

National Curriculum Reference

Subject: Science



**CULCHETH
HIGH SCHOOL**
THE BEST THAT WE CAN BE

Key Stage 3

By the end of key stage 3, pupils are expected to know, apply and understand the matters, skills and processes specified in the programme of study.

Pupils should be taught to	At Culcheth High School, this is taught
Scientific attitudes	
Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility	Any lesson that encompasses experimental work includes a need to make observations or measure accurately. Teachers always ask about the need for repetition. The use of these key terms is being developed in line with our KS4 curriculum. Our skills sheets have been updated to include these terms. Two specific examples include: Year 8 Unit 2 Year 9 Unit 2
Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review	Year 7 Unit 3 Year 7 Unit 4 Year 9 Unit 3 Year 9 Unit 4 Year 9 Chem Topic 1
Evaluate risks.	Any lesson that encompasses experimental work includes a discussion of risk. Pupils are expected to evaluate and manage these risks but this may not be demonstrated in writing. Some examples include:

	<p>Year 7 Unit 1</p> <p>Year 7 Unit 3</p> <p>Year 7 Unit 4</p> <p>Year 7 Unit 8</p> <p>Year 8 Unit 5</p> <p>Year 8 Unit 7</p>
Experimental skills and investigations	Each Unit will have attributes linking to this section. The lessons listed are lessons that focus specifically on planning skills which encompass the majority of this section. This is not an exhaustive list.
Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience	<p>This is included in a practical in each Unit. Some specific examples include:</p> <p>Year 7 Unit 1</p> <p>Year 7 Unit 3</p> <p>Year 7 Unit 10</p> <p>Year 8 Unit 2</p> <p>Year 8 Unit 4</p> <p>Year 9 Unit 3</p>
Make predictions using scientific knowledge and understanding	<p>Year 7 Unit 3, 6 and 9</p> <p>Year 8 Unit 2, 3 and 6</p> <p>Year 8 Unit 2, 3 and 6</p>
Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate	<p>Year 7 Unit 3, 6 and 9</p> <p>Year 8 Unit 2, 3 and 9</p> <p>Year 8 Unit 2 and 3</p>

Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety	Year 7 Unit 1, 3, 6 and 9 Year 8 Unit 2, 3 and 6
Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements	Year 7 Unit 3, 4, 6 and 9 Year 8 Unit 2, 3 and 6
Apply sampling techniques	Year 7 Unit 10
Analysis and evaluation	Each unit will have attributes linking to this section. The lessons listed are lessons that focus specifically on analysis which encompass much of this section. This is not an exhaustive list.
Apply mathematical concepts and calculate results	Year 7 Unit 2 and 4 Year 8 Unit 1, 5 and 6
Present observations and data using appropriate methods, including tables and graphs	Year 7 Unit 3, 5 and 10 Year 8 Unit 2 and 6
Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions	Year 7 Unit 3, 5 and 10 Year 8 Unit 1, 2 and 6
Present reasoned explanations, including explaining data in relation to predictions and hypotheses	Year 7 Unit 2 Year 8 Unit 2, 3, 4 and 6
Evaluate data, showing awareness of potential sources of random and systematic error	Year 8 Unit 2, 3 and 11
Identify further questions arising from their results.	Year 8 Unit 2, 3 and 11
Measurement	Each unit will have attributes linking to this section. The lessons listed are not an exhaustive list but have this as a focus.
Understand and use SI Units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature	This is included in any lesson that includes measuring some specific key units are: Year 8 Unit 3 Year 9 Unit 3

Use and derive simple equations and carry out appropriate calculations	Year 7 Unit 4 Year 8 Unit 3 Year 9 Unit 2 and 5
Undertake basic data analysis including simple statistical techniques	All practical work where pupils take repeated results or share results requires them to calculate a mean. E.g. The energy in food investigation requires data analysis specifically relating to the calculation of how much energy there is in food. The variation topic in year 7 biology focuses on class analysis of data.
Biology	
Structure and function of living organisms	
Cells and organisation	
Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope	Year 7 Unit 1 and 4
The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts	Year 7 Unit 4
The similarities and differences between plant and animal cells	Year 7 Unit 4
The role of diffusion in the movement of materials in and between cells	Year 7 Unit 4
The structural adaptations of some unicellular organisms	Year 7 Unit 4 Year 8 Unit 4
The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.	Year 7 Unit 4
The skeletal and muscular systems	
The structure and functions of the human skeleton, to include support, protection, movement and making blood cells	Year 8 Unit 9 Year 9 Unit 4 2023 only
Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles	Year 8 Unit 9

