



# Science curriculum overview KS3

Topic	1 – Acids and Alkalis	2-Cells
Length of topic (in weeks)	4 Weeks	2 Weeks
Links to National Curriculum	defining acids and alkalis in terms of neutralisation reactions the pH scale for measuring acidity/alkalinity; and indicators reactions of acids with metals to produce a salt plus hydrogen reactions of acids with alkalis to produce a salt plus water	cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts the similarities and differences between plant and animal cells the role of diffusion in the movement of materials in and between cells the structural adaptations of some unicellular organisms the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water.	Multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. There are many types of cell. Each has a different structure or feature so it can do a specific job.
Key Skills	Observe and investigate a range of chemical reactions using equipment appropriately. Measure changes in the pH of solutions using indicators	Use a light microscope to observe and draw cells. Obtain and record a clearly focused image of a microscopic object. Work out the length of a plant cell - give results in nm, um and mm. Express in normal and standard form.

Topic	3-Current, Voltage and Resistance	4-Particle Model
Length of topic (in weeks)	3 Weeks	2 Weeks
Links to National Curriculum	<p>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current differences in resistance between conducting and insulating components (quantitative).</p>	<p>the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition changes with temperature in motion and spacing of particles internal energy stored in materials the difference between chemical and physical changes. Brownian motion in gases diffusion in liquids and gases driven by differences in concentration conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation,</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>Current is a movement of electrons and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work</p> <p>Around a charged object, the electric field affects other charged objects, causing them to be attracted or repelled. The field strength decreases with distance. We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance reduce the current flowing and shift energy to the surroundings.</p>	<p>Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Observations where substances change temperature or state can be described in terms of particles gaining or losing energy.</p>
Key Skills	<p>Represent and interpret a range of simple circuit diagrams using appropriate symbols. Build electrical circuits using various components and measure current using an ammeter</p> <p>Represent and interpret a range of simple circuit diagrams using appropriate symbols. Build electrical circuits using various components and measure current and voltage using an ammeter and voltmeter.</p>	<p>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</p>

# Science Faculty curriculum overview – Year 7 (KS3)

Topic	5- Movement	6- Speed
Length of topic (in weeks)	2 Week	3 Weeks
Links to National Curriculum	the structure and functions of the human skeleton, to include support, protection, movement and making blood cells biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles the function of muscles and examples of antagonistic muscles.	forces as pushes or pulls, arising from the interaction between two objects using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces, opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) the representation of a journey on a distance-time graph relative motion: trains and cars passing one another. forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) change depending on direction of force and its size. using physical processes and mechanisms (pathways), rather than energy, to explain the intermediate steps that bring about such changes.
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	The parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Antagonistic pairs of muscles create movement when one contracts and the other relaxes	Speed: How much distance is covered in how much time. Average speed: The overall distance travelled divided by overall time for a journey. Relative motion: Different observers judge speeds differently if they are in motion too, so an object's speed is relative to the observer's speed. Acceleration: How quickly speed increases or decreases
Key Skills	Carry out practical procedures using instructions without guidance and in a calm fashion with due regard to the safety of others. Collect data from throwing a ball and measuring arm length.	Measure the speed of a moving object using appropriate equipment

Topic	7- Separating Mixtures	8- Variation
Length of topic (in weeks)	3 Weeks	3 Weeks
Links to National Curriculum	<p>the concept of a pure substance mixtures, including dissolving diffusion in terms of the particle model simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography the identification of pure substances.</p>	<p>Genetics and evolutions Inheritance, chromosomes, DNA and genes Heredity as the process by which genetic information is transmitted from one generation to the next 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 Differences between species The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection Changes in the environment may leave individuals within a species, and some entire species, less well adapted The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</p>	<p>There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment.</p>
Key Skills	<p>Use techniques to separate mixtures. Separate ingredients from mixtures using appropriate techniques such as evaporation, filtration, chromatography and magnets. Work out the amount of salt in salt water - express as percentage</p>	<p>Collect data on continuous and discontinuous variation and decide how to present data appropriately.</p>

# Science Faculty curriculum overview – Year 7 (KS3)

Topic	9- Sound	10- Earth Structure
Length of topic (in weeks)	3 Weeks	3 Weeks
Links to National Curriculum	frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound sound needs a medium to travel, the speed of sound in air, in water, in solids sound waves are longitudinal	the composition of the Earth the structure of the Earth the rock cycle and the formation of igneous, sedimentary and metamorphic rocks
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch.	Sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.
Key Skills	Represent different sounds in graph form.	Observe and investigate how the rate of cooling affects crystal formation. Use models to represent rock formation.

