CURRICULUM – SCIENCE

Intent, Curriculum Map & Age Related Expectations

Abstract

Students are carefully provided with feedback on their learning to enable them to improve.
They gain the knowledge leading onto the skills that are necessary to enable them to become successful lifelong learners.

CWO

Southchurch High School

Contents

Whole School INTENT

Southchurch students embrace learning opportunities.

INTENT, IMPLEMENTATION & IMPACT

INTENT • Southchurch students embrace learning opportunities. • We aim for students to gain a high science capital so our students can flourish into successful adult citizens with a valuable place in society by meeting the demands of growing up in an increasingly technically and scientifically advanced world.
Implementation • Sequencing of the curriculum • Adaptive teaching (to take into account of what the learners know and don't know) • Extending opportunities for extracurricular
Impact • All students will achieve their potential with altered trajectories

KS2 Links

KS2 National Curriculum

UNIT	**KS2 LINKS (PRIOR LEARNING YEAR 5 AND 6)**
Working scientifically	▪ Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ▪ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ▪ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs ▪ using test results to make predictions to set up further comparative and fair tests ▪ reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations ▪ identifying scientific evidence that has been used to support or refute ideas or arguments
Living things and their habitats	▪ describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ▪ describe the life process of reproduction in some plants and animals ▪ describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals ▪ give reasons for classifying plants and animals based on specific characteristics
Animals, including humans	▪ describe the changes as humans develop to old age ▪ identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood ▪ recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function ▪ describe the ways in which nutrients and water are transported within animals, including humans
Properties and changes of materials	▪ compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets ▪ know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ▪ use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating ▪ give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic ▪ demonstrate that dissolving, mixing and changes of state are reversible changes ▪ explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda
Earth and space	▪ describe the movement of the Earth and other planets relative to the sun in the solar system ▪ describe the movement of the moon relative to the Earth ▪ describe the sun, Earth and moon as approximately spherical bodies ▪ use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Forces	▪ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ▪ identify the effects of air resistance, water resistance and friction, that act between moving surfaces ▪ recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect
Evolution and inheritance	▪ recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago ▪ recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents ▪ identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
Light	▪ recognise that light appears to travel in straight lines ▪ use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye ▪ explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes ▪ use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
Electricity	▪ associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ▪ compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches ▪ use recognised symbols when representing a simple circuit in a diagram

CURRICULUM MAP

	Autumn Term		Spring Term		Summer Term		
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	1 17 18 19 20 21	22 23 24 25 26 27	28 29 30 31 32 33	34 35 36 37 38 39 40	
Yr 7	**Enquiry Processes** Feedforward assessment – Exit card mixed ability **Biology - Organisms 1** Feedforward assessment - Exit card mixed ability	**Project (Details TBC)** **Physics – Electromagnets 1** Feedforward assessment - Exit card mixed ability **Chemistry – Matter 1** Feedforward assessment - Exit card mixed ability	**Chemistry – Matter 1** Feedforward assessment – Exit card mixed ability **Project (Details TBC)** **Physics – Forces 1** Feedforward assessment – Exit card mixed ability	**Biology – Genes 1** Feedforward assessment – Exit card mixed ability **Physics – Waves 1** Feedforward assessment – Exit card mixed ability	**Chemistry – Reactions 1** Feedforward assessment – Exit card mixed ability	**Project (Details TBC)** **Biology – ecosystems 1** Feedforward assessment – Exit card mixed ability	AP
Yr 8	**Enquiry Processes** Feedforward assessment – Exit card mixed ability **Physics - Energy 1** Feedforward assessment – Exit card mixed ability **Chemistry – Earth 1** Feedforward assessment – Exit card mixed ability	**Chemistry – Earth 1** Feedforward assessment – Exit card mixed ability **Project (Details TBC)** **Biology – Organisms 2** Feedforward assessment – Exit card mixed ability	**Biology – Organisms 2** Feedforward assessment – Exit card mixed ability **Physics – Forces 2** Feedforward assessment – Exit card mixed ability	**Chemistry – Reactions 2** Feedforward assessment – Exit card mixed ability **Physics – electromagnets 2** Feedforward assessment – Exit card mixed ability **Project (Details TBC)**	**Biology – ecosystems 2** Feedforward assessment – Exit card mixed ability **Chemistry – Earth 2** Feedforward assessment – Exit card mixed ability	**Physics – Waves 2** Feedforward assessment – Exit card mixed ability **Project (Details TBC)**	AP
Yr 9	**Chemistry – Matter 2** Feedforward assessment – Exit card mixed ability **Biology – Genes 2** Feedforward assessment – Exit card mixed ability	**B1 – cell structure and transport** Feedforward assessment – Exit card mixed ability **C1 – atomic structure** Feedforward assessment – Exit card mixed ability **P1 - conservation and dissipation of energy** Feedforward assessment – Exit card mixed ability	**B2 – cell division** Feedforward assessment – Exit card mixed ability **C2 – the periodic table** Feedforward assessment – Exit card mixed ability **P2 - energy transfers** Feedforward assessment – Exit card mixed ability	**B3 – organization and the digestive system** Feedforward assessment – Exit card mixed ability **C3 – structure and bonding** Feedforward assessment – Exit card mixed ability **P3 - energy resources** Feedforward assessment – Exit card mixed ability	**B4 – organizing animals and plants** Feedforward assessment – Exit card mixed ability **C4 – chemical calculation** Feedforward assessment – Exit card mixed ability	**P4 – electrical circuits** Feedforward assessment – Exit card mixed ability **B5 – communicable diseases** Feedforward assessment – Exit card mixed ability	AP
Yr 10	**P1 – conservation and dissipation of energy** Feedforward assessment – Exit card H / F	**B6 – preventing and treating disease** Feedforward assessment – Exit card H / F	**C8 – rates and equilibrium** Feedforward assessment – Exit card H / F	**P9 – motion** Feedforward assessment – Exit card H / F	**B10 – the human nervous system** Feedforward assessment – Exit card H / F	**C14 – earths resources** Feedforward assessment – Exit card H / F	Revision / End of year Exami