	Year 9 Unit 4 2023 only
the function of muscles and examples of antagonistic muscles.	Year 8 Unit 9 Year 9 Unit 4 2023 only
Nutrition and digestion	
Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed	Year 8 Unit 4
Calculations of energy requirements in a healthy daily diet	Year 8 Unit 4
The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases	Year 8 Unit 4
The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)	Year 8 Unit 4
The importance of bacteria in the human digestive system	Year 8 Unit 4
Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.	Year 7 Unit 7
Gas exchange systems	
The structure and functions of the gas exchange system in humans, including adaptations to function	Year 8 Unit 9
The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume	Year 8 Unit 9
The impact of exercise, asthma and smoking on the human gas exchange system	Year 8 Unit 9
The role of leaf stomata in gas exchange in plants.	Year 7 Unit 7
Reproduction	
Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details	Year 8 Unit 7

of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta	
Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.	Year 7 Unit 7
Health	
The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.	Year 8 Unit 9
Material cycles and energy	
Photosynthesis	
The reactants in, and products of, photosynthesis, and a word summary for photosynthesis	Year 7 Unit 7
The dependence of almost all life on Earth on the ability of photosynthetic 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	Year 7 Unit 2, 7 and 10
The adaptations of leaves for photosynthesis.	Year 7 Unit 7
Cellular respiration	
Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life	Year 7 Unit 7 Year 8 Unit 9 Year 9 Unit 4 2023 only
A word summary for aerobic respiration	Year 7 Unit 7 Year 8 Unit 9 Year 9 Unit 4 2023 only
The process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration	Year 8 Unit 9 Year 9 Unit 4 2023 only

The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.	Year 8 Unit 9 Year 9 Unit 4 2023 only
Interactions and interdependencies	
Relationships in an ecosystem	
The interdependence of organisms in an ecosystem, including food webs and insect-pollinated crops	Year 7 Unit 10
The importance of plant reproduction through insect pollination in human food security	Year 7 Unit 10
How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.	Year 7 Unit 10
Genetics and evolution	
Inheritance, chromosomes, DNA and genes	
Heredity as the process by which genetic information is transmitted from one generation to the next	Year 9 Unit 4
A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model	Year 9 Unit 4
The differences between species	Year 9 Unit 4
The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation	Year 7 Unit 10 Year 9 Unit 4
The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection	Year 9 Unit 4
Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction	Year 7 Unit 10 Year 9 Unit 4

The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.	Year 9 Unit 4
Chemistry	
The particulate nature of matter	
The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure	Year 7 Unit 3 Year 8 Unit 1
Changes of state in terms of the particle model.	Year 7 Unit 3 Year 8 Unit 1
Atoms, elements and compounds	
A simple (Dalton) atomic model	Year 7 Unit 3 Year 7 Unit 6
Differences between atoms, elements and compounds	Year 7 Unit 6
Chemical symbols and formulae for elements and compounds	Year 7 Unit 6
Conservation of mass changes of state and chemical reactions.	Year 7 Unit 6
Pure and impure substances	
The concept of a pure substance	Year 7 Unit 6 and 9
Mixtures, including dissolving	Year 7 Unit 6 and 9
Diffusion in terms of the particle model	Year 7 Unit 3
Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography	Year 7 Unit 9
The identification of pure substances.	Year 7 Unit 6 and 9
Chemical reactions	
Chemical reactions as the rearrangement of atoms	Year 8 Unit 3

Representing chemical reactions using formulae and using equations	Year 8 Unit 3
Combustion, thermal decomposition, oxidation and displacement reactions	Year 8 Unit 3 Year 9 Unit 2
Defining acids and alkalis in terms of neutralisation reactions	Year 8 Unit 3
The pH scale for measuring acidity/alkalinity; and indicators	Year 8 Unit 3
Reactions of acids with metals to produce a salt plus hydrogen	Year 8 Unit 3
Reactions of acids with alkalis to produce a salt plus water	Year 8 Unit 3
What catalysts do.	Year 8 Unit 11
Energetics	
Energy changes on changes of state (qualitative)	Year 7 Unit 3
Exothermic and endothermic chemical reactions (qualitative).	Year 9 Unit 2
The Periodic Table	
The varying physical and chemical properties of different elements	Year 7 Unit 6
The principles underpinning the Mendeleev Periodic Table	Year 7 Unit 6 Year 9 Chem Topic 1
The Periodic Table: periods and groups; metals and non-metals	Year 7 Unit 6 Year 9 Chem Topic 1
How patterns in reactions can be predicted with reference to the Periodic Table	Year 7 Unit 6 Year 9 Chem Topic 1
The properties of metals and non-metals	Year 8 Unit 3
The chemical properties of metal and non-metal oxides with respect to acidity	Year 8 Unit 3
Materials	

