. Students to describe the adaptations within the body for efficient gas exchange and what factors may affect this. **Keywords** Breathing, trachea, bronchi, bronchioles, alveoli, ribs, diaphragm, lung volume.	**Biology** Students to know that our body needs a balanced diet and the function of each food group. Students to label the organs within the digestive system and how they are adapted to break large molecules down to enable them to be absorbed into our blood. Students to describe the impact on the body of unbalanced diets and the effects of malnutrition. **Keywords** Enzymes, dietary fibre, carbohydrates, lipids, protein, stomach, small intestine, large intestine, gut bacteria.	**Biology** Students to recall word equations for both aerobic and anaerobic respiration and link to specific activities. Students to understand the difference between the physical process of breathing and the chemical process of respiration. Students to describe the process of fermentation and the difference in products in animals compared to plants or yeast. **Keywords** Aerobic respiration, anaerobic respiration, fermentation.	**Biology** Students to understand that plants synthesise glucose through photosynthesis and recall the word equation. Students to identify the reactants and products in the word equation and recognise the relationship with aerobic respiration. Students to be aware of the conditions which affect the rate of photosynthesis. **Keywords** Fertilisers, photosynthesis, chlorophyll, stomata.
		Chemistry Students to build on their understanding of our solar system from KS2 to describe the structure of our universe with reference to the different planets, moons and other satellites which allow space exploration. Students to explain days, year length and seasons using their knowledge of the earth being tilted on its axis and orbit of the sun. **Keywords** Galaxy, light year, stars, orbit, exoplanet.	**Chemistry** Students to understand how elements are arranged in the periodic table with reference to groups and periods. Students to recall the names of the key groups including the alkali metals, the halogens and the noble gases. Students to describe the reactivity of group 1 and 7 including the observations of group 1 with water and displacement reactions for group 7. **Keywords** Periodic table, physical properties, chemical properties, groups, periods.	**Chemistry** Students to distinguish between elements, compounds and mixtures using particle diagrams. Students to understand that elements can react to form compounds which are named based on the elements present. Students to investigate the formation of compounds, recording observations and constructing word equations. **Keywords** Elements, atom, molecules, compound, chemical formula, polymer.		**Chemistry** Students to understand exothermic and endothermic reactions giving examples for each and real-life applications. Students carry out investigations using laboratory apparatus to make observations and interpret data to classify reactions as exothermic or endothermic. **Keywords** Catalysts, exothermic reaction, endothermic reaction, chemical bond.	**Chemistry** Students to understand different types of chemical reactions and their products including combustion and thermal decomposition. Students to demonstrate an understanding of conservation of mass and that no atoms can be created or destroyed. Students to construct word equations where given reactants and products. **Keywords** Fuel, chemical reaction, physical change, reactants, products, conserved.
		Physics Students to compare energy content in food and energy transferred by different activities and the difference in energy requirements by individuals. Students to define renewable and non-renewable resources providing examples of each and advantages and disadvantages relating to cost, reliability and any detrimental effects on the environment. **Keywords** Power, energy resource, renewable, non-renewable, fossil fuels.	**Physics** Students to recall the different forms of energy and describe energy transfers within a system and identify useful and wasted energy transfers. Students to represent energy transfers in a system using energy transfer diagrams. **Keywords** Thermal energy store, chemical energy store, kinetic energy store, gravitational potential energy store, elastic energy store, dissipated.	**Physics** Students to describe how sound travels as waves through different mediums and explain why sound is unable to travel in a vacuum. Students to label the key parts of a wave and compare the amplitude and frequency of sound waves from a diagram. **Keywords** Vibration, longitudinal wave, volume, pitch, amplitude, wavelength, frequency, vacuum, oscilloscope, absorption, auditory range, echo.	**Physics** Students to describe how light travels as waves and compare to sound waves studied previously. Students to draw ray diagrams to show how light waves travel and observations where light reflects and refracts when entering and leaving mediums of different densities. **Keywords** Incident ray, reflected ray, normal line, angle of reflection, angle of incidence, refraction, absorption, scattering, transparent, translucent, opaque.	**Physics** Students to sketch forces on a diagram and determine resultant forces allowing them to identify whether objects are in equilibrium. Students to describe the effect of forces on an object's form and carry out an investigation on Hooke's Law. **Keywords** Equilibrium, deformation, linear relationship, newton, resultant force, friction, tension, compression, contact force.	