# Science Faculty curriculum overview – Year 7 (KS3)

Topic	11- Interdependence	12- Energy Transfer
Length of topic (in weeks)	2 Weeks	3 Weeks
Links to National Curriculum	<p>Interactions and interdependencies Relationships in an ecosystem The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops How organisms affect, and are affected by, their environment, including the accumulation of toxic materials</p>	<p>comparing energy values of different foods (from labels) (kJ) fuels and energy resources. 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 processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients.</p>	<p>We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.</p>
Key Skills	<p>Represent changes to a population size in graph form. Interpret population size data relate to changes in the environment.</p>	<p>Draw conclusions, Communicate ideas Construct explanations when investigating the energy in different foods</p>

# Science Faculty curriculum overview – Year 7 (KS3)

Topic	Revision/assessment units	Yearly review
Length of topic (in weeks)	3 Weeks	2 Weeks
Links to National Curriculum		
Assessment Task(s)	<ul style="list-style-type: none"> <li>• Half termly tests</li> </ul>	<ul style="list-style-type: none"> <li>• Recall 5</li> <li>• End of Year test (AO2)</li> </ul>
Key Knowledge	See termly units	See termly units
Key Skills	Recall/Memory	Recall/Memory



Topic	1- Digestion	2- Elements	3- Gravity
Length of topic (in weeks)	2 Weeks	2 Weeks	1 Week
Links to National Curriculum	<p>content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed § calculations of energy requirements in a healthy daily diet § the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases § 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) Science – key stage 3 6 § the importance of bacteria in the human digestive system</p>	<p>a simple (Dalton) atomic model            § differences between atoms, elements and compounds            § chemical symbols and formulae for elements and compounds properties of ceramics, polymers and composites (qualitative).</p>	<p>gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)            non-contact forces: gravity forces acting at a distance on Earth and in space,</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.</p>	<p>Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain.</p>	<p>Mass and weight are different but related. Mass is a property of the object; weight depends upon mass but also on gravitational field strength. Every object exerts a gravitational force on every other object. The force increases with mass and decreases with distance. Gravity holds planets and moons in orbit around larger bodies.</p>
Key Skills	<p>Use appropriate units for area measurements. Calculate area for a variety of shapes, including rectangles and cuboids.</p>	<p>Use particle diagrams to classify a substance as an element, mixture or compound and as molecules or atoms. Name simple compounds using rules: change non-metal to -ide; mono, di, tri prefixes; and symbols of hydroxide, nitrate, sulphate and carbonate.</p>	<p>Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg).</p>

Topic	4- Human Reproduction	5- Contact Forces	6- Energy Costs
Length of topic (in weeks)	4 Weeks	3 Weeks	2 Weeks
Links to National Curriculum	<p>§ 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 of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta</p>	<p>similarities and differences, including density differences, between solids, liquids and gases            pressure in liquids, increasing with depth; upthrust effects, floating and sinking            force-extension linear relation; Hooke’s Law as a special case            forces measured in newtons, measurements of stretch or compression as force is changed            other processes that involve energy transfer: stretching a spring            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            work done and energy changes on deformation</p>	
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.</p>	<p>When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object’s form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied.</p> <p><b>Year 7- speed- contact and non contact forces, forces and motion</b></p>	<p>We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages. Calculate the cost of home energy usage, using the formula: cost = power (kW ) x time (hours) x price (per kWh)</p>
Key Skills	<p>An understanding of number, size and scale and the quantitative relationship between units. Using estimations and explaining when they should be used</p>	<p>Sketch the forces acting on an object, and label their size and direction.</p>	<p>substituting values in simple formulae and solving resulting equations</p>