The order of metals and carbon in the reactivity series	Year 8 Unit 3 Year 9 Unit 2
The use of carbon in obtaining metals from metal oxides	Year 8 Unit 3 Year 9 Unit 2
Properties of ceramics, polymers and composites (qualitative)	Year 8 Unit 11
Earth and atmosphere	
The composition of the Earth	Year 8 Unit 6
The structure of the Earth	Year 8 Unit 6
The rock cycle and the formation of igneous, sedimentary and metamorphic rocks	Year 8 Unit 6
Earth as a source of limited resources and the efficacy of recycling	Year 8 Unit 6
The carbon cycle	Year 8 Unit 6
The composition of the atmosphere	Year 8 Unit 6
The production of carbon dioxide by human activity and the impact on climate.	Year 8 Unit 6
Physics	
Energy	
Calculation of fuel uses and costs in the domestic context	Year 7 Unit 8
Comparing energy values of different foods (from labels) (kJ)	Year 8 Unit 4
Comparing power ratings of appliances in watts (W, kW)	Year 7 Unit 8
Comparing amounts of energy transferred (J, kJ, kW hour)	Year 7 Unit 8
Domestic fuel bills, fuel use and costs	Year 7 Unit 8
Fuels and energy resources.	Year 7 Unit 2 Year 8 Unit 6

	Year 9 Physics Topic 1
Energy changes and transfers	
Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged	Year 9 Unit 5
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	Year 8 Unit 2
Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.	Year 7 Unit 1 and 2 Year 9 Unit 1
Changes in systems	
Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change	Year 7 Unit 2 Year 8 Unit 1 and 2 Year 9 Unit 1
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	Year 7 Unit 2 Year 8 Unit 1 and 2 Year 9 Unit 1
Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.	Year 7 Unit 2 Year 8 Unit 2 and 3
Motion and forces	
Describing motion	
Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)	Year 8 Unit 8
The representation of a journey on a distance-time graph	Year 8 Unit 8

Relative motion: trains and cars passing one another.	Year 8 Unit 8
Forces	
Forces as pushes or pulls, arising from the interaction between two objects	Year 7 Unit 5
Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces	Year 7 Unit 5
Moment as the turning effect of a force	Year 9 Unit 5
Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water	Year 7 Unit 5
Forces measured in newtons, measurements of stretch or compression as force is changed	Year 7 Unit 5
Force-extension linear relation; Hooke's Law as a special case	Year 9 Unit 5
Work done and energy changes on deformation	Year 9 Unit 5
Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.	Year 7 Unit 5
Pressure in fluids	
Atmospheric pressure, decreases with increase of height as weight of air above decreases with height	Year 9 Unit 5
Pressure in liquids, increasing with depth; upthrust effects, floating and sinking	Year 9 Unit 5
Pressure measured by ratio of force over area – acting normal to any surface.	Year 9 Unit 5
Balanced forces	
Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface	Year 9 Unit 5
Forces and motion	
Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)	Year 7 Unit 5

Change depending on direction of force and its size.	Year 7 Unit 5
Waves	
Observed waves	
Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.	Year 8 Unit 5
Sound waves	
Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound	Year 8 Unit 8
Sound needs a medium to travel, the speed of sound in air, in water, in solids	Year 8 Unit 8
Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the eardrum; sound waves are longitudinal	Year 8 Unit 8
Auditory range of humans and animals.	Year 8 Unit 8
Energy and waves	
Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.	Year 8 Unit 8
Light waves	
The similarities and differences between light waves and waves in matter	Year 8 Unit 5
Light waves travelling through a vacuum; speed of light	Year 8 Unit 5
The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface	Year 8 Unit 5
Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye	Year 8 Unit 5
Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras	Year 8 Unit 5

Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.	Year 8 Unit 5
Electricity and electromagnetism	
Current electricity	
Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge	Year 7 Unit 8
Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current	Year 7 Unit 8
Differences in resistance between conducting and insulating components (quantitative)	Year 7 Unit 8
Static electricity	
Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects	Year 7 Unit 8
The idea of electric field, forces acting across the space between objects not in contact	Year 7 Unit 8
Magnetism	
Magnetic poles, attraction and repulsion	Year 8 Unit 9 2022/23 Year 9 Unit 5 2024 onwards
Magnetic fields by plotting with compass, representation by field lines	Year 8 Unit 9 2022/23 Year 9 Unit 5 2024 onwards
Earth's magnetism, compass and navigation	Year 8 Unit 9 2022/23 Year 9 Unit 5 2024 onwards
The magnetic effect of a current, electromagnets, D.C. motors (principles only).	Year 8 Unit 9 2022/23 Year 9 Unit 5 2024 onwards
Matter	

Physical changes	
Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving	Year 7 Unit 3 Year 8 Unit 1 Year 9 Unit 1
Similarities and differences, including density differences, between solids, liquids and gases	Year 7 Unit 3 and 6 Year 8 Unit 1 Year 9 Unit 1
Brownian motion in gases	Year 7 Unit 3
Diffusion in liquids and gases driven by differences in concentration	Year 7 Unit 4
The difference between chemical and physical changes.	Year 7 Unit 6
Particle model	
The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition	Year 7 Unit 3 Year 8 Unit 1
Atoms and molecules as particles.	Year 7 Unit 3 and 6 Year 8 Unit 1 Year 9 Unit 1
Energy in matter	
Changes with temperature in motion and spacing of particles	Year 8 Unit 1 and 2
Internal energy stored in materials.	Year 8 Unit 1 and 2
Space physics	
Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)	Year 7 Unit 5 Year 9 Unit 3