	B5 – communicable diseases Feedforward assessment – Exit card H / F **C6 - electrolysis** Feedforward assessment – Exit card H / F **P2 – energy transfers** Feedforward assessment – Exit card H / F	**C7 – energy changes** Feedforward assessment – Exit card H / F **P3 – energy resources** Feedforward assessment – Exit card H / F **B7 – non-communicable diseases** Feedforward assessment – Exit card H / F		**P8 – forces in balance** Feedforward assessment – Exit card H / F **B8 - photosynthesis** Feedforward assessment – Exit card H / F **C9 – crude oil and fuels** Feedforward assessment – Exit card H / F	**B9 – respiration** Feedforward assessment – Exit card H / F **C12 – chemical analysis** Feedforward assessment – Exit card H / F **P10 – force and motion** Feedforward assessment – Exit card H / F		**C13 – the earths atmosphere** Feedforward assessment – Exit card H / F **P12 – wave properties** Feedforward assessment – Exit card H / F **B11 – hormonal coordination** Feedforward assessment – Exit card H / F	**P13 – electromagnetic waves** Feedforward assessment – Exit card H / F		nation Rehearsals
Year 10 T	**PAPER 1 TRIPLE CONTENT (FROM YEAR 9 MODULES)** **P1 – conservation and dissipation of energy** Feedforward assessment – Exit card H TRIPLE	**B5 – communicable diseases** Feedforward assessment – Exit card H TRIPLE **C6 - electrolysis** Feedforward assessment – Exit card H TRIPLE **P2 – energy transfers** Feedforward assessment – Exit card H TRIPLE		**B6 – preventing and treating disease** Feedforward assessment – Exit card H TRIPLE **C7 – energy changes** Feedforward assessment – Exit card H TRIPLE **P3 – energy resources** Feedforward assessment – Exit card H TRIPLE	**B7 – non communicable disease** Feedforward assessment – Exit card H TRIPLE **C8 – rates and equilibrium** Feedforward assessment – Exit card H TRIPLE **P8 – forces in balance** Feedforward assessment – Exit card H TRIPLE **C9 – crude oil and fuels** Feedforward assessment – Exit card H TRIPLE		**P8 – forces in balance** Feedforward assessment – Exit card H TRIPLE **B9 - respiration** Feedforward assessment – Exit card H TRIPLE **C10 – organic reactions (triple only)** Feedforward assessment – Exit card H TRIPLE **C11 – polymers (triple only)** Feedforward assessment – Exit card H TRIPLE	**P10 – force and motion** Feedforward assessment – Exit card H TRIPLE **B10 – the human nervous system** Feedforward assessment – Exit card H TRIPLE **C12 - polymers** Feedforward assessment – Exit card H TRIPLE **P11 – force and pressure (triple only)** Feedforward assessment – Exit card H TRIPLE	Revision	End of year Examination Rehearsals
Yr 11	**B10 – human nervous system** Formative assessment – Exit card H / F **B11- - hormonal coordination** Formative assessment – Exit card H / F **C12 - polymers** Formative assessment – Exit card H / F **P10 – force and motion** Formative assessment – Exit card H / F	**B13 - reproduction** Formative assessment – Exit card H / F **P12 – wave properties** Formative assessment – Exit card H / F **P13 – electromagnetic waves** Formative assessment – Exit card H / F		**B14 – variation and evolution** Formative assessment – Exit card H / F **B15 – genetics and evolution** Formative assessment – Exit card H / F **P15 – electromagnetism** Formative assessment – Exit card H / F	**REVISION**		**REVISION**	**EXAMS**		
	Examination Rehearsal 1 - (December)									

KS5 Links

GCE AS and A level subject content for biology, chemistry, physics and psychology

