



Science

CURRICULUM OVERVIEW – YEAR 9 (KS3)

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Curriculum Overview

Subject: KS3 Science

Year group	Topic and length	Key Words	Key Skills	Assessments	Cultural Capital	Links to NC and Spec
9	7. Earth (Part 2) 12 hours	Atmosphere Carbon cycle Carbon sink Climate change Combustion Electrolysis Extraction Fossil fuel Greenhouse effect Greenhouse gas Global warming Mineral Natural resource Ore Photosynthesis Respiration	Comprehension, reading, literature, interpretation of evidence. Critical thinking. Numeracy, Data interpretation and evaluation. Constructing and understanding models to represent key concepts.	~45 mark end of topic test with review action points for pupils to act on upon reflection Think pink/go green task to measure the understanding of topic key skills. Weekly Seneca homework to review concepts from this topic.	Understand where metals, used in our everyday lives, come from. Understand the importance of recycling and how recycling can occur. Understand the evidence surrounding global warming/climate change. What is the greenhouse effect and how might humanity be contributing to it? Understand the environmental	<ul style="list-style-type: none"> • Earth as a source of limited resources and the efficacy of recycling • the carbon cycle • the composition of the atmosphere • the production of carbon dioxide by human activity and the impact on climate.

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					impact of climate change and increasing carbon emissions.	
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9	3. Energy (Part 2)	Conduction Convection Convection current Force multiplier Input force Insulator Infrared radiation Lever Output force Simple machine Temperature Thermometer Thermal conductor Thermal energy store	Analysis and interpretation of data and information. Numeracy, multiplication, unit conversion, re-arranging equations. Practical planning and practical conduction skills. Making a prediction and drawing conclusions.	~45 mark end of topic test with review action points for pupils to act on upon reflection Think pink/go green task to measure the understanding of topic key skills. Weekly Seneca homework to review	Understand how energy is transferred in particles. Understand what materials make good conductors or good insulators and when they should be used in our everyday lives. Understand why, in a roofed house/building, a room upstairs is warmer than	<ul style="list-style-type: none"> simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit,

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		Thermal imaging camera Work done		concepts from this topic.	a room downstairs. Understand how simple machines operate. How do levers work?	<p>stretching a spring, metabolism of food, burning fuels.</p> <ul style="list-style-type: none"> energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.
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8	9. Ecosystem (Part 2)	Aerobic respiration Algae Anaerobic respiration Chlorophyll Mineral deficiency Fermentation	<ul style="list-style-type: none"> Test hypothesis Estimate risks Plan variables Devise questions 	<p>~45 mark end of topic test with review action points for pupils to act on upon reflection</p> <p>Think pink/go green task to</p>	<p>How do plants make their own food?</p> <p>What are the conditions needed for plants to thrive?</p>	<ul style="list-style-type: none"> the reactants in, and products of, photosynthesis, and a word summary for photosynthesis the dependence of almost all life on Earth on the ability of photosynthetic

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		<p>Fertiliser Haemoglobin Lactic acid Magnesium Nitrates Oxygen debt Phosphates Photosynthesis Plasma Potassium Producer Red blood cell</p>	<ul style="list-style-type: none"> • Communicate ideas • Construct explanations • Present data • Draw conclusions 	<p>measure the understanding of topic key skills.</p> <p>Weekly Seneca homework to review concepts from this topic.</p>	<p>How do we make bread and alcohol?</p> <p>How do we get energy from the food we eat?</p> <p>How does oxygen get to our cells and why do we need it?</p> <p>Why do plants need minerals?</p>	<p>organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</p> <ul style="list-style-type: none"> • the adaptations of leaves for photosynthesis. • aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life • a word summary for aerobic respiration • the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration • the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed
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						<p>and the implications for the organism.</p> <ul style="list-style-type: none"> plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.
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9	4. Waves (Part 2)	Compression Electromagnetic spectrum Gamma rays Infrared Ionisation Longitudinal wave Loudspeaker	Analysis and interpretation of data and information. Graph interpretation, numeracy, range calculations, unit	~45 mark end of topic test with review action points for pupils to act on upon reflection	Understand how pregnancy scans work. Understand how microphones and speakers work.	<ul style="list-style-type: none"> waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. Sound waves frequencies of sound waves, measured in hertz