Our Sun as a star, other stars in our galaxy, other galaxies	Year 9 Unit 3
The seasons and the Earth's tilt, day length at different times of the year, in different hemispheres	Year 9 Unit 3
The light year as a Unit of astronomical distance.	Year 9 Unit 3

Key Stage 4

By the end of key stage 4, pupils are expected to know, apply and understand the matters, skills and processes specified in the programme of study.

Pupils should be taught to	At Culcheth High School, this is taught
The development of scientific thinking	
the ways in which scientific methods and theories develop over time	<p>Biology Topic 6 lesson 14 and 15 Darwin, Wallace. Chemistry Topic 1 lesson 5 – the stages in the discovery of the nuclei model of the atom including interpreting Rutherford's gold foil experiment. lesson 10 Periodic table Topic 9 lesson 2 Evolution of the atmosphere and Global climate change.</p> <p>Physics Topic 4 lesson 1 and 2 - the stages in the discovery of the nuclei model of the atom including interpreting Rutherford's gold foil experiment.</p> <p>Physics Topic 8 lesson 5- the Expanding Universe Theory. Showing how new evidence can disprove or support the Big Bang theory</p>
using a variety of concepts and models to develop scientific explanations and understanding	<p>Covered in a variety of lessons across all 3 disciplines.</p> <p>Chemistry Topic 1 – Model of the atom.</p> <p>Physics Topic 3 – Particle models to represent states of matter, Topic 4 - Model of the atom, Nuclear fission. Topic 8 Scale models of the universe</p>
appreciating the power and limitations of science and considering ethical issues which may arise	<p>Biology Topic 1 lesson 9 and 10 Stem cells, Topic 6 lesson 11 and 12 Genetic engineering and Cloning. Topic 7 lesson 20 Human impact – Food security.</p> <p>Physics Topic 8 lesson 5 – Big Bang Theory has not been proven due to a lack of supporting evidence because we do not have the knowledge or equipment to measure what we need.</p>

<p>explaining everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments</p>	<p>Biology Topic 7 lesson 20 Human impact – Food security.</p> <p>Physics Topic 1 lesson 10 and 11 – Non-renewable and renewable energy resources. Advantages and disadvantages of each. Including location and environmental issues.</p>
<p>evaluating risks both in practical science and the wider societal context, including perception of risk</p>	<p>Biology Topic 6 lesson 14 and 15 Darwin, Wallace. Chemistry Topic 1 lesson 5 Atomic structure lesson 10 Periodic table Topic 9 lesson 2 Evolution of the atmosphere and Global climate change.</p> <p>Physics Topic 2 lesson 4-5 Resistance of a wire – Focus on method, health and safety, graph work and conclusion. Also includes work on relevant physics equations. Links to relevant scientific theories.</p>
<p>recognising the importance of peer review of results and of communication of results to a range of audiences.</p>	<p>Biology Topic 3 lesson 9 developing drugs</p>
<p>Experimental skills and strategies</p>	
<p>using scientific theories and explanations to develop hypotheses</p>	<p>Biology Topic 6 lesson 9 Natural selection</p> <p>Physics Topic 5 lesson 6-7 Hooke's Law – Focus on carrying out the practical with the appropriate equipment, identifying inaccuracies and improvements. Also linking mathematical terms to what students observed. Also includes work on relevant physics equations. Links to relevant scientific theories</p> <p>Physics -Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations making measurements, conclusion and evaluation skills</p> <p>Chemistry Topic 4, lesson 6 Electrolysis</p>
<p>planning experiments to make observations, test hypotheses or explore phenomena</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics Topic 1 lesson 8-9 Thermal conductivity – Focus on planning, observations and graph work. Links to relevant scientific theories.</p> <p>Physics Topic 3 lesson 2-3 Density - Focus on method and practical skills. Also includes work on relevant physics equations.</p>