Topic	7- Types of Reactions	8- Universe	9- Breathing	10- Metals and non metals
Length of topic (in weeks)	3 Weeks	3 Weeks	2 Weeks	3 Weeks
Links to National Curriculum	§ chemical reactions as the rearrangement of atoms § representing chemical reactions using formulae and using equations § combustion, thermal decomposition, oxidation and displacement reactions conservation of mass changes of state and chemical reactions.	our Sun as a star, other stars in our galaxy, other galaxies. the light year as a unit of astronomical distance. the seasons and the Earth’s tilt, day length at different times of year, in different hemispheres	Gas exchange Health The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.	§ chemical reactions as the rearrangement of atoms § representing chemical reactions using formulae and using equations § combustion, thermal decomposition, oxidation and displacement reactions
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.	The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies. <b>Keywords</b>	In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing	Metals and non-metals react with oxygen to form oxides which are either bases or acids. Metals can be arranged as a reactivity series in order of how readily they react with other substances. Some metals react with acids to produce salts and hydrogen.
Key Skills	Write word equations from information about chemical reactions.	Using ratios to compare quantities. Writing one number as a fraction of another and converting fractions to decimals. Substituting values into simple formulae and solving resulting equations. Drawing line graphs and scatter graphs, and using these to draw conclusions.	Identify the ranges of readings in data. Explain why data with a small range is of good quality. Calculate means and explain their use. Identify anomalous results in data.	Analyse patterns Discuss limitations Draw conclusions Present data Communicate ideas Construct explanations Estimate risks Examine consequences

# Science Faculty curriculum overview – Year 8 (KS3)

Topic	11- Light	12- Plant Reproduction	13- Magnetism
<b>Length of topic (in weeks)</b>	<b>3 Weeks</b>	<b>3 Weeks</b>	<b>4 Weeks</b>
<b>Links to National Curriculum</b>	<p>the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface  light waves travelling through a vacuum; speed of light  the similarities and differences between light waves and waves in matter  use of ray model to explain the refraction of light and action of convex lens in focusing (qualitative);  the human eye</p>	<p>Reproduction  Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms  The importance of plant reproduction through insect pollination in human food security</p>	<p>Earth’s magnetism, compass and navigation  the magnetic effect of a current, electromagnets, D.C. motors (principles only).</p>
<b>Assessment Task(s)</b>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
<b>Key Knowledge</b>	<p>When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model.</p>	<p>Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary</p>	<p>Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.</p>
<b>Key Skills</b>	<p>Construct ray diagrams to show how light reflects off mirrors, forms images and refracts.</p>	<p>Use appropriate units for area measurements. Calculate areas for squares and rectangles. Use a sample to calculate an estimate of population size.</p>	<p>Present data  Communicate ideas  Construct explanations</p>

# Science Faculty curriculum overview – Year 8 (KS3)

Topic	Revision/assessment units	Yearly review
Length of topic (in weeks)	3 Weeks	2 Weeks
Links to National Curriculum		
Assessment Task(s)	<ul style="list-style-type: none"> <li>• Half termly tests</li> <li>Recall</li> </ul>	<ul style="list-style-type: none"> <li>• Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	See termly units	See termly units
Key Skills	Recall/Memory	Recall/Memory

Topic	1.Periodic Table	2.Inheritance
<b>Length of topic</b>	3 Weeks	3 Weeks
<b>Links to National Curriculum</b>	§ the varying physical and chemical properties of different elements § the principles underpinning the Mendeleev Periodic Table § the Periodic Table: periods and groups; metals and non-metals § how patterns in reactions can be predicted with reference to the Periodic Table § the properties of metals and non-metals § the chemical properties of metal and non-metal oxides with respect to acidity.	Genetics and evolution Inheritance, chromosomes, DNA and genes Heredity as the process by which genetic information is transmitted from one generation to the next, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model Differences between species The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection Changes in the environment may leave some individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
<b>Assessment Task(s)</b>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
<b>Key Knowledge</b>	The elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties.	Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation.
<b>Key Skills</b>	Weigh up the benefits and risks of an application of science to make a decision.	Evaluate the social, economic and environmental consequences of new discoveries and inventions.

# Science Faculty curriculum overview – Year 9 (KS3)

Topic	3.Wave Properties and Effects	4.Earth's Resources
Length of topic	2 Weeks	3 Weeks
Links to National Curriculum	auditory range of humans and animals. sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum pressure waves transferring energy; by ultra-sound light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material colours and the different frequencies of light, white light and prisms (qualitative only);	the order of metals and carbon in the reactivity series § the use of carbon in obtaining metals from metal oxides § Earth as a source of limited resources and the efficacy of recycling
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> <li>Metal extraction – Enquire (AO3b)</li> </ul>
Key Knowledge	A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection. When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy. Light – waves , reflection and refraction (year 8)	There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources. Most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals.
Key Skills	Weigh up the benefits and risks of an application of science to make a decision	Explain why a hypothesis may become stronger after it is tested; describe how controlling variables is important in providing evidence for a conclusion; identify independent and dependent variables and describe how to control variables and identify those that are beyond their control; choose a suitable range of repeated data and identify outliers and discount from mean; having due regard for the correct manipulation of apparatus, the accuracy of measurements, suggest and justify improvements to equipment to lead to more accurate results.