AGE RELATED EXPECTATIONS

YEAR 7

Biology					
	Topics / Units	**Cells**	**Body Structure & Systems**	**Human Reproduction**	**Interdependence**
4	**EXPERT**	• I can make deductions about how medical treatments work based on cells, tissues, organs and • systems. • I can explain how specialised cells are adapted to carry out their functions.	• I can predict the consequences of damage to a joint, bone or muscle, and research how technology can improve human movement. • I can explain how exercise, smoking and asthma affect the gas exchange system.	• I can research and evaluate the use of various fertility treatments according to the couple's needs. • I can explain why pregnancy is more or less likely at certain stages of the menstrual cycle.	• I can evaluate the link between instinct and survival. • I can construct classification keys to distinguish between a groups of organisms based on their features.
3	**ADVANCED**	• I can suggest what kind of tissue or organism a cell is part of, based on its features. • I can complete labelled diagrams of specialised cells.	• I can suggest why organs such as heart or a chicken wing contain muscle tissue. • I can explain how the parts of the gas exchange system are adapted to their function.	• I can suggest how contraception and fertility treatments work. • I can use diagram to show stages in development of a foetus from the production of sex cells to birth.	• I can suggest how specific behavioural and physical adaptations can be an advantage for an animal. • I can suggest effects of environmental changes on a species' population.
2	**DEVELOPING**	• I can use a light microscope to observe and draw • cells. • I can name some common cells, tissues, organs and organ systems in the human body. • I can describe features an animal cell and a plant cell.	• I can describe muscles create movement when one contracts and the other relaxes. • I can describe the role of oxygen in respiration using the word equation. • I can measure and compare your heart rate in bpm • before and after exercise.	• I can complete labelled diagrams of a of male and female reproductive organs. • I can describe key events on a diagram of the menstrual cycle. • I can identify foetus relies on mother for nutrients and oxygen.	• I can suggest benefits of adaptations for various • predators and their prey. • I can describe features used to classify into 5 different groups. • I can describe typical adaptations of herbivores and • carnivores.
1	**POTENTIAL**	• I can state multicellular organisms are composed of • cells. • I can identify parts of a microscope.	• I can identify the parts of the human skeleton. • I can name organs in the respiratory system.	• I can state the egg must fertilised by a sperm for a foetus to develop. • I can state menstrual cycle last approx. 28 days.	• I can name the 5 animal classes. • I can identify predators are dependent on their prey for survival.

Chemistry					
	Topics / Units	**States & Particles**	**Atoms, Elements & Compounds**	**Separating Techniques**	**Introduction to Reactions**
4	**EXPERT**	• I can evaluate observations that provide evidence for the existence of particles. • I can explain the properties of solids, liquids and gases based on the arrangement and movement of • their particles.	• I can compare and contrast the properties of elements and compounds and give a reason for their differences. • I can predict displacement reactions using word equations.	• I can suggest a combination of methods to separate a complex mixture and justify the choices. • I can explain how substances dissolve using the particle model.	• I can explain the difference between combustion or • thermal decomposition. • I can compare the pros and cons of fossil fuels in terms of their products of combustion and their effect on the environment.
3	**ADVANCED**	• I can draw before and after diagrams of particles to explain observations gas pressure and diffusion. • I can explain changes in states in terms of changes to the energy of particles.	• I can represent atoms, molecules and elements, mixtures and compounds using particle diagrams • I can translate chemical formulae to give the name and number of elements present.	• I can choose the most suitable technique to separate out a mixture of substances. • I can investigate factors effecting solubility.	• I can explain the dangers of carbon monoxide. • I can describe the mains steps in fractional distillation.
2	**DEVELOPING**	• I can describe movement and energy of particles in • solid, liquids and gases. • I can identify what is meant by melting, freezing, condensing, sublimation. • I can identify solids, liquids and gases from particle diagrams.	• I can use symbols to represent the elements in a sulphate, nitrate and hydroxide group. • I can describe rules for naming simple compounds • e.g. - non-metal: -ide. • I can name compounds using their chemical • formulae.	• I can describe the main stages and apparatus in filtration and distillation. • I can draw simple particle diagrams to show mixtures and dissolved substances e.g. air, sea • water, fruit juice. • I can state mixtures may be separated due to differences in their physical properties.	• I can complete word equations for • complete/incomplete combustion. • I can use the fire triangle to suggest the best method to extinguish a fire. • I can describe what is meant by a hydrocarbon and • give some examples.
1	**POTENTIAL**	• I can arrange unknown substances in solids liquids • and gases. • I can state properties of solids, liquids and gases.	• I can state the chemical symbols for some common elements. • I can identify elements, mixtures and compounds • from particle diagrams.	• I can state a pure substance consists of only one type of particle and has its own boiling/melting • point. • I can identify common physical and chemical changes.	• I can state the meaning of combustion. • I can identify common fuels.

Physics				
	Topics / Units	**Energy**	**Forces**	**Sound & Waves**
4	**EXPERT**	• I can explain why processes such as swinging pendulums or bouncing balls cannot go on forever. • I can suggest the mechanism responsible for energy changing form one store to another.	• I can explain how the effects of drag and other forces on falling or accelerating objects change as they move. • I can compare the behaviour of different materials when stretched and squashed using the idea of • proportionality.	• I can suggest the effects of particular ear problems on a person's hearing. • I can explain how sound waves are used for echolocation/sonar.
3	**ADVANCED**	• I can illustrate energy transfer by particles in conduction and convection, and by radiation. • I can draw simple diagrams to show how energy changes from one store to another.	• I can hypothesise how sports or vehicle technology reduces frictional or drag forces. • I can calculate resultant force on an object and describe the effect on motion.	• I can use drawings of waves to describe how sound waves change with volume or pitch. • I can describe the function of different parts of the ear.
2	**DEVELOPING**	• I can calculate wasted energy when given values of • input and output energy. • I can identify thermal conductors and insulators. • I can state energy content of food is measured in kilojoules (kJ) or calories.	• I can use formula: weight (n) = mass (kg) x gravitational field strength (n/kg). • I can investigate what happens to the length of a spring when the force on it changes. • I can describe balanced and unbalanced forces using • simple free body diagrams.	• I can describe how amplitude and frequency of a wave affects volume and pitch. • I can complete a labelled diagram showing parts of the ear. • I can complete diagrams of longitudinal waves.
1	**POTENTIAL**	• I can name 5 energy stores. • I can state energy is measured in Joules.	• I can name common force pairs. • I can state a force can cause a push pull or twist.	• I can describe the movement of particles as a wave moves through a medium. • I can state all waves carry energy.

