

Science Curriculum Overview – year 9

Year 9		HT1	HT2	HT3	HT4	HT5	HT6
Topic	9A Genetics and Evolution 9E Making Materials 9I Forces and Motion	9B Plant Growth 9F Reactivity 9J Force fields and Electromagnets	Recap of KS3 Biology, chemistry and Physics through lessons and projects	Recap of KS3 Biology, chemistry and Physics through lessons and projects	KS3 /4 Transition for Biology, Chemistry	KS3 /4 Transition for Physics	
subject	Why this and why now?	<p>9A – in year 7 and 8 students learn about adaptations and variation and this is extended in this unit to look at what happens if an organism does not adapt to changing environments</p> <p>9E- students apply what they know about different chemicals to learn how they are used to make new materials and how bonding affects the properties of materials</p> <p>9I –students develop their understanding of forces and energy to understand how these combine to make objects move</p>	<p>9B – in year 8 students learn how plants reproduce and in this unit students build on their knowledge of plants to learn about chemical reactions, plant adaptations and uses of plants in farming</p> <p>9F – previously in KS3 students have learnt about atoms and chemical reactions. In this unit students learn why chemical reactions happen and how different factors affect the rate of chemical reactions</p> <p>9J – students develop their knowledge of electricity, magnetism and gravity to compare different fields and their effects</p>	This is to ensure fundamental knowledge, skills and understanding from KS3 in year 7 and 8 is retained and any misconceptions are addressed. This will ensure mastery of the KS3 curriculum as topics are linked together for example exchange systems is linked to respiration	This is to ensure fundamental knowledge, skills and understanding from KS3 in year 7 and 8 is retained and any misconceptions are addressed. This will ensure mastery of the KS3 curriculum as topics are linked together for example exchange systems is linked to respiration	The Biology transition reviews the NC to ensure mastery of microorganisms as pathogens and cause of disease, especially virus life cycles, which uses Year 8 learning. Plus, students study the nervous endocrine systems, their differences and how they cause change building on body systems and ecosystems from Year 7. The chemistry transition builds upon prior learning of atoms, elements and compounds and the periodic table to look specifically at how atoms form ions and how this leads to chemical bond on ensuring mastery of word and symbol equations for chemical reactions and ensuring they know how to balance them as well as knowing what happens in a reaction and affecting factors.	The Physics transition unit extends knowledge of energy and forces using abstract models, comparing fields such as magnetic and gravitational, mathematical relationships between variables and cause and effect.
What is the essential knowledge that needs to be	9A - Causes of environmental variation, discontinuous and continuous variation, classification, inherited variation, normal distribution curves, discovery of DNA, DNA	9B - Chemical reactions in plants, aerobic respiration, rates of photosynthesis, adaptations of plants, products from plants, how farmers grow crops, how selective	Project – animal smuggling - endangered animals, conservation and preserving biodiversity Project – enzyme investigation – planning an	Periodic table Metals and non-metals, groups in the periodic table and trends and properties in groups Earth and atmosphere	Biology transition – communicable and non-communicable disease; viruses life cycles; stages of testing medicines, including placebo and double blind	Physics transition – difference in temperature and differences in potential energy and also density and pressure differences, fields in science such as magnetic	

<p>re membered ?</p>	<p>structure, importance of DNA, relationship between genes, chromosomes and DNA, extinction, competition, preserving biodiversity, Darwin's theory of evolution 9E- Know the properties of ceramics and how they are made, polymer structures and uses, how composite materials are made and uses, problems of making and using materials, recycling and materials 9I- Know how forces affect objects and the way they move, energy resources and how they are used to move things, energy stores and transfers, calculating speed, distance time graphs, increasing sizes of forces, turning forces and forces in equilibrium, work done and how machines magnify forces</p>	<p>breeding is carried out, problems caused by farming 9F- Know why explosions happen, review chemical and physical changes, gas pressure, compare the reactivity of metals, rusting and prevention of rust, energy from chemical reactions, exothermic and endothermic changes, displacement reactions, extracting metals from their ores 9JJ- Force fields, magnetic and gravitational, static electricity and its effects, current electricity and how it can be measured and