	Application of knowledge (Assessment)	**HT1 Summative assessment**		**HT3 Summative assessment**			**HT6 Summative assessment**
	Revision Strategy	• Flashcards • Mind-mapping for each topic • Look, cover, write, check					
	Wider links		World Science Day for Peace and Development National Tree Week	International Day of Women and Girls in Science	British Science Week World Water Day	Earth Day International Day for Biological Diversity	World Ocean's Day

	Year 9	HT1	HT2	HT3	HT4	HT5	HT6
Science	Curriculum Related Expectation	**Biology** Students to use the theory of natural selection to explain how species evolve over time. Students to use evidence to explain why a species may have become extinct and the importance of biodiversity in maintaining populations. **Keywords** Population, natural selection, extinct, biodiversity, competition, evolution.	**Biology** Students to apply their knowledge of variation to understand genetic variation and how characteristics are inherited from parents during sexual reproduction. Students to refer to male and female gametes from the human reproduction topic when describing sexual reproduction. **Keywords** Inherited characteristic, DNA, chromosome, gene.			**Biology** Students to be able to describe the structure of animals from cells to organism including adaptations of the respiratory and circulatory systems. Students to understand respiration and other chemical reactions which take place in the human body. Students to describe the risk factors for non-communicable diseases including CHD. **Keywords** Eukaryotic, cells, organelles, tissue, trachea, alveoli, capillaries, atrium, ventricles, arteries, veins, communicable, non-communicable, health, disease.	
		Chemistry Students to understand the impact human activities have on the Earth. Students to give examples of greenhouse gases and describe how global warming can impact climate and local weather patterns. **Keywords** Global warming, fossil fuels, carbon sink, greenhouse effect.	**Chemistry** Students to be aware of limited number of resources and how these can be extracted from their ores with various methods depending on their reactivity. Students to explain the importance of recycling these resources. **Keywords** Natural resources, minerals, ore, extraction, recycling, electrolysis.			**Chemistry** Students to define elements, compounds and mixtures and describe different separation techniques. Students to describe the structure of an atom and how this has developed over the years. Students to compare the structure of different atoms in terms of subatomic particles as well as different forms of the same element with reference to isotopes. **Keywords** Element, compound, mixture, distillation, crystallisation, chromatography, filtration, protons, electrons, neutrons, nucleus, plum pudding model, nuclear model, alpha particle, isotope.	
		Physics Students to understand that pressure increases with depth in a fluid and an object will sink or float depending on weight and upthrust. Students to calculate pressure where the force and area is known. Students to describe the changes in atmospheric pressure at different altitudes. **Keywords** Fluid, pressure, upthrust, atmospheric pressure.	**Physics** Students to recall magnetic materials and what factors affect the strength of the magnetic field. Students to describe how an electromagnet can be made and compare with bar magnets in terms of their properties and uses. **Keywords** Magnetic force, magnetic poles, permanent magnet, electromagnet, solenoid, core.	**Physics** Students describe how work is done when an object is moved by forces and compare the work needed at different distances. Students to apply the equation (work done = force x distance) to calculate the work done or rearrange to determine the force or distance. **Keywords** Work, lever, input force, output force, displacement, deformation. Students to compare different methods of transferring thermal energy and explain how thermal insulation works to oppose these with reference to reducing heat loss in the home. **Keywords** Thermal conductor, thermal insulator, temperature, thermal energy, conduction, convection, radiation.	**Physics** Students to describe how waves travel to transfer energy and the differences in damage done to cells due to different frequencies. Students to use physical models of waves to allow visualisation and describe the properties of longitudinal and transverse waves. **Keywords** Ultrasound, ultraviolet, microphone, loudspeaker, pressure wave, waves, transverse, longitudinal, transmission.		**Physics** Students to describe the arrangement and movement of particles in the three states of matter. Students to define internal energy as the sum of kinetic energy and potential energy of all particles within a system. Students to define specific latent heat and specific heat capacity including the investigation of the specific heat capacity of different metals. Students to calculate density for regular and irregular objects using mass and volume. **Keywords** Solid, liquid, gas, particle model, kinetic energy, melting, freezing, evaporation, condensation, sublimation, heating curve, cooling curve, internal energy, specific latent heat, specific heat capacity.