YEAR 8

Biology				
	Topics / Units	**Respiration and Photosynthesis**	**Health and Digestion**	**Inheritance, Variation and Evolution**
4	**EXPERT**	• I can assess similarities and differences between aerobic and anaerobic respiration, and the conditions which cause them to • occur. • I can suggest reasons for particular adaptations of leaves, roots and stems, and types of tropism.	• I can make deductions from medical symptoms showing problems with the digestive system e.g. cystic fibrosis. • I can design a diet for a person with specific dietary needs e.g. cystic fibrosis.	• I can evaluate applications of genetic modification and cloning. • I can suggest how a species changing over time supports natural selection.
3	**ADVANCED**	• I can investigate factors effecting rate of respiration in yeast and/or photosynthesis in plants. • I can investigate the presence of starch as a product of photosynthesis in leaves.	• I can combine the events that take place in order to turn a meal into simple food molecules inside a cell. • I can outline how organs and tissues involved in digestion are adapted for their role.	• I can explain what is meant by the theory of evolution. • I can construct bar charts or line graphs to show discontinuous or continuous variation • data.
2	**DEVELOPING**	• I can sketch a line graph to show how the rate of photosynthesis is affected by changing conditions. • I can describe ways in which plants obtain resources for photosynthesis. • I can use word equations to describe aerobic and anaerobic respiration and photosynthesis.	• I can describe simple tests for the presence of sugar, starch and protein. • I can calculate food requirements for a healthy diet, using information provided. • I can describe possible health effects of unbalanced diets	• I can use a diagram to show how number of chromosomes in gametes changes during fertilisation. • I can use a diagram to show the relationship between DNA, chromosomes and genes. • I can describe what is meant by natural selection and selective breeding.
1	**POTENTIAL**	• I can describe respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy. • I can know iodine is used to test for the presence of starch.	• I can describe the function of the different nutrients in a balanced diet. • I can name the organs in the digestive system.	• I can describe genes as sections of DNA which code for inherited characteristics. • I can identify inherited and environmental characteristics.

Chemistry						
	Topics / Units	**The Periodic table**	**Acids and Alkalis**	**Metals, non-metals and chemical reaction**	**Atmosphere**	**Earth's resources**
4	**EXPERT**	• I can suggest elements for different applications based on their position • in the periodic table. • I can predict the position of an element in the periodic table based on information about its physical and chemical • properties.	• I can suggest applications and uses of acids/alkalis. • I can evaluate the pros and cons of different indicators.	• I can predict the position of an element in the periodic table based on information about its physical and chemical • properties. • I can use particle diagrams to represent oxidation, displacement and metal-acid • reactions.	• I can evaluate the implications of a proposal to reduce • carbon emissions. • I can compare the relative effects of human-produced and natural global warming.	• I can evaluate environmental and economic reasons for • recycling materials. • I can suggest ways in which waste products from industrial processes could be reduced.
3	**ADVANCED**	• I can use data showing a pattern in physical properties to estimate a missing value for an element. • I can use observations of a pattern in chemical reactions to predict the behaviour of an element in a group. • .	• I can choose the most suitable indicator to distinguish between solutions of different ph. • I can use data and observations to determine the ph of a solution and explain what this shows.	• I can use particle diagrams to represent oxidation, displacement and metal-acid • reactions. • I can use experimental observations to distinguish exothermic and endothermic • reactions.	• I can describe how global warming can impact on climate and ecosystems. • I can use a diagram to show how carbon is • recycled in the environment (carbon cycle).	• I can suggest ways in which changes in behaviour and the use of alternative materials may • limit the consumption of natural resources. • I can explain the impact of polymer use / disposal • on the environment.
2	**DEVELOPING**	• I can use the reactivity series to predict successful displacement reactions. • I can describe the elements in a group all react in a similar way. • I can identify alkali metals, halogens and noble gases as group 1, 7 and 0.	• I can complete word equations to give name of the salt produced during a neutralisation • reaction. • I can describe a method to make a neutral solution from an acid and • alkali. • I can describe the strength of an acid/alkali using the ph scale.	• I can use observations of a pattern in chemical reactions to order metals in terms of • reactivity. • I can describe energy is required to break bond and released when making bonds. • I can state was is meant by endothermic and exothermic.	• I can describe gas tests (and positive results) for co2 and o2. • I can describe the composition of the atmosphere. • I can name sources and stores of carbon dioxide.	• I can describe how less reactive metals can be extracted with carbon/ more reactive metals • with electrolysis. • I can describe properties and applications of some common polymers. • I can state recycling reduces the need to • extract resources.
1	**POTENTIAL**	• I can state metals are generally found on the left side of the table, non-metals on the right. • I can state periodic table arranged in groups and periods.	• I can state acids and alkalis can be corrosive or irritant and require safe handling / hazard symbols. • I can name some common acids and alkalis.	• I can describe the properties of metals and • non-metals. • I can identify metals on the periodic table.	• I can state there is a link between human activity and global warming. • I can name some greenhouse gases.	• I can state most metals must be extracted from their ores. • I can name some of earth limited resources.