controlled, resistance and how to calculate it, factors that affect resistance, how electricity can produce magnetism, electromagnets and their uses</p>	<p>investigation into the effect of enzymes on gelling agents Project – teeth – communicating cause of tooth decay to the public Separating substances Filtration, distillation, chromatography, particle model, states of matter and mixtures Chemical reactions Atoms, elements, compounds, writing equations, types of reaction, energy in reactions and speeding up reactions Physical and Chemical Reactivity series, acids and alkalis, indicators, neutralisation, reactions of acids and metals, properties of materials</p>	<p>Changing atmosphere, structure of the Earth, Earth resources and rock cycle Energy- Energy resources, energy stores and transfers, transferring energy by heating, paying for energy Forces- Forces around us, balanced and unbalanced forces, controlling forces, speed Waves and fields Describing waves, sound and light waves, gravitational and magnetic fields, electric fields Machines Work done, moments and levers, electricity, electromagnets and moments Students know how to plan, research and communicate a range of scientific projects.</p>	<p>trial; nervous and endocrine systems; nerves and hormones; population distribution and quadrat samples; diffusion and osmosis Chemistry transition – atomic structure and how atoms become ions; metallic bonding and ionic bonding including a comparison; chemical reactions including formula and balancing equations, affecting factors on reaction rates; endothermic and exothermic; reversible reactions.</p>	<p>fields and gravitational fields, exploring causation and correlation and how to establish cause and effect in science, variables in terms of mathematical relationships such as directly proportional and inverse proportional and how we use models in science to explore abstract concepts such as wave and particle models</p>
<p>What is the assessment intent and how will you assess?</p>	<p>Each unit is assessed using an end of topic assessment and this will address any misconceptions and the teacher will re teach areas that students have not fully understood either a full lesson or in the 'do now'</p>	<p>Each unit is assessed using an end of topic assessment and this will address any misconceptions and the teacher will re teach areas that students have not fully understood either a full lesson or in the 'do now'</p>	<p>KS3 Year 9 baseline from active learn for Biology, Chemistry and Physics this assessment will baseline acquired knowledge, skills and understanding from KS3 and allow us to highlight gaps and misconceptions that need to be overcome before KS4 curriculum is taught.</p>		<p>Biology and chemistry transition end of unit assessment and this will address any misconceptions and the teacher will re teach areas that students have not fully understood either a full lesson or in the 'do now'</p>	<p>Physics transition end of unit assessment and this will address any misconceptions and the teacher will re teach areas that students have not fully understood either a full lesson or in the 'do now'</p>
<p>What should the end point look like?</p>	<p>9A- Types and causes of environmental variation; explain classification problems; Identify types of inherited variation; explain variation via reproduction; identify normal distribution; describe DNA, its importance and the relationship between genes, chromosomes and DNA; explain extinction,</p>	<p>9B - Explain photosynthesis, its affecting factors, and respiration; describe plant feature adaptations for their functions; explain how substances enter and leave plants; explain how and why plants make different substances; explain the importance of nitrates; describe alterations in food supplies; explain creation of plant varieties; explain food production boosts;</p>	<p>Biology revision Cells, systems and movement- Identify parts the different cells; describe organ system functions; organisation of cells, tissues and organs; explain how muscles, ligaments and tendons work together to allow movement Exchange Systems- Describe and explain</p>	<p>Periodic table Identify on the periodic table where metals and non-metals, name and identify groups in the periodic table and describe the properties of groups in the periodic table Earth and atmosphere Describe how the atmosphere has changed over time, describe the</p>	<p>Biology transition – Give examples of different kinds of diseases and describe how they are caused, explain why there is no virus kingdom, describe how the nervous system works, describe how hormones affect the body, describe the stages of testing new medicines, describe the uses of control</p>	<p>Physics transition – Describe how temperature differences can cause convection currents, state the meanings of latent heat and specific heat capacity, use the formula for gravitational potential energy, model force fields using diagrams and interpret them, describe some examples of cause and</p>