	Application of knowledge (Assessment)	**HT1 Summative assessment**		**HT3 Summative assessment**			**HT6 Summative assessment**
	Revision Strategy	• Flashcards • Mind-mapping for each topic • Look, cover, write, check				• Flashcards • Mind-mapping for each topic • Look, cover, write, check • Exam questions	
	Wider links		World Science Day for Peace and Development National Tree Week *North Star Science School*	International Day of Women and Girls in Science	British Science Week World Water Day	Earth Day International Day for Biological Diversity	World Ocean's Day

	Year 10	HT1	HT2	HT3	HT4	HT5	HT6
Science	Curriculum Related Expectation	**Biology** Students to describe the adaptations of the digestive system including the role of digestive enzymes in the breaking down of food and the importance of digestion to ensure nutrients can be absorbed into the bloodstream. Students to refer to optimum conditions for enzyme activity and investigate the effect of pH and temperature. Students to describe the food tests and observations which would be made in the presence of starch, glucose, lipids and protein. **Keywords** Digestion, villi, diffusion, active transport. Enzymes, denaturation, optimum pH, optimum temperature, starch protein, glucose, lipids, amylase, protease, lipase, amino acids, fatty acids, glycerol.	**Biology** Students to describe the different pathogens and how they cause disease in animals referring to symptoms and treatments for common diseases including measles, malaria, gonorrhoea and HIV. Students to compare communicable and non-communicable diseases looking in greater depth at cancer and linking with the different stages of the cell cycle. Students to explain how vaccines and antibiotics work as well as the development of drugs including the use of placebos and double-blind trials. **Keywords** Pathogen, disease, bacteria, virus, fungi, protist, vector, lymphocytes, phagocytes, phagocytosis, engulf, communicable, non-communicable, antibiotic, vaccine, painkiller, placebo, double blind trial, toxins, antitoxins.	**Biology** Students to be able to describe the structure of plants with reference to cells and using their prior knowledge of microscopy from KS3 to observe plant cells and apply the equation (magnification = image size / actual size). Students to describe specialised cells within plants including root hair cells, palisade cells relating to functions such as photosynthesis. Students to apply their knowledge of transport of substances to plants and investigate osmosis including identification of variables and interpretation of results. **Keywords** Photosynthesis, palisade, chloroplast, chlorophyll, magnification, xylem, phloem, transpiration, translocation, osmosis, isotonic, hypertonic, hypotonic, turgid, flaccid.	**Biology** Students to deepen their understanding of photosynthesis in plants through the study of factors which affect the rate of photosynthesis and complete an investigation on light intensity. Students to apply their knowledge of pathogens and disease from the animal topic to plants and understand plant diseases including Rose Black Spot and Tobacco Mosaic Virus. **Keywords** Photosynthesis, limiting factors, light intensity, concentration, rate, pathogen, disease, virus, fungi, spores.	**Biology** Students to explain that homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function and recall the internal conditions which need to be controlled including temperature, water levels and blood glucose concentration. Students to describe the adaptations of a nerve cell for its specific function. Students to explain how the structure of the nervous system is adapted and how information is passed from receptors to the CNS. **Keywords** Homeostasis, regulation, optimum, central nervous system (CNS), brain, spinal cord, stimulus, receptor, coordinator, effector, response, muscle, sensory neurone, relay neurone, motor neurone, synapse, neurotransmitter, diffusion.	**Biology** Students to describe the principles of hormonal coordination and control by the endocrine system and control of blood glucose levels relating to diabetes. Students to describe the roles of hormones in human reproduction and evaluate different methods of contraception including condoms and contraceptive pill. Students to explain the use of hormones in fertility treatments to stimulate egg maturity and release. Students to evaluate IVF and embryonic screening. **Keywords** Homeostasis, regulation, optimum, blood glucose, diabetes, insulin, pancreas, gland, hormone, contraception.