# Science Faculty curriculum overview – Year 9 (KS3)

Topic	5.Evolution	6.Electromagnets
<b>Length of topic</b>	2 Weeks	3 Weeks
<b>Links to National Curriculum</b>	<p>Heredity as the process by which genetic information is transmitted from one generation to the next</p> <p>A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of DNA model</p> <p>Differences between species</p> <p>The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</p> <p>The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection</p> <p>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</p> <p>The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</p>	<p>non-contact forces: forces between magnets magnetic poles, attraction and repulsion</p> <p>magnetic fields by plotting with compass, representation by field lines</p>
<b>Assessment Task(s)</b>	<ul style="list-style-type: none"> <li>• Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>• Recall 5, CUBE, Numeracy</li> </ul>
<b>Key Knowledge</b>	<p>Natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction.</p> <p>Within an ecosystem, having many different species ensures resources are available for other populations, like humans.</p>	<p>An electromagnet uses the principle that a current through a wire causes a magnetic field.</p> <p>Its strength depends on the current, the core and the number of coils in the solenoid.</p>
<b>Key Skills</b>	<p>Evaluate the social, economic and environmental consequences of new discoveries and inventions.</p>	<p>Describe further questions that can be investigated from your conclusions and evaluation.</p> <p>Evaluate the conclusion in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.</p>



# Science Faculty curriculum overview – Year 9 (KS3)

Topic	7. Chemical Energy	8. Respiration	9. Energy in a Thermal Store
Length of topic	4 Weeks	2 Weeks	3 Weeks
Links to National Curriculum	§ what catalysts do. § energy changes on changes of state (qualitative) § exothermic and endothermic chemical reactions (qualitative).	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 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 and the implications for the organism.	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
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic.	Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable. Year 8- breathing- respiratory system, breathing vs respiration	The thermal energy of an object depends upon its mass, temperature and what it's made of. When there is a temperature difference, energy transfers from the hotter to the cooler object. Thermal energy is transferred through different pathways, by particles in conduction and convection, and by radiation.
Key Skills	Describe further questions that can be investigated from your conclusions and evaluation. Evaluate the conclusion in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.	Evaluate the social, economic and environmental consequences of new discoveries and inventions.	Explain why a hypothesis may become stronger after it is tested; describe how controlling variables is important in providing evidence for a conclusion; identify independent and dependent variables and describe how to control variables and identify those that are beyond their control; choose a suitable range of repeated data and identify outliers and discount from mean; having due regard for the correct manipulation of apparatus, the accuracy of measurements, suggest and justify improvements to equipment to lead to more accurate results.



# Science Faculty curriculum overview – Year 9 (KS3)



Topic	10.Climate	11.Pressure
Length of topic	2 Weeks	2 Weeks
Links to National Curriculum	<p>the carbon cycle            § the composition of the atmosphere            § the production of carbon dioxide by human activity and the impact on climate.</p>	<p>atmospheric pressure, decreases with increase of height as weight of air above decreases with height            pressure in liquids, increasing with depth            pressure measured by ratio of force over area – acting normal to any surface.            forces: associated with deforming objects; stretching and squashing – springs</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth’s crust (such as photosynthesis and respiration) as well as human activities (burning fuels). Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. Scientists have evidence that global warming caused by human activity is causing changes in climate.</p>	<p>Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust.            Objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust.            Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces.  <a href="#">Year 7- particles- states of matter and gas pressure</a></p>
Key Skills	<p>Weigh up the benefits and risks of an application of science to make a decision.</p>	<p>Explain why a hypothesis may become stronger after it is tested; describe how controlling variables is important in providing evidence for a conclusion; identify independent and dependent variables and describe how to control variables and identify those that are beyond their control; choose a suitable range of repeated data and identify outliers and discount from mean; having due regard for the correct manipulation of apparatus, the accuracy of measurements, suggest and justify improvements to equipment to lead to more accurate results.</p>