	<p>Physics -Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations making measurements, conclusion and evaluation skills.</p> <p>Physics -Topic 6 - lesson 2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with improvements. Also includes work on relevant physics equations.</p> <p>Physics – Topic 5 lesson 15-16 Investigating motion – focus on recording observations, graph work and key mathematical terms. Also includes work on relevant physics equations.</p> <p>Chemistry Topic 3 lesson 11, titration.</p> <p>Chemistry Topic 4 lesson 8 Making soluble salts.</p> <p>Chemistry Topic 6 lesson 2-3 Rates of reaction</p> <p>Chemistry Topic 10, lesson 3 potable water.</p>
<p>applying a knowledge of a range of techniques, apparatus, and materials to select those appropriate both for fieldwork and for experiments</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics Topic 5 - lesson 6-7 Hooke's Law – Focus on carrying out the practical with the appropriate equipment, identifying inaccuracies and improvements. Also linking mathematical terms to what students observed. Also includes work on relevant physics equations. Links to relevant scientific theories</p> <p>Physics Topic 3- lesson 2-3 Density - Focus on method and practical skills. Also includes work on relevant physics equations</p>
<p>carrying out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Chemistry Topic 4 lesson 6 Electrolysis,</p> <p>Chemistry Topic 5 lesson 2-3 Neutralisation</p> <p>Chemistry Topic 6 lesson 2-3 Rates of reaction</p>

	<p>Physics Topic 2 lesson 4-5 Resistance of a wire – Focus on method, health and safety, graph work and conclusion. Also includes work on relevant physics equations. Links to relevant scientific theories.</p> <p>Physics -Topic 1 - lesson 6, Specific Heat Capacity – Focus on observations, measurement accuracy, health and safety. Graph work is developed as well as maths skills associated with it. Also includes work on relevant physics equations.</p> <p>Physics -Topic 6 - lesson 2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with improvements. Also includes work on relevant physics equations</p>
<p>recognising when to apply a knowledge of sampling techniques to ensure any samples collected are representative</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics Topic 1 lesson 6, Specific Heat Capacity – Focus on observations, measurement accuracy, health and safety. Graph work is developed as well as maths skills associated with it. Also includes work on relevant physics equations</p>
<p>making and recording observations and measurements using a range of apparatus and methods</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics Topic 5 lesson 15-16 Investigating motion – focus on recording observations, graph work and key mathematical terms. Also includes work on relevant physics equations.</p> <p>Chemistry Topic 6 lesson 2-3 Rates of reaction</p> <p>Chemistry Topic 7, lesson 3-4 Chromatography</p> <p>Physics, Topic 1 lesson 6, Specific Heat Capacity – Focus on observations, measurement accuracy, health and safety. Graph work is developed as well as maths skills associated with it. Also includes work on relevant physics equations.</p> <p>Physics, Topic 1 lesson 8-9 Thermal conductivity – Focus on planning,</p>

	<p>Physics Topic 2 - lesson 6-8 IV Graphs - Focus on observations, graph work including sketch graph. Links to relevant scientific theories it also includes work on relevant physics equations.</p> <p>Physics -Topic 6 - lesson 2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with</p> <p>Physics -Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations making measurements, conclusion and evaluation skills</p>
<p>evaluating methods and suggesting possible improvements and further investigations.</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics Topic 6 lesson 2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with improvements. Also includes work on relevant physics equations.</p> <p>Physics Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations, making measurements, conclusions and evaluation skills.</p> <p>Chemistry Topic 5 lesson 2-3 Neutralisation</p> <p>Chemistry Topic 6 lesson 2-3 Rates of reaction</p> <p>Physics, Topic 1 lesson 6, Specific Heat Capacity – Focus on observations, measurement accuracy, health and safety. Graph work is developed as well as maths skills associated with it. Also includes work on relevant physics equations.</p> <p>Physics Topic 5 - lesson 6-7 Hooke's Law – Focus on carrying out the practical with appropriate equipment, identifying inaccuracies and improvements. Also linking mathematical terms to what students observed. Also includes work on relevant physics equations. Links to relevant scientific theories</p> <p>Physics -Topic 6 - L2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with improvements. Also includes work on relevant physics equations.</p>

	<p>Physics -Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations making measurements, conclusion and evaluation skills</p>
<p>Analysis and evaluation</p>	
<ol style="list-style-type: none"> 1. applying the cycle of collecting, presenting and analysing data, including presenting observations and other data using appropriate methods 2. translating data from one form to another 3. carrying out and representing mathematical and statistical analysis 4. representing distributions of results and making estimations of uncertainty 5. interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions 6. presenting reasoned explanations, including relating data to hypotheses 7. being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error 8. communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions, using paper-based and electronic reports and presentations. 	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Chemistry Topic 6 lesson 2-3 Rates of reaction</p> <p>Chemistry Topic 7, lesson 3-4 Chromatography</p> <p>Chemistry lesson 9 Anion tests</p> <p>Physics, Topic 1 lesson 6, Specific Heat Capacity – Focus on observations, measurement accuracy, health and safety. Graph work is developed as well as maths skills associated with it. Also includes work on relevant physics equations.</p> <p>Physics, Topic 1 lesson 8-9 Thermal conductivity – Focus on planning, observations and graph work. Links to relevant scientific theories.</p> <p>Physics Topic 2 - lesson 4-5 Resistance of a wire – Focus on method, health and safety, graph work and conclusion. Also includes work on relevant physics equations. Links to relevant scientific theories.</p> <p>Physics Topic 2 - lesson 6-8 IV Graphs - Focus on observations, graph work including sketch graph. Links to relevant scientific theories it also includes work on relevant physics equations.</p> <p>Physics Topic 3- lesson 2-3 Density - Focus on method and practical skills. Also includes work on relevant physics equations.</p> <p>Physics Topic 5 - lesson 6-7 Hooke's Law – Focus on carrying out the practical with appropriate equipment, identifying inaccuracies and improvements. Also linking mathematical terms to what students observed. Also includes work on relevant physics equations. Links to relevant scientific theories</p> <p>Physics – Topic 5 lesson 15-16 Investigating motion – focus on recording observations, graph work and key mathematical terms. Also includes work on relevant physics equations.</p>