	<p>adaptions, biodiversity and natural selection. 9E Identify ceramics and describe their uses and properties; name examples and uses of polymers, explain their properties and how they are made; explain, give examples and uses; explain thermal decomposition; explain exothermic and endothermic reactions; explain problems caused by making and using materials, describe recycling and explain the advantages of recycling 9I- Recall different types of forces, explain effects of balanced and unbalanced forces, explain why moving objects have a top speed, recall ways energy is stored and transferred, recall the law of conservation of energy, state what is meant by efficiency, describe meanings of speed and mean speed, use formula speed, distance and time, use distance time graphs, describe how a simple lever can multiply forces or distances, identify the load, effort and pivot on a diagram of a lever, factors that affect the size of a moment, explain why something will balance if moments are equal and opposite, describe how simple machines magnify forces, describe factors that affect total work done</p>	<p>recognise the advantages and disadvantages of different farming methods. 9F – Use particle theory to explain gas pressure; describe reactions of metals with water, dilute acids and air; explain metal placements in the reactivity series; explain physical barriers and sacrificial protection in rusting; describe test for oxygen; explain speeding up of combustion; classify changes as exothermic or endothermic; explain need for energy in some reactions; explain and predict displacement reactions.; explain metal extraction based on their reactivity; explain oxidation and reduction 9J – Meaning of force field; describe shape of a magnetic field; factors that affect strength and gravity; calculate weight and mass; effects of electrically charged objects; recall behaviour of current and describe voltage in series and parallel circuits; describe factors that affect resistance; use the formula relating voltage, current and resistance, describe an electromagnet and its field, its uses and change in strength.</p>	<p>nutrition through digestive system (animals) and photosynthesis (plants); describe a balanced diet; describe and explain gas exchange in the lungs (humans) and stomata (plants) and what causes damage. Reproduction and health Structure and function of parts of the reproductive system; structure and function of egg and sperm cells; describe human life cycles; structure and function of a plants reproduction system; explain the differences between stimulants and depressants and describe what is meant by a side effect of drugs. Energy in Ecosystems Describe leaf adaption for photosynthesis; define and explain cellular respiration; describe interdependence of animals in an ecosystem; analyse food chains and webs. Genetics and Evolution Describe and explain the relationship between genes, chromosomes and DNA; describe and explain asexual and sexual reproduction; describe adaptation and variation (continuous and discontinuous) and how variation can lead to natural selection; describe the term and importance of biodiversity. Chemistry revision and projects Separating substances Review the particle model</p>	<p>structure of the Earth, State the advantages and disadvantages of recycling and describe the rock cycle Project – carbon capture – research how we can deal with rising carbon dioxide levels by capturing carbon Project – Electrolysis – plan an investigation by selecting variables, describing controls and ensuring reliability and validity Project – Nanoparticles – communicate to the public how we use nanoparticles Physics revision and projects Models in science Model how the earth moves around the sun and how the moon moves around Earth, describe what makes up our solar system and describe what is meant by a galaxy and a light year Energy Identify energy resources as being renewable and non-renewable, describe energy transfers and explain different energy transfers by heating, describe and explain how we pay for electricity and calculate usage Forces Identify forces and use diagrams to show if forces acting on an object are balanced / unbalanced, describe pressure and calculate it and calculate speed Waves and fields Describe waves as a transfer of energy, describe how transverse and longitudinal</p>	<p>groups and placebos in testing new medicines, identify suitable apparatus for measuring distribution and abundance, use data from abundance investigations to estimate population size, give examples of how surface area: volume ratio affects organisms, describe how osmosis works Chemistry transition – Explain how ions are formed, describe metallic and ionic bonding, explain how metals and ionic compounds conduct electricity, interpret and sketch reaction profiles, explain why changes are described as being exothermic or endothermic, explain how bonding affects the properties of some substances, describe how rates of reaction change, explain the importance of surface area: volume ratio in chemical reactions, write balanced symbol equations with state symbols, represent reversible reactions using balanced symbol equations, explain how dynamic equilibrium is formed in reversible reactions</p>	<p>effect in science, describe the difference between correlation and cause, identify linear and proportional relationships from graphs, explain the difference between physical and abstract models, describe some ways in which models are used in science</p>