Topic	12.Photosynthesis	13.Work
Length of topic (in weeks)	2 weeks	2 Weeks
Links to National Curriculum	<p>Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots</p> <p>The role of leaf stomata in gas exchange in plants</p> <p>Material cycles and energy</p> <p>Photosynthesis</p> <p>The reactants in, and products of, photosynthesis, and a word summary for photosynthesis</p> <p>The dependence of almost all life on Earth on the ability of photosynthetic organism, such as plants an 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> <p>Adaptations of leaves for photosyntheses</p>	<p>simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged</p> <p>moment as the turning effect of a force</p>
Assessment Task(s)	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>	<ul style="list-style-type: none"> <li>Recall 5, CUBE, Numeracy</li> </ul>
Key Knowledge	<p>Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis.</p> <p>They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis.</p>	<p>Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work.</p> <p>Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction.</p>
Key Skills	<p>Evaluate the social, economic and environmental consequences of new discoveries and inventions.</p>	<p>Weigh up the benefits and risks of an application of science to make a decision.</p>

# Science Faculty curriculum overview – Year 9 (KS3)

Topic	Revision/assessment units	Yearly review
Length of topic (in weeks)	3 Weeks	2 Weeks
Links to National Curriculum		
Assessment Task(s)	<ul style="list-style-type: none"> <li>• Half termly tests</li> <li>Recall</li> </ul>	<ul style="list-style-type: none"> <li>• Recall 5</li> <li>• End of Year test (AO2)</li> </ul>
Key Knowledge	See termly units	See termly units
Key Skills	Recall/Memory	Recall/Memory

## Science Faculty curriculum overview – Year 7 (KS3)

Teaching Beyond the National Curriculum	
Y7 – Acids and Alkalis	Introducing students to common hazard symbols found in science labs and their meanings
Y7 – Variation	Identifying and understanding the difference between continuous and discontinuous data
Y7 – Sound	Investigating and calculating the speed of sound
Y7 – Energy	Renewable and Non-renewable energy sources

## Teaching Beyond the National Curriculum

Y8 – Digestion	'Food Tests' to identify what food groups are found in different meals
Y8 – Human Reproduction	The changes of males and females during puberty Explaining the basics of fertility treatment Discussing the different methods of contraception
Y8 – Energy Costs	Identifying the advantages and disadvantages of different energy resources Evaluating the social, economical and environmental consequences of using resources to generate electricity Using data Energy costs and cost management
Y8 – Universe	The importance of space exploration Understanding how solar and lunar eclipses occur and the phases of the moon
Y8 – Light	Calculating the speed of light Introduction to the electromagnetic spectrum

Teaching Beyond the National Curriculum	
Y9 – Inheritance	How recessive alleles and mutations can result in undesirable characteristics Practice of genetic punnett squares to predict genetic inheritance Case studies (cycstic fibrosis and huntingtons)
Y9 – Earth's Resources	Highlighting the growing threat of global food security and the growing population and identifying potential solutions



# Science curriculum overview KS4



Topic	B1- Cell biology	B2- Organisation
Length of topic (in weeks)	9 Weeks	9 Weeks
Links to specification	4.1	4.2
Assessment Task(s)	Recall 5 Extended response questions- evaluate	Recall 5 Extended response questions- Explain
Key Knowledge	<p>Cells are the basic unit of all forms of life. In this section students explore how structural differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. For an organism to grow, cells must divide by mitosis producing two new identical cells. If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. This phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells. (Culturing microorganisms- Understand bacteria multiply by simple cell division. Bacteria can be grown in a nutrient broth solution or as colonies on an agar gel plate. Uncontaminated cultures of microorganisms are required for investigating the action of disinfectants and antibiotics.)</p>	<p>Students will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. Students will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.</p>
Key Skills	<p>Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue. Investigate the effect of antiseptics or antibiotics on bacterial growth using agar and measuring zones of inhibition.</p>	<p>Use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. Investigate the effect of pH on the rate of reaction of amylase enzyme.</p>

Topic	B3- Infection & response	B4- Bioenergetics
Length of topic (in weeks)	9 Weeks	8 Weeks
Links to specification	4.3	4.4
Assessment Task(s)	Recall 5 Extended response questions-	Recall 5 Extended response questions End of term
Key Knowledge	<p>Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. Unfortunately many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics. Students should be able to describe how monoclonal antibodies are produced. Students should be able to describe some of the ways in which monoclonal antibodies can be used. Plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects.</p>	<p>We will explore how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.</p> <p>Photosynthesis from the start (Year 9)</p>
Key Skills	n/a	Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.