		Chemistry Students to demonstrate a clear understanding of the layout of the periodic table with focus on key groups including alkali metals, halogens and noble gases. Students to compare the typical properties of metals and non-metals and link the properties to uses. Students to describe how elements are placed in the periodic table based on their atomic number and in appropriate groups based on properties and how the periodic table has changed over time. **Keywords** Group, period, metal, non-metal, physical property, reactivity, alkali metal, halogen, noble gas.	**Chemistry** Students to describe and illustrate the three types of chemical bonding (covalent, ionic, metallic) giving examples for each. Students to predict physical properties based on the type of bonding present. Students to compare allotropes of carbon and the different uses based on their properties such as melting and boiling point, conductivity. Students to draw particle diagrams to represent the different states of matter and describe how changes of state occur. **Keywords** Covalent, ionic, metallic, physical property, delocalised electrons, dot-and-cross diagram, electrostatic force, intermolecular forces. Students to understand mass is conserved in all chemical reactions meaning no atoms can be gained or destroyed. Students to calculate concentration of solutions using mass and volume. **HT ONLY** Students to calculate the number of atoms of any substance present in one mole and use moles to determine predicted yield and limiting reagents. Students to apply their knowledge of moles to determine empirical formula and use relative formula mass to determine atom economy for a given reaction. **Keywords** Conservation of mass, reactants, products, concentration, volume, relative atomic mass, percentage yield, atom economy, moles, limiting reactant, empirical formula.	**Chemistry** Students to describe the reactivity of metals with oxygen, water and acids including the naming of the products using the correct nomenclature. Students to make observations and use them to determine the order of reactivity for different metals. Students to describe the reactivity series and how this can be used to distinguish the method of extraction. Students to investigate the pH scale and the reactivity of acids and alkalis in neutralisation reactions. Students to produce a soluble salt using a scientific method. **Keywords** Reactivity, oxidation, reduction, metal oxide, reactivity series, electrolysis, displacement, native, pH scale, acidic, alkaline, neutral, neutralisation, indicators, salt, filtration, crystallisation.	**Chemistry** Students to describe the process of electrolysis and the products of both molten and aqueous substances. Students to describe the movement of ions to the oppositely charged electrode. Students to describe the method of titration and how it can be used to determine unknown concentrations of solutions. Students to compare the use of pipettes for the measurement of fixed volumes and burettes for the measurement of variable volumes. **Keywords** Electrolysis, electrolyte, cathode, anode, discharged, oxidation, reduction, ions, titration, pipette, burette, indicator, neutralisation.	**Chemistry** Students to describe energy transfer in exothermic and endothermic reactions giving examples. Students to draw and label simple reaction profile diagrams and use to identify whether reactions are exothermic or endothermic. Students to calculate the energy transferred in a chemical reaction using bond energies and the overall energy change to determine whether a reaction is exothermic or endothermic. Students to describe the reactions which occur in fuel cells including the writing of half equations. **Keywords** Exothermic, endothermic, reactants, products, activation energy, overall energy change, bond energies, reaction profile, fuel cells.	**Chemistry** Students to describe how to calculate the rate of reaction and draw/interpret graphs of product or reactant against time. Students to describe the factors which affect the rate of reaction linking to the collision theory. Students to describe reversible reactions and how in a closed system equilibria will be reached where the forward rate is equal to the reverse rate. Students to describe the factors which affect the position of equilibrium including concentration, temperature and pressure. **Keywords** Rate, concentration, pressure, surface area, temperature, catalyst, activation energy, collision theory, reversible reaction, equilibrium, Le Chatelier's principle.