	<p>Physics -Topic 6 - lesson 2 Wave speed – Linked to wave speed equations. Focus is on observation, measurements and evaluating methods with improvements. Also includes work on relevant physics equations.</p> <p>Physics -Topic 6 lesson 5 Absorption – Linked to infrared radiation and uses. Focus is on equipment, graph work and conclusions.</p> <p>Physics -Topic 6 lesson 9 reflection and refraction – Links to Law of reflection. Focus is on practical application, record observations making measurements, conclusion and evaluation skills</p>
<p>Vocabulary, units, symbols and nomenclature</p>	
<p>developing their use of scientific vocabulary and nomenclature</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work. It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>
<p>recognising the importance of scientific quantities and understanding how they are determined</p>	<p>Biology Topic 1 lesson 1 – 5 Microscopes.</p> <p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work.</p> <p>Chemistry topic 3</p> <p>Required practicals for all sciences It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>

<p>using SI units and IUPAC chemical nomenclature unless inappropriate</p>	<p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work.</p> <p>Required practicals for all sciences</p> <p>It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>
<p>using prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano)</p>	<p>Biology Topic 1 lesson 19 and 20 Osmosis, Topic 2 lesson 4 and 5 Enzymes, Topic 3 lesson 2 and 3 Culturing bacteria, Topic 4 lesson 3 Photosynthesis, Topic 5 lesson 2 Reaction speed, Topic 7 lesson 3 and 4 Distribution of organisms sampling.</p> <p>Biology Topic 1 lesson 1 – 5 Microscopes.</p> <p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work.</p> <p>It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Required practicals for all sciences</p> <p>Chemistry topic 3</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>
<p>interconverting units</p>	<p>Biology Topic 1 lesson 1 – 5 Microscopes.</p> <p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work.</p> <p>It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Chemistry topic 3</p>

	<p>Required practicals for all sciences</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>
using an appropriate number of significant figures in calculations.	<p>Biology Topic 1 lesson 1 – 5 Microscopes.</p> <p>Physics covered in the majority of lessons. More focus when the lessons are maths based within the scheme of work.</p> <p>Chemistry topic 3</p> <p>Required practicals for all sciences</p> <p>It is covered as starter/plenary activities for conversion, significant figures, recalling equations. When teaching the equations as a full lesson prefixes and power of ten are taught and expanded on when converting units.</p> <p>Subject word of the day highlights the key scientific vocab which is expanded on during the lesson.</p>
Biology	
Cell biology	
cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells	Topic 1 lesson 6 Eukaryotic cells lesson 7 Prokaryotic cells
stem cells in animals and meristems in plants	Topic 1 lesson 9 and 10
enzymes	Topic 2 lesson 3
factors affecting the rate of enzymatic reactions	Topic 2 lesson 4, 5 and 6
the importance of cellular respiration; the processes of aerobic and anaerobic respiration	Topic 1 lesson 6 Mitochondria and Topic 4
carbohydrates, proteins, nucleic acids and lipids as key biological molecules.	<p>Topic 2 lesson 2 Carbohydrates, Proteins and Lipids</p> <p>Topic 6 lesson 3 DNA and Protein synthesis</p>
Transport systems	

the need for transport systems in multicellular organisms, including plants	Topic 1 lesson 18
the relationship between the structure and functions of the human circulatory system.	Topic 2 lesson 8 and 9
Health, disease and the development of medicines	
the relationship between health and disease	Topic 2 lesson 11 and 12
communicable diseases including sexually transmitted infections in humans (including HIV/AIDs)	Topic 3 lesson 4
non-communicable diseases	Topic 2 lesson 11 and 12 Topic 2 lesson 10 CHD
bacteria, viruses and fungi as pathogens in animals and plants	Topic 3 lesson 4
body defences against pathogens and the role of the immune system against disease	Topic 3 lesson 11 and 12
reducing and preventing the spread of infectious diseases in animals and plants	Topic 3 lesson 1
the process of discovery and development of new medicines	Topic 3 lesson 8 and 9
the impact of lifestyle factors on the incidence of non-communicable diseases.	Topic 2 lesson 11 and 12
Coordination and control	
principles of nervous coordination and control in humans	Topic 5 lesson 1 – 5
the relationship between the structure and function of the human nervous system	Topic 5 lesson 1
the relationship between structure and function in a reflex arc	Topic 5 lesson 2
principles of hormonal coordination and control in humans	Topic 5 lesson 6
homeostasis.	Topic 5 lesson 6
Photosynthesis	
photosynthesis as the key process for food production and therefore biomass for life	Topic 4 lesson 3
the process of photosynthesis	Topic 4 lesson 3