Physics							
	Topics / Units	**Pressure**	**Motion**	**Light**	**Energy resources**	**Electricity**	**Electromagnets**
4	**EXPERT**	• I can research the idea of pressure changing with depth to explain • underwater effects. • I can investigate the effect increasing applied force, pressure and area in hydraulics.	• I can explain how an object's speed changes when the forces on it change as it approaches • top speed. • I can hypothesise how the motion of two objects moving at different speeds in the same direction would appear to the other.	• I can explain (with ray diagrams) how a device with multiple mirrors works. • I can explain observations where coloured lights are mixed or objects are viewed in • different lights.	• I can research alternative methods for generating energy in the future. • I can compare the advantages and disadvantages of different energy • resources.	• I can compare the advantages of series and parallel circuits for • particular uses. • I can suggest the how changing resistance of a component will affect the current flow in series and • parallel circuits.	• I can predict the pattern of field lines and the force around two magnets placed near each • other. • I can evaluate the design of a device using an electromagnet • e.g. bells/ loudspeakers and suggest improvements.
3	**ADVANCED**	• I can compare how the effects of forces are different because of differences in the area over which • they are applied. • I can demonstrate why objects either sink or float depending upon their weight and the up thrust acting on them • using diagrams.	• I can compare how the speed of an object varies when measured by observers who are not moving, or moving relative to the object. • I can interpret a straight line on a distance-time graph shows constant speed, a curving line shows acceleration.	• I can construct ray diagrams to describe how light passes through lenses and transparent • materials. • I can illustrate how light bends towards (or away) from the normal; when it enters a more (or less) • dense medium.	• I can suggest some pros and cons of generating electrical energy. • I can investigate the energy stored in a variety of fuels.	• I can complete circuit diagrams using rule: in a parallel circuit, current divides between the different loops. • I can complete circuit diagrams using rule: in a • series circuit, current divides between the different loops.	• I can construct diagrams of magnetic fields by drawing field lines to show the strength and direction • I can investigate how an electromagnet can be made and • how to change its strength.
2	**DEVELOPING**	• I can calculate using the formula: fluid pressure, or stress on a surface = force (n)/area (m2). • I can convert kilo newton's, and kilo pascals into newton's • and pascals (s.i units).	• I can calculate using the formula: speed = distance (m)/time (s) or distance-time graphs, to calculate speed. • I can convert kilometres, minutes	• I can construct ray diagrams to show how light reflects. • I can identify how a light ray meets a different medium some of it is absorbed and some	• I can draw a diagram of energy transfers from a renewable or non-renewable source to • electricity.	• I can interpret circuit diagrams to construct real series and parallel circuits, and vice versa. • I can measure current and	• I can use field lines to show how the direction or strength of the field around a magnet varies. • I can construct a functioning

		• I can interpret pressure acts in a fluid in all directions. it increases with depth due to the • increased weight of fluid, and results in an up thrust.	and hours into metres and seconds (s.i units). • I can illustrate a journey with changing speed on a distance time graph, and label changes in motion.	• reflected. • I can state light travels at 300 million metres per second in a vacuum.	• I can describe the main energy transfers used by a variety of power stations/energy • resources. • I can describe the difference between renewable and non- • renewable resources.	voltage in simple circuits. • I can state current is a movement of electrons.	electromagnet using a circuit diagram. • I can describe factors which will affect the strength of a regular • or electromagnet.
1	**POTENTIAL**	• I can identify different stresses on a solid object can be used to explain observations where objects scratch, sink into • or break surfaces. • I can describe objects sink or float depending on whether the weight of the object is bigger or smaller than the up • thrust.	• I can identify in units for speed as m/s • I can describe how if resultant force on an object is non-zero, its motion slows down, speeds up or changes direction.	• I can state different colours of light have • different wavelengths. • I can state light is wave which travels in straight lines.	• I can list common energy resources. • I can know energy is measured in joules or kilojoules.	• I can state current is measured in amps and voltage is measure in • volts. • I can name some common conductors and insulators.	• I can identify two 'like' magnetic poles repel and two 'unlike' magnetic poles attract. • I can state field lines flow from the north-seeking pole to the south-seeking pole.