		Physics Students to describe the structure of an atom including the subatomic particles and where they are located. Students to compare different models of the atom and how they have been disproved over the years by different scientists with emphasis on the alpha particle scattering experiment by Ernst Rutherford using gold foil. Students to describe radioactive decay and the methods in which nuclear radiation can be emitted by as well as the materials which can block this. Students to construct nuclear equations and interpret graphs to determine half-lives. **Keywords** Protons, electrons, neutrons, nucleus, plum pudding model, nuclear model, alpha particle, isotope, alpha, beta, gamma, radioactive, decay, half-live, count rate, radioactive contamination, irradiation.	**Physics** Students to recall the different energy stores and how energy is transferred from one store to another. Students to apply formula to calculate gravitational potential, kinetic and elastic potential energy. Students should apply law of conservation of energy to determine useful and wasted energy transfers allowing the efficiency to be determined. Students should describe, giving examples, renewable and non-renewable resources and understand why some resources are more reliable than others as well as any environmental impact associated. **Keywords** Energy store, system, gravitational potential, elastic potential, kinetic, specific heat capacity, power, dissipation, efficiency, energy resource, renewable, non-renewable.	**Physics** Students to understand electrical current, resistance and potential difference and apply their knowledge to electrical circuits. Students to recall circuit symbols from KS3 and learn additional circuit symbols. Students to use the correct circuit symbols to construct circuit diagrams for series and parallel circuits. Students to describe how current, potential difference and resistance vary in series and parallel circuits and how to measure or determine these quantities. Students to highlight advantages for both series and parallel circuits. Students to investigate resistance in a circuit using both a variable resistor and through changing the length of a wire. **Keywords** Current, potential difference, resistance, series, parallel, ohmic conductor.	**Physics** Students to explain the difference between direct and alternating potential difference and that the mains electricity in the UK is an alternating current supply. Students to identify the colours in a three core cable used in mains electricity and explain the associated dangers. Students to describe the National Grid as a system linking power stations to consumers and explain why this is efficient at transferring energy. Students to distinguish between step up and step down transformers and their role in the National Grid. Students to describe the production of static electricity and how the transfer of electrons can be used to explain the phenomena of static electricity. **Keywords** Alternating current, direct current, live, earth, neutral, national grid, transformers, power, efficiency, static electricity.	**Physics** Students to describe contact and non-contact forces giving examples of each from KS3 including forces such as gravity and friction. Students to define and give examples of scalars and vectors. Students to use diagrams to represent resultant forces and calculate resultant forces in different scenarios. Students to describe the effect of forces on a spring and describe the difference between elastic deformation and inelastic deformation. Students to describe Hooke's Law and describe the relationship from a graph using the term directly and indirectly proportional. **Keywords** Scalar, vector, contact, non-contact, resultant force, stationary, acceleration, deceleration, stretch, compression, tension, deformation.	**Physics** Students to understand speed and velocity including how they can be calculated and the units for each. Students to use distance-time graphs to present data and determine the speed using the gradient. Students to compare distance-time graphs and velocity-time graphs and understand the differences in the data presented. Students to understand Newton's Laws and apply to different situations with reference to real life scenarios to aid understanding. Students to calculate momentum and to use the concept of momentum as a model to describe and explain examples of momentum in an event. **Keywords** Speed, velocity, distance-time graph, velocity-time graph, acceleration, deceleration, momentum.