factors affecting the rate of photosynthesis.	Topic 4 lesson 4 and 5
Ecosystems	
levels of organisation within an ecosystem	Topic 7 lesson 1
some abiotic and biotic factors which affect communities; the importance of interactions between organisms in a community	Topic 7 lesson 2
how materials cycle through abiotic and biotic components of ecosystems	Topic 7 lesson 2
the role of microorganisms (decomposers) in the cycling of materials through an ecosystem	Topic 7 lesson 9
organisms are interdependent and are adapted to their environment	Topic 7 lesson 6 and 7
the importance of biodiversity	Topic 7 lesson 8
methods of identifying species and measuring distribution, frequency and abundance of species within a habitat	Topic 7 lesson 3
positive and negative human interactions with ecosystems.	Topic 7 lesson 13 – 17
Evolution, inheritance and variation	
the genome as the entire genetic material of an organism	Topic 6 lesson 3
how the genome and its interaction with the environment, influence the development of the phenotype of an organism	Topic 6 lesson 4
the potential impact of genomics on medicine	Topic 6 lesson 3
most phenotypic features being the result of multiple, rather than single, genes	Topic 6 lesson 4
single gene inheritance and single gene crosses with dominant and recessive phenotypes	Topic 6 lesson 4
sex determination in humans	Topic 6 lesson 6
genetic variation in populations of a species	Topic 6 lesson 8
the process of natural selection leading to evolution	Topic 6 lesson 9

the evidence for evolution	Topic 6 lesson 16 and 17
developments in biology affecting classification	Topic 6 lesson 18
the importance of selective breeding of plants and animals in agriculture	Topic 6 lesson 10
the uses of modern biotechnology including gene technology; some of the practical and ethical considerations of modern biotechnology.	Topic 6 lesson 10 – 12
Chemistry	
Atomic structure and the Periodic Table	
a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes	Topic 1 lesson 5-9
the number of particles in a given mass of a substance	Topic 1 lesson 5-9
the modern Periodic Table, showing elements arranged in order of atomic number	Topic 1 lesson 10
position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons	Topic 1 lesson 11-19
properties and trends in properties of elements in the same group	Topic 1 lesson 11-19
characteristic properties of metals and non-metals	Topic 1 lesson 11-23
chemical reactivity of elements in relation to their position in the Periodic Table.	Topic 1 lesson 10-23
Structure, bonding and the properties of matter	
changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces	Topic 2 lesson 1 also physics topic 3 lesson 4
types of chemical bonding: ionic, covalent, and metallic	Topic 2 lesson 2, 5, 7, 9
bulk properties of materials related to bonding and intermolecular forces	Topic 2 lesson 3, 5-9.
bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings	Topic 2 lesson 6, 7, 8, 12
structures, bonding and properties of diamond, graphite, fullerenes and graphene	Topic 2 lesson 7 and 8

Chemical changes	
determination of empirical formulae from the ratio of atoms of different kinds	Topic 3 Topic 2 lesson 2-3
balanced chemical equations, ionic equations and state symbols	Topic 1 lesson 15 Topic 4 lesson 4 Throughout topic 3
identification of common gases	Topic 8 lesson 5
the chemistry of acids; reactions with some metals and carbonates	Topic 4 lesson 5-7
pH as a measure of hydrogen ion concentration and its numerical scale	Topic 4 lesson 9-11
electrolysis of molten ionic liquids and aqueous ionic solutions	Topic 4 lesson 13-16
reduction and oxidation in terms of loss or gain of oxygen.	Topic 4 lesson 1, 3-4
Energy changes in chemistry	
Measurement of energy changes in chemical reactions (qualitative)	Topic 5 lesson 1-4
Bond breaking, bond making, activation energy and reaction profiles (qualitative).	Topic 5 lesson 1-4
Rate and extent of chemical change	
factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst	Topic 6 lesson 1-6
factors affecting reversible reactions.	Topic 6 lesson 7-9
Chemical analysis	
distinguishing between pure and impure substances	Topic 8 lesson 1-2
separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation	Topic 8 lesson 3 Topic 1 lesson 3-4
quantitative interpretation of balanced equations	Covered throughout all topic areas