YEAR 9

Biology				
	Topics / Units	**Cells and transportation**	**Organisation**	**Infection and response**
4	**EXPERT**	• I can fully evaluate the practical risks and benefits of therapeutic cloning, as well as social and ethical issues, of the use of stem cells in medical research and treatments. • I can partially compare the similarities and difference between diffusion, osmosis and active transport. • I can fully plan an investigating the action of disinfectants and antibiotics. • I can calculate cross-sectional areas of colonies or clear areas around colonies using πr^2 in standard form. • I can fully explain adaptations to surface area to volume ratio and exchange surfaces in the following examples: small intestine and lungs in mammals, gills in fish, and the roots and leaves. • I can fully calculate the percentage gain or loss of water uptake using osmosis investigation data.	• I can fully evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant. • I can fully explain how the structure of root hair cells, xylem and phloem are adapted to their functions. • I can fully explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration.	● know that: the pathogens that cause malaria are protists; the malarial protist has a life cycle that includes the mosquito; malaria causes recurrent episodes of fever and can be fatal; the spread of malaria is controlled by preventing the vectors, mosquitos, from breeding and by using mosquito nets to avoid being bitten. ● know that: rose black spot is a fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early; it affects the growth of the plant as photosynthesis is reduced; it is spread in the environment by water or wind; rose black spot can be treated by using fungicides and/or removing and destroying the affected leaves.
3	**ADVANCED**	• .I can fully describe how microscopy techniques have developed over time and the differences between a lens microscope and electron microscope. • I can fully describe therapeutic cloning for humans and plants. • I can calculate the order of magnitude larger/smaller organelles are to the size of the cell. • Including use of standard form. • I can calculate the number of bacteria in a population after a certain time if given the mean division time. • I can fully describe therapeutic cloning for humans. • I can fully calculate the surface area to volume ratio in the context of diffusion. • I can partially explain adaptations to surface area to volume ratio and exchange surfaces in the following examples: small	• I can describe all of the key stages to test food for carbohydrates, lipids and proteins. I can discuss all the different risk factors that can lead to ill health both mentally and physically. • I can fully discuss the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally. • I can describe how stomata and guard cells regulate the diffusion of water and gas exchange in a leaf/plant. • I can all of the key steps to determine a factor that affect enzyme activity. • I can describe the relationship between health and disease and the interactions between different types of disease. • I can describe what sampling is when collection data related to health/disease patterns. • I can also discuss the benefits of sampling in terms of time and money.	● know that: bacteria and viruses may reproduce rapidly inside the body; bacteria may produce poisons (toxins) that damage tissues and make us feel ill; viruses live and reproduce inside cells, causing cell damage. ● know that: measles is a viral disease showing symptoms of fever and a red skin rash; measles is a serious illness that can be fatal if complications arise and, for this reason, most young children are vaccinated against measles; the measles virus is spread by inhalation of droplets from sneezes and coughs. ● know that: HIV initially causes a flu-like illness and, unless successfully controlled with antiretroviral drugs, the virus attacks the body's immune cells; late stage HIV infection, or AIDS, occurs when the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers; HIV is spread by sexual

		intestine and lungs in mammals, gills in fish, and the roots and leaves • I can partially plan an investigation of one variable in an osmosis investigation. • I can partially calculate the percentage gain or loss of water uptake using osmosis investigation data.	• I can explain how the structures of plant tissues are related to their functions. • I can partially explain how the structure of root hair cells, xylem and phloem are adapted to their functions.	contact or exchange of body fluids such as blood which occurs when drug users share needles.
2	**DEVELOPING**	I can fully describe differences between eukaryotes and prokaryotes cells. I can carry out calculations involving magnification, real size and image size without the given formula. • I can fully describe the key stages of needed for looking at cells under a microscope and draw organelles or cells in an appropriate way. • I can fully describe the aseptic technique for the culture of bacteria. • I can partially plan an investigating the action of disinfectants and antibiotics. • I can calculate cross-sectional areas of colonies or clear areas around colonies using πr^2. • I can apply my knowledge of mitosis and recognise or describe situations where mitosis is occurring in a new situation. • I can compare the similarities and difference in stems cells from embryos, bone marrow and meristem tissue in plants. • I can fully explain how the organelles in animal, plant and bacterial cells are related to their functions. • I can calculate the order of magnitude larger/smaller organelles are to the size of the cell. I can partially describe how microscopy techniques have developed over time and the differences between a lens microscope and electron microscope. • I can partially describe the key stages of needed for looking at cells under a microscope and draw organelles or cells in an appropriate way.	I can describe how the hearts natural resting heart rate is controlled by a group of cell and explain how artificial pacemakers are used to correct irregularities in the heart rate. I can partially evaluate the advantages and disadvantages of treating cardiovascular • diseases by drugs, mechanical devices or transplant. • I can state examples of risk factors that can lead to ill health. • I can partially discuss the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally. • I can fully identify a correlation between 2 variables in data in relation to incidence of diseases by looking at data plotted on a graph. • I can state and discuss both lifestyle and genetic factors for developing cancer. • I can describe how xylem and phloem transport substances in plants. • I can describe the production, storage and use of bile in the digestive system. • I can describe most of the key stages to test food for carbohydrates, lipids and proteins. • I can plan most of the key steps to determine a factor that affect enzyme acitivity. • I can describe all of the ways the lungs is adapted for gaseous exchange. I can explain how the structure of these vessels relates to their functions. • I can describe either advantages or disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant.	● describe the process of discovery and development of potential new medicines, including preclinical and clinical testing. ● know that traditionally drugs were extracted from plants and microorganisms (e.g. the heart drug digitalis originates from foxgloves, the painkiller aspirin originates from willow, penicillin was discovered by Alexander Fleming from the Penicillium mould.) • know that white blood cells help to defend against pathogens by: phagocytosis, antibody production and antitoxin production. ● know that antibiotics, such as penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body; it is important that specific bacteria should be treated by specific antibiotics. ● know that the use of antibiotics has greatly reduced deaths from infectious bacterial diseases but the emergence of strains resistant to antibiotics is of great concern. ● know that antibiotics cannot kill viral pathogens. ● know that painkillers and other medicines are used to treat the symptoms of disease but do not kill pathogens. ● understand that it is difficult to develop drugs that kill viruses without also damaging the body's tissues.