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How does it cover the NC	<p>9A- Reproduction in humans and plants; DNA, chromosome and genes; role of individuals in DNA model; variation and differences in species; competition; adaption; extinction; biodiversity</p> <p>9E- chemical symbols and formulae for elements and compounds; pure substance; combustion, thermal decomposition, oxidation and displacement reactions; chemical reactions and representation using formulae and equations; exothermic</p>	<p>9B- cells and cell structure and functions; use of a light microscope; diffusion; photosynthesis; plant reproduction; plant adaption; types of respiration; interdependence of organisms; human food security via insect pollination; impact of environment on organisms and visa versa.</p> <p>9F- the properties of the different states of matter in terms of the particle model; changes of state in terms of the particle model; Dalton Model; chemical symbols</p>	<p>KS3 Working Scientifically:</p> <ul style="list-style-type: none"> -Scientific attitudes -Experimental skills and investigations -Analysis and evaluation -Measurement <p>Biology:</p> <ul style="list-style-type: none"> -Cells and organisation -The skeletal and muscular systems -Nutrition and digestion -Gas exchange systems -Reproduction --Health -Photosynthesis 	<p>Physics:</p> <ul style="list-style-type: none"> -Energy -Energy changes and transfers -Changes in systems -Describing motion -Forces - Pressure in fluids -Balanced forces -Forces and motion -Waves -Sound waves -Energy and waves -Light waves -Current electricity -Static electricity 	<p>Biology transition name and describe the key features of some microorganisms (8D) • explain that a deficiency disease is caused by a lack of an essential nutrient in the diet (8A) • describe the role of the nervous system (7A) and know that nerves control muscles (7C) • describe changes to the body during puberty that are caused by sex hormones (7B) • state that a drug is a substance that affects the</p>	<p>Chemistry transition recall that all matter is made of atoms (7H) • recall the common properties of metals (8G) • describe how atoms are rearranged in chemical reactions (8F) • classify reactions as exo- or endothermic (8E, 9E, 9F) • appreciate that reactions occur at different speeds (8G) • model reactions as simple symbol equations (8G).</p> <p>Physics transition</p>

		<p>and endothermic; properties of ceramics, polymers and composites; carbon dioxide production by human activity and the impact on climate; recycling</p> <p>9I- relationships between speed, distance and time; relative motion; forces; measurements of force; energy transfer.</p>	<p>and formulae for elements and compounds; conservation of mass in changes of state and chemical reactions; chemical reactions as the rearrangement of atoms; representing chemical reactions using formulae and using equations; combustion, thermal decomposition, oxidation and displacement reactions; energy changes; exothermic and endothermic reactions</p> <p>9J- starting and final conditions of a system; energy changes; forces; electricity; measurements of electricity; resistance; energy transfer; gravity and gravitational fields; attraction and repulsion; magnetic fields.</p>	<p>-Cellular respiration -Interactions and interdependencies -Inheritance, chromosomes, DNA and genes</p> <p>Chemistry; -The particulate nature of matter -Atoms, elements and compounds -Pure and impure substances -Chemical reaction -Energetics -The periodic table -Materials -Earth and atmosphere</p>	<p>- Magnetism, -Physical changes -Particle model -Energy in matter -Space physics</p>	<p>way the body works, and give examples of drugs (7C)</p> <ul style="list-style-type: none"> • give examples of inherited and environmental variation between individuals in a population (7D, 8B) • describe how to estimate the size of a population using quadrats for sampling (8B) • explain how diffusion takes place across a partially permeable membrane, and give examples of how this affects unicellular organisms (8A). 	<p>use models to describe how electric circuits work (7J)</p> <ul style="list-style-type: none"> • describe how particle theory explains material properties, including gas pressure and the changes in density and state that result from heating (8I and 8K) • describe the idea of a force field, and how this can be used to model the effects of magnets and the effects of gravity (8L).
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