	Application of knowledge (Assessment)		**PPE**		**PPE**		**PPE**
	Revision Strategy	• Flashcards • Mind-mapping for each topic • Exam questions including complete past papers • Walking talking mocks					
	Wider links			Rare Disease Day			

	Year 11	HT1	HT2	HT3	HT4	HT5	HT6
Science	Curriculum Related Expectation	**Biology** Students to describe the principles of hormonal coordination and control by the endocrine system and control of blood glucose levels relating to diabetes. Students to describe the roles of hormones in human reproduction and evaluate different methods of contraception including condoms and contraceptive pill. Students to explain the use of hormones in fertility treatments to stimulate egg maturity and release. Students to evaluate IVF and embryonic screening. **Keywords** Homeostasis, regulation, optimum, blood glucose, diabetes, insulin, pancreas, gland, hormone, contraception.	**Biology** Students to describe sexual and asexual reproduction with reference to meiosis and the formation of gametes. Students to recall the adaptations of gametes from previous teaching of specialised cells. Students to give examples of inherited and environmental variation. Students to describe how disorders such as cystic fibrosis and polydactyly can be inherited and use punnet square diagrams to illustrate probability. **Keywords** Sexual, asexual, gamete, meiosis, mitosis, variation, chromosome, allele, gene, heterozygous, homozygous, recessive, dominant, genotype, phenotype.	**Biology** Students to understand the theory of evolution by natural selection and evidence of early life form. Students to describe how DNA mutations can result in changes within a species which makes them more advantageous. Students to explain selective breeding and the impact on food plants and domesticated animals. Students to describe the process of genetic engineering and the potential benefits and risks. Students to understand cloning using cuttings from plants and adult cell cloning using embryos. Students to build on their knowledge of evolution and describe the work of Darwin and Wallace on the theory of speciation. **Keywords** Evolution, natural selection, mutation, selective breeding, inbreeding, genetic engineering, vector, cloning, tissue culture, cuttings, embryo, speciation, fossils, extinction, classification.	**Biology** Students to describe the different levels of organisation in an ecosystem and how abiotic and biotic factors might affect a community. Students to define and give examples of both abiotic and biotic factors. Students to explain the importance of the water and carbon cycle. Students to explain the importance of biodiversity and how humans impact this. Students to describe how the rapid growth of the human population affects the amount of waste produced and land available. Students to describe the differences between trophic levels of organisms within an ecosystem and describe pyramids of biomass. **Keywords** Community, ecosystem, abiotic, biotic, adaptations, population, sampling, quadrat, transect, carbon cycle, water cycle, decomposition, biodiversity, pollution, deforestation, global warming, trophic levels, biomass, sustainable, biotechnology.	**Revision and exam preparation.**	
		Chemistry Students to describe how crude oil is formed and how it can be separated into different fractions by fractional distillation. Students to define hydrocarbons and recall the formula and structure of the first four alkanes. Students to explain the importance of cracking to meet the demands of smaller hydrocarbons as fuels. Students to describe the products of cracking and comparison of alkanes and alkenes including the observation when added to bromine water. Students to describe the reactions of alkenes, alcohols and carboxylic acids and common uses. Students to demonstrate awareness of naturally occurring polymers and their purpose in everyday life. **Keywords** Crude oil, hydrocarbon, alkane, alkene, alcohol, carboxylic acid, saturated, unsaturated, fractional distillation, cracking, polymer.	**Chemistry** Students to describe the physical properties of pure substances including the recognition of a pure substance from melting point data or graph. Students to define formulations and give examples such as paint and medicines. Students to describe the method of chromatography and how it can be used to separate mixtures and calculate R_f values to compare to known values. Students to describe how to test for common gases including Oxygen, Hydrogen, Carbon Dioxide and Chlorine and the observation which would be made if they were present. Students to describe how to test for common metal ions using flame tests and non-metal ions including the reagents which are used and observations. **Keywords** Pure substance, mixture, formulation, chromatography, mobile phase, stationary phase, soluble, insoluble, precipitate.	