		• I can partially describe the aseptic technique for the culture of bacteria. • I can identify where stems cells are located in humans and plants. • I can partially describe therapeutic cloning. • I can partially plan an investigation of one variable in an osmosis investigation. I can calculate the percentage of water uptake using osmosis investigation data. • I can partially compare the similarities and difference between diffusion, osmosis and active transport • I can describe the function of most organelles in animal, plant and bacterial cells. • I can state names of specialised cells and define differentiated cells. • I can define what a stem cell is. • I can carry out calculations involving magnification, real size and image size with the given formula: magnification = size of real image/object. • I can describe the 3 key stages of how a cell divides (mitosis). I can explain how the 3 factors that affect the rate of diffusion. • I can describe examples of active transport: Mineral ions movement in plants and sugar movement in the gut.	• I can draw, read from and interpret tables, charts and graphs relating to the following incidences of disease; transpiration in plant. • I can compare the similarities and differences of benign and malignant tumours. • I can describe how the tissue in leaves are adapted to carry out their roles in the organ. • I can calculate the rate of activity for chemical reactions of an enzyme. • I can describe word equations for the catalytic breakdown of large molecules to smaller molecules using amylase, proteases and lipases. • I can describe how the body uses the products of digestion. • I can describe some of the ways the lungs is adapted for gaseous exchange. • I can locate where the group of cells control the hearts natural resting heart rate. • I can explain how blood cells are adapted to their function. • I can define communicable and non-communicable disease and give examples of each. • I can describe the functions for the structures of plant tissues.	
1	**POTENTIAL**	• I can partially state differences between eukaryotes and prokaryotes cells. • I can use estimations to relative size of each organelle (when a scale drawing is given) and explain when they should be used to judge the relative size or area of organelles. • I state the names of different microscopy techniques. • I can, when given information, identify 3 stages of the cell cycle. • I can, with given information, partially calculate the surface area to volume ratio in the context of diffusion. • I can calculate the rate of water uptake using osmosis investigation data.	• I can describe the function of each organ in the digestive system. I can describe the factors that affect the activity of an enzyme. • I can name where amylase, proteases and lipases and produced in the body. • I can describe key features each of the 3 blood vessels. • I can calculate the rate of blood flow or rate of transpiration, using data given. I can recognise different types of blood cells in a photograph or diagram. • I can describe the issues of specific cardiovascular diseases such as problems with • coronary heart disease, heart valves, and heart failure.	• know that: pathogens are microorganisms that cause infectious disease; they may be viruses, bacteria, protists or fungi; they may infect plants or animals and can be spread by direct contact, by water or by air. ● know that tobacco mosaic virus (TMV) is a widespread plant pathogen affecting many species of plants including tomatoes: it gives a distinctive 'mosaic' pattern of discolouration on the leaves which affects the growth of the plant due to lack of photosynthesis. ● know that: salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions; in the UK, poultry are vaccinated against

		• I can name and label the organelles in animal, plant and bacteria cells. • I can state the names of equipment and stains needed for looking at cells under a microscope. • I can state the time it takes to for bacteria to complete binary fission. • I can state the names of apparatus/equipment for the culture of bacteria. • I can define and identify the locations of nucleus, chromosomes, gene, DNA. I can define diffusion and state 3 factors that affect the rate of diffusion. • I can define osmosis and active transport. • I can state the names of apparatus/equipment needed for an osmosis investigation.	• I can define and compare the relative sizes of cells, tissues, organs and organ systems. • I can name and identify the locations of organs in the digestive system. I can describe the stages of 'lock and key' mechanism of an enzyme. • I can some of the apparatus/equipment needed to test food for carbohydrates, lipids and proteins. • I can plan some of the key steps to determine a factor that affect enzyme activity. • I can name and label the structures of the heart and lungs. I can describe the basic function of the heart and lungs. • I can state the names and functions of key components of blood. • I can state what cancer is and how it grows. • I can name and label key structures of plant tissues.	salmonella to control the spread; fever, abdominal cramps, vomiting and diarrhoea are caused by the bacteria and the toxins they secrete. ● know that: gonorrhoea is a sexually transmitted disease (STD) with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating; it is caused by a bacterium and was easily treated with the antibiotic penicillin until many resistant strains appeared; gonorrhoea is spread by sexual contact; the spread can be controlled by treatment with antibiotics or the use of a barrier method of contraception such as a condom. ● know that if a pathogen enters the body the immune system tries to destroy the pathogen ● know that vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies; if the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection.