Topic	C1- Atomic structure & Periodic table	C2- Bonding
Length of topic (in weeks)	9 Weeks	9 Weeks
Links to specification	5.1	5.2
Assessment Task(s)	Recall 5 Extended response questions- Explain	Recall 5 Extended response question- Evaluate
Key Knowledge	<p>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 provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.</p> <p>Properties of transition metals</p>	<p>Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. Theories of bonding explain how atoms are held together in these structures. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.</p> <p>Bulk and surface properties of matter including nanoparticles</p>
Key Skills	n/a	n/a

Topic	C3- Quantitative Chemistry	C4- Chemical changes
Length of topic (in weeks)	5 Weeks	8 Weeks
Links to specification	5.3	5.4
Assessment Task(s)	Recall 5 Extended response question-	Recall 5 Extended response question-
Key Knowledge	<p>Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. Chemical reactions can be classified in various ways. Identifying different types of chemical reaction allows chemists to make sense of how different chemicals react together, to establish patterns and to make predictions about the behaviour of other chemicals. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas. Calculation moles and using moles to balance equations. Percentage yield Using concentrations Use of amount of substance in relation to volumes of gases</p>	<p>Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organizing their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'. Titration</p>
Key Skills	n/a	<p>Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. Investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis.</p>

<b>Topic</b>	<b>C5- Energy changes</b>
<b>Length of topic (in weeks)</b>	<b>4 Weeks</b>
<b>Links to specification</b>	<b>5.5</b>
<b>Assessment Task(s)</b>	Recall 5 Extended response question End of term test
<b>Key Knowledge</b>	<p>Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds.</p> <p>Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic.</p> <p>These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications. Some interactions between ions in an electrolyte result in the production of electricity. Cells and batteries use these chemical reactions to provide electricity. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way. Chemical cells and fuel cells</p> <p><b>Energy changes from basics (Year 9)</b></p>
<b>Key Skills</b>	Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.

Topic	P1- Energy	P2- Electricity
Length of topic (in weeks)	9 Weeks	9 Weeks
Links to specification	6.1	6.2
Assessment Task(s)	Recall 5 Extended response question	Recall 5 Extended response question
Key Knowledge	<p>The concept of energy emerged in the 19th century. The idea was used to explain the work output of steam engines and then generalised to understand other heat engines. It also became a key tool for understanding chemical reactions and biological systems. Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage.</p>	<p>Electric charge is a fundamental property of matter everywhere. Understanding the difference in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits. Many circuits are powered with mains electricity, but portable electrical devices must use batteries of some kind. Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control. The fundamentals of electromagnetism were worked out by scientists of the 19th century. However, power stations, like all machines, have a limited lifetime.</p> <p>Static electricity</p>
Key Skills	<p>Investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored.</p>	<p>Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. This should include:</p> <ul style="list-style-type: none"> <li>• the length of a wire at constant temperature</li> <li>• combinations of resistors in series and parallel.</li> </ul> <p>Use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature.</p>

Topic	P3-Particle model of matter	P4- Atomic structure
Length of topic (in weeks)	9 Weeks	8 Weeks
Links to specification	6.3	6.4
Assessment Task(s)	Recall 5 Extended response question	Recall 5 Extended response question
Key Knowledge	<p>The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. It helps us to explain a wide range of observations and engineers use these principles when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. It also explains why it is difficult to make a good cup of tea high up a mountain. Pressure in gases Increasing the pressure of gases</p> <p>(</p>	<p>Ionising radiation is hazardous but can be very useful. Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. Early researchers suffered from their exposure to ionising radiation. Rules for radiological protection were first introduced in the 1930s and subsequently improved. Today radioactive materials are widely used in medicine, industry, agriculture and electrical power generation. Hazards and uses of radioactive emissions and of background radiation. Nuclear fission and fusion</p>
Key Skills	<p>Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects, and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers.</p>	n/a

Topic	B5 - Homeostasis and response	B6 Inheritance, variation and Evolution –
Length of topic (in weeks)	9 Weeks	9 Weeks
Links to specification	4.5	4.6
Assessment Task(s)	Recall 5 Extended response questions- evaluate contraception	Recall 5 Extended response questions- Explain genetic engineering / selective breeding
Key Knowledge	<p>Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about changes.</p> <p>In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.</p> <p>Recall and revision based on B3 as covered in lockdown</p>	<p>In this section we will discover how the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic. Scientists have now discovered how to take genes from one species and introduce them in to the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.</p>
Key Skills	<p>plan and carry out an investigation into the effect of a factor on human reaction time.</p> <p>investigate the effect of light or gravity on the growth of newly germinated seedlings.</p> <p>Record results as both length measurements and as careful, labelled biological drawings to show the effects.</p>	n/a