**Chemistry** Students to describe the composition of today's atmosphere and compare to the Earth's early atmosphere and explain why the composition has changed. Students to explain the reduction in the level of carbon dioxide and increase in the level of oxygen in the atmosphere. Students to describe greenhouse gases giving examples of Methane, Carbon Dioxide and Water Vapour and describe how global warming contributes to climate change. Students to explain the impact of human activity such as deforestation on global climate change. **Keywords** Atmosphere, photosynthesis, greenhouse gas, greenhouse effect, global warming, climate change, deforestation.	**Chemistry** Students to distinguish between finite and renewable resources and describe sustainable development. Students to describe how to obtain potable water and treat waste water to remove harmful microbes. Students to compare the different methods of desalination including distillation and reverse osmosis. Students to describe the different stages of life cycle assessments and the importance of recycling to reduce the use of resources. Students to compare the uses of different materials based on their properties including alloys and ceramics. Students to apply Le Chatelier's principle to the Haber process and describe the compromised conditions to maximise yield. Students to describe how NPK fertilisers are formed and their importance. **Keywords** Finite, renewable, sustainable development, potable, filtration, sterilisation, distillation, desalination, reverse osmosis. aerobic, anaerobic, recycling, life cycle assessment, ores, phantomining, bioleaching, corrosion, alloys, corrosion, Haber process, equilibrium, NPK fertilisers.		
		Physics Students to understand speed and velocity including how they can be calculated and the units for each. Students to use distance-time graphs to present data and determine the speed using the gradient. Students to compare distance-time graphs and velocity-time graphs and understand the differences in the data presented. Students to understand Newton's Laws and apply to different situations with reference to real life scenarios to aid understanding. Students to calculate momentum and to use the concept of momentum as a model to describe and explain examples of momentum in an event. **Keywords** Speed, velocity, distance-time graph, velocity-time graph, acceleration, deceleration, momentum.	**Physics** Students to describe the difference between longitudinal and transverse waves giving examples for each. Students to label the key parts of both longitudinal and transverse waves on a diagram. Students to be familiar with the electromagnetic spectrum and how the properties of electromagnetic waves vary and their practical applications. Students to compare concave and convex lenses and describe what happens to the light rays as they pass through. Students to describe how colour is seen and define black body radiation with reference to both emission and absorption of infrared radiation. **Keywords** Longitudinal, transverse, electromagnetic spectrum, radio waves, microwaves, infrared, visible light, ultraviolet, x-rays, gamma, concave, convex, black body radiation, emission, absorption.	**Physics** Students to recall the three magnetic materials from KS3. Students to describe the difference between permanent and induced magnets. Students to draw the magnetic field pattern of a bar magnet showing how strength and direction change. Students to compare the geographic poles and the magnetic poles of the earth. Students to describe how the magnetic effect of a current can be demonstrated and explain how a solenoid arrangement can increase the magnetic effect of the current. Students to investigate how the number of coils affects the strength of an electromagnet. **Keywords** Magnetic, magnetic field, magnetic pole, geographic pole, current, core, coil, solenoid, electromagnet, motor, loudspeaker, microphone, transformer, generator effect.	**Physics** Students to describe our solar system and the formation of the sun. Students to describe the life cycle of a star and explain how fusion processes lead to the formation of new elements. Students to describe the red-shift as evidence supporting the Big Bang theory and explain how scientists are able to use observations to devise such theories. **Keywords** Solar system, planets, dwarf planets, moons, sun, satellites, nebula, protostar, red giant, white dwarf, black dwarf, supernova, neutron star, black hole, red-shift, galaxies.		
	Application of knowledge (Assessment)		**PPE**		**PPE**		
	Revision Strategy	• Flashcards • Mind-mapping for each topic • Exam questions including complete past papers • Walking talking mocks					