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		<p>Microphone Microwaves Pressure waves Radio waves Refraction Superpose Transverse wave Ultrasound Ultraviolet Visible light Wave x-rays</p>	<p>conversion, re-arranging equations.</p> <p>Research, drawing, scientific diagrams, making predictions.</p>	<p>Think pink/go green task to measure the understanding of topic key skills.</p> <p>Weekly Seneca homework to review concepts from this topic.</p>	<p>Be aware of how phones and TVs send and receive signals.</p> <p>To understand how electromagnetic waves are categorised and their properties/health risks: light waves, microwaves, X-rays etc.</p> <p>How does a microwave oven work?</p>	<p>(Hz); echoes, reflection and absorption of sound</p> <ul style="list-style-type: none"> • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals. Energy and waves • pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone.
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9	6. Reactions (Part 2) 12 hours	Chemical reaction Endothermic Exothermic Reaction profile Activation energy Reactant	<ul style="list-style-type: none"> • Analyse patterns • Discuss limitations • Draw conclusions • Present data 	~45 mark end of topic test with review action points for pupils to act on upon reflection	Why do some chemical reactions cause the environment to increase in temperature?	<ul style="list-style-type: none"> • chemical reactions as the rearrangement of atoms • representing chemical reactions using formulae and using equations • combustion, thermal decomposition, oxidation and displacement reactions

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		Product Combustion Conservation of mass Thermal decomposition Energy level diagram Bond energies	<ul style="list-style-type: none">• Communicate ideas• Construct explanations• Justify opinions• Collect data• Devise questions• Test hypothesis• Estimate risks	Think pink/go green task to measure the understanding of topic key skills. Weekly Seneca homework to review concepts from this topic.	Why do some chemical reactions cause the environment to decrease in temperature? What examples of endothermic and endothermic reactions occur in our everyday lives? What is combustion? What is thermal decomposition? Why don't reactions happen all the time? Why doesn't wood spontaneously combust with oxygen in the air?	what catalysts do. <ul style="list-style-type: none">• energy changes on changes of state (qualitative)• exothermic and endothermic chemical reactions (qualitative).
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9	Cell structure and transport and cell division 22 hours	Cells Organelles Nucleus Mitochondria Ribosomes Magnification Microscopes Cancer Mitosis Stem cells Differentiation Diffusion Osmosis Active transport	WS- Applying the cycle of collecting, presenting and analysing data Experimental skills and strategies Maths- use of standard form, conversion of units Communication & Literacy- Developing their use of scientific vocabulary and nomenclature	Explore how structural differences between types of cells enables them to perform specific functions within the organism. For an organism to grow, cells must divide by mitosis. Understanding of how doctors can repair damaged organs by growing new tissue from stem cells. The transport of substances in plants and animals.	6-mark mid-topic assessment RP: Using a light microscope	Refining microscope skills Comparing electron and light microscopes Awareness of macro to micro model Studying disease or problems with organs/systems and changing approaches to solutions with improved Science/ technologies	Life processes depend on molecules whose structure is related to their function the fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling life processes to be performed more effectively

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9	Atomic structure and the periodic table 22 hours	Atoms Elements Compound Proton Electron Neutron Properties Charge Mass Mendeleev Atomic model	WS- Applying the cycle of collecting, presenting and analysing data Experimental skills and strategies Maths- use relative atomic mass and atomic number in calculations Communication & Literacy- Developing their use of scientific vocabulary and nomenclature	How the periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure. The arrangement of elements in the modern periodic table and how this can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom	6-mark mid-topic assessment	Studying the work of Scientists throughout history and their impact on current understanding The development of scientific thinking and changing ideas over time	A simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes the number of particles in a given mass of a substance the modern Periodic Table, showing elements arranged in order of atomic number position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons

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9	Conservation and dissipation of energy, Energy transfers by heating and Energy resources 22 hours	Energy changes Heat Work Force Electric current Power Conservation Dissipation Efficiency Renewable Kinetic Thermal Gravitational Elastic Potential	WS- Applying the cycle of collecting, presenting and analysing data Experimental skills and strategies Maths- calculating energy changes using given formula Communication & Literacy- Developing their use of scientific vocabulary and nomenclature	with electrons in energy levels. There are changes in the way energy is stored when a system changes. Students should be able to describe all the changes involved in the way energy is stored when a system changes, for example: an object projected upwards, a moving object hitting an obstacle, an object accelerated by a constant force, a vehicle slowing down, bringing water to a boil in an electric kettle. Throughout this unit students should be able to calculate the changes in	6-mark mid-topic assessment RP: Investigating thermal insulation	Usefulness of experimental data in everyday contexts. Recalling and applying equations linked to energy to apply quantitative analysis. Discussing issues of energy loss and social responsibility in choosing energy resources	Energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved power as the rate of transfer of energy conservation of energy in a closed system, dissipation calculating energy efficiency for any energy transfers renewable and non-renewable energy sources used on Earth, changes in how these are used

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				energy by: heating, work done by forces, work done when a current flows.			
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