Chemistry				
	Topics / Units	**Atomic structure and the periodic table**	**Bonding, structure and properties of matter**	**Chemical Analysis**
4	**EXPERT**	● Predict possible reactions and probable reactivity of elements from their positions in the periodic table. • Suggest suitable separation and purification techniques for mixtures when given appropriate information.	• describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent molecules or giant structures • deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule	• I can determine Rf values from chromatograms without support of an equation. I can fully explain how paper chromatography separates mixtures in terms of distribution of a substance between the mobile and stationary phase. • Suggest how chromatographic methods can be used for distinguishing pure substances from impure substances. • I can write balanced equations for the reactions to produce the insoluble metal hydroxides.
3	**ADVANCED**	● Describe, explain and give examples of the physical processes of separation such as crystallisation and fractional distillation ● Describe why the new evidence from the scattering experiment led to a change in the atomic model ● Describe the difference between the plum pudding model of the atom and the nuclear model of the atom. ● Know that: the number of protons in an atom of an element is its atomic number; all atoms of a particular element have the same number of protons; atoms of different elements have different numbers of protons.	• the particles are atoms which share pairs of electrons; for metallic bonding the particles are atoms which share delocalised electrons. ● know that Ionic bonding occurs in compounds formed from metals combined with non-metals, covalent bonding occurs in most non-metallic elements and in compounds of non-metals, and metallic bonding occurs in metallic elements and alloys. ● write balanced half equations and ionic equations where appropriate	• I can describe all of the steps in order to carry out a chromatography. • I can begin to describe multiple test needed to determine the content of pure unknown compounds.
2	**DEVELOPING**	• Write formulae and balanced chemical equations for the reactions in this specification. ● Know the relative electrical charges of the particles in atoms and that the number of electrons is equal to the number of protons in the nucleus so atoms have no overall electrical charge. ● Use the nuclear model to describe atoms. ● Know that the sum of the protons and neutrons in an atom is its mass number; atoms of the same element can have different numbers of neutrons; and these atoms are called isotopes of that element.	● know that metal atoms lose electrons to become positively charged ions and non-metal atoms gain electrons to become negatively charged ions. ● know that the ions produced by metals in Groups 1 and 2 and by non-metals in Groups 6 and 7 have the electronic structure of a noble gas (Group 0).	• I can begin to explain how paper chromatography separates mixtures in terms of distribution of a substance between the mobile and stationary phase. • I can identify the mobile and stationary phases in a chromatography experiment. • I can describe the method to form precipitates to identify unknown solution of metal ions.

				• I can recall of precipitates when sodium hydroxide is added to solutions of copper (II), iron (II) and iron (III), aluminium, calcium and magnesium ions. • I can recall the test and results for carbonates. • I can interpret chromatograms for example: pure vs mixture; solubility of spot; determining composition of formulation. • I can use melting point and boiling point data to distinguish pure from impure substances. • I can describe some of the steps in order to carry out a chromatography. • I can recall the flame colours that identify lithium, sodium, potassium, calcium and copper ions and vice versa. • I can recall the test and results for chloride, bromide and iodide ions. • I can state the reasons for using instrumental analysis.
1	**POTENTIAL**	**Atomic Structure and the Periodic Table** ● Use the names and symbols of the first 20 elements in the periodic table, the elements in Groups 1 and 7, and some other elements ● Name compounds of these elements from given formulae or symbol equations ● Write word equations for the reactions in this specification ● ● Know the approximate size of an atom and the relative size of the nucleus ● Know the relative masses of protons, neutrons and electrons ● Calculate the numbers of protons, neutrons and electrons in an atom or ion, given its atomic number and mass number ● Represent the electronic structures of the first twenty elements of the periodic table in both forms.	• recognise common substances that consist of small molecules from their chemical formula. • know that: there are three types of strong chemical bonds: ionic, covalent and metallic; for ionic bonding the particles are oppositely charged ions; for covalent bonding • explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons. ● know that when a metal atom reacts with a non-metal atom, electrons in the outer shell of the metal atom are transferred ● know that the electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram, eg for sodium chloride.	• I can recall examples of formulations. • I can identify formulations, given appropriate information. • I can draw and label the set-up of a chromatography experiment. • • I can describe the flame test method to determine the metal ion in a compound. • I can recall the test and results for sulfate ions. • I can define formulation and pure and distinguish them from the meaning of pure in everyday terms. • I can recall tests and results for hydrogen, oxygen, carbon dioxide and water.

Physics		
	Topics / Units	**Energy**
4	**EXPERT**	• •I can consistently apply multiple equations in the same question. • •I can fully describe the environmental impact arising from the use of different energy resources. •I can fully explain patterns and trends in the use of energy resources. •I can fully plan the investigation of dropping a ball to determine the transfer of gravitational energy store to kinetic energy store. • •I can fully compare ways that different energy resources are used, the uses to include transport, electricity generation and heating
3	**ADVANCED**	•I can consistently recall all of the following equations, substitute values, rearrange the subject using algebra and calculate the value of the subject: •g. p. e. = mass × grav. field strength × height •kinetic energy = 0.5 × mass × speed2 power = energy transferred ÷ time power = work done ÷ time efficiency = (useful power ÷ output power) x 100 •I can describe ways to increase the efficiency of an intended energy transfer. • •I can describe all of the steps in a method needed to determine the specific heat capacity of one or more materials. •I can explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation. • •I can plan investigation to determine the best conductor of heat using 3 rods of materials. • •I can mostly compare ways that different energy resources are used, the uses to include transport, electricity generation and heating
2	**DEVELOPING**	I can recall most of the following equations, substitute values and calculate values without rearrangement: g. p. e. = mass × grav. field