concentrations of solutions in relation to mass of solute and volume of solvent	Topic 3 lesson 4
Chemical and allied industries	
life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life	Topic 10 lesson 1
the viability of recycling of certain materials	Topic 10 lesson 2
carbon compounds, both as fuels and feedstock, and the competing demands for limited resources fractional distillation of crude oil and cracking to make more useful materials	Topic 7 lesson 1-4
extraction and purification of metals related to the position of carbon in a reactivity series.	Topic 4 lesson 3 Topic 10 lesson 5
Earth and atmospheric science	
evidence for composition and evolution of the Earth's atmosphere since its formation	Topic 9 lesson 1-2
evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change	Topic 9 lesson 3-4
potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate	Topic 9 lesson 3-5
common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources	Topic 9 lesson 5
the Earth's water resources and obtaining potable water.	Topic 10 lesson 3-4
Physics	
Energy	
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	Topic 1 lesson 1, 2 and 3
power as the rate of transfer of energy	Topic 1 lesson 7

	Topic 1 lesson 15
conservation of energy in a closed system; dissipation	Topic 1 lesson 1
calculating energy efficiency for any energy transfers	Topic 1 lesson 1
renewable and non-renewable energy sources used on Earth; changes in how these are used.	Topic 1 lesson 10 - 11
Forces	
forces and fields: electrostatic, magnetic, gravity	Topic 2 lesson 12, 16, 17 Topic 5 lesson 1 and 2 Topic 7 lesson 1, 2, 3
forces as vectors	Topic 5 lesson 1
calculating work done as force x distance; elastic and inelastic stretching	Topic 5 lesson 1, 5, 6 and 7
pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative).	Topic 5 lesson 22-25
Forces and motion	
speed of sound; estimating speeds and accelerations in everyday contexts	Topic 5 lesson 9-12 Topic 6 lesson 12, 13
interpreting quantitatively graphs of distance, time, and speed	Topic 5 lesson 9, 10
acceleration caused by forces; Newton's First Law	Topic 5 lesson 13, 15 and 16
weight and gravitational field strength	Topic 5 lesson 1
decelerations and braking distances involved on roads.	Topic 5 lesson 17
Wave motion	
amplitude, wavelength and frequency; relating velocity to frequency and wavelength	Topic 6 lesson 1 and 2

transverse and longitudinal waves	Topic 6 lesson 1 and 2
electromagnetic waves and their velocity in a vacuum; waves transferring energy; wavelengths and frequencies from radio to gamma-rays	Topic 6 lesson 3, 4 and 11
velocities differing between media: absorption, reflection, refraction effects	Topic 1 lesson 8 and 9 Topic 6 lesson 6-10
production and detection, by electrical circuits, or by changes in atoms and nuclei	Topic 4 lesson 1
uses in the radio, microwave, infra-red, visible, ultra-violet, X-ray and gamma-ray regions, hazardous effects on bodily tissues.	Topic 6 lesson 3, 4 and 11
Electricity	
measuring resistance using p.d. and current measurements	Topic 2 lesson 1 and 2
exploring current, resistance and voltage relationships for different circuit elements, including their graphical representations	Topic 2 lesson 3-10
quantity of charge flowing as the product of current and time	Topic 2 lesson 12
drawing circuit diagrams; exploring equivalent resistance for resistors in series	Topic 2 lesson 1-10
the domestic a.c. supply; live, neutral and earth mains wires; safety measures	Topic 2 lesson 13
power transfer related to p.d. and current, or current and resistance.	Topic 2 lesson 14
Magnetism and electromagnetism	
exploring the magnetic fields of permanent and induced magnets, and the Earth's magnetic field, using a compass	Topic 7 lesson 1
magnetic effects of currents; how solenoids enhance the effect	Topic 7 lesson 2-3
how transformers are used in the national grid and the reasons for their use.	Topic 2 lesson 14 Topic 7 lesson 6-7
The structure of matter	

relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities	Topic 3 lesson 4 and 8
melting, evaporation, and sublimation as reversible changes	Topic 3 lesson 6-7
calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat	Topic 1 lesson 6, 8-9 Topic 3 lesson 6-7
links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative).	Topic 3 lesson 8-9
Atomic structure	
the nuclear model and its development in the light of changing evidence	Topic 4 lesson 1-2
masses and sizes of nuclei, atoms and small molecules	Topic 4 lesson 1-2
differences in numbers of protons and neutrons related to masses and identities of nuclei; isotope characteristics and equations to represent changes	Topic 4 lesson 1-4
ionisation; absorption or emission of radiation related to changes in electron orbits	Topic 4 lesson 1-2
radioactive nuclei; emission of alpha or beta particles, neutrons, or gamma-rays, related to changes in the nuclear mass and/or charge	Topic 4 lesson 3-4
radioactive materials, half-life, irradiation, contamination and their associated hazardous effects; waste disposal	Topic 4 lesson 5-6
nuclear fission, nuclear fusion and our Sun's energy	Topic 4 lesson 9-10
Space physics	
the main features of the solar system.	Topic 8 lesson 1