<b>Topic</b>	<b>B7 Ecology</b>
<b>Length of topic (in weeks)</b>	<b>8 Weeks</b>
<b>Links to specification</b>	<b>4.7</b>
<b>Assessment Task(s)</b>	Recall 5 Extended response questions- describe decomposition
<b>Key Knowledge</b>	The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. These ecosystems provide essential services that support human life and continued development. In order to continue to benefit from these services humans need to engage with the environment in a sustainable way. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being.
<b>Key Skills</b>	Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species. Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.

Topic	C6 The rate and extent of Chemical Change	C7 Organic Chemistry
Length of topic (in weeks)	9 Weeks	5 Weeks
Links to specification	5.6	5.7
Assessment Task(s)	Recall 5 Extended response questions End of term	Recall 5 Extended response questions- Explain
Key Knowledge	<p>Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product. Understanding energy changes that accompany chemical reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way.</p>	<p>The chemistry of carbon compounds is so important that it forms a separate branch of chemistry. A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds. This branch of chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are a major source of feedstock for the petrochemical industry. Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents.</p>
Key Skills	<p>investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity.</p> <p>Recall and revision based on C4 as covered in lockdown</p>	n/a

Topic	C8 - Chemical Analysis	C9 Chemistry of the atmosphere
Length of topic (in weeks)	5 Weeks	5 Weeks
Links to specification	5.8	5.9
Assessment Task(s)	Recall 5 Extended response question- Evaluate	Recall 5 Extended response question-
Key Knowledge	Analysts have developed a range of qualitative tests to detect specific chemicals. The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate. Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. Forensic scientists and drug control scientists rely on such instrumental methods in their work.	The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. Scientists use very complex software to predict weather and climate change as there are many variables that can influence this. The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.
Key Skills	Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R <sub>f</sub> values use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections Flame tests to Sulfates.	n/a

<b>Topic</b>	<b>C10 Using Resources</b>
<b>Length of topic (in weeks)</b>	<b>5 Weeks</b>
<b>Links to specification</b>	<b>5.10</b>
<b>Assessment Task(s)</b>	Recall 5 Extended response question-
<b>Key Knowledge</b>	Industries use the Earth's natural resources to manufacture useful products. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised.
<b>Key Skills</b>	Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation

Topic	P5 Forces	P6 Waves
Length of topic (in weeks)	9 Weeks	9 Weeks
Links to specification	6.5	6.6
Assessment Task(s)	Recall 5 Extended response question – Hooke’s Law, changing momentum	Recall 5 Extended response question - ripple tanks, uses of waves
Key Knowledge	Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way. Recent developments in artificial limbs use the analysis of forces to make movement possible.	Wave behaviour is common in both natural and man-made systems. Waves carry energy from one place to another and can also carry information. Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves. Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.
Key Skills	Investigate the relationship between force and extension for a spring. Investigate the effect of varying the force on the acceleration of an object of constant mass and the effect of varying the mass of an object on the acceleration produced by a constant force. <b>Recall and revision based on P3 as covered in lockdown</b>	Investigate the reflection of light by different types of surface and the refraction of light by different substances investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

Topic	P7 Magnetism and Electromagnetism	P8 Space Physics (Triple only)
Length of topic (in weeks)	6 Weeks	2 weeks
Links to specification	6.7	6.8
Assessment Task(s)	Recall 5 Extended response question - electromagnetic induction	Recall 5 Extended response question Life Cycle of a Star
Key Knowledge	Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this.	Questions about where we are, and where we came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. ‘Dark matter’, which bends light and holds galaxies together but does not emit electromagnetic radiation, is everywhere – what is it? And what is causing the universe to expand ever faster?
Key Skills	n/a	n/a

<b>Topic</b>	<b>Exam preparation</b>	
<b>Length of topic (in weeks)</b>	<b>6 Weeks</b>	
<b>Links to specification</b>		
<b>Assessment Task(s)</b>		
<b>Key Knowledge</b>		
<b>Key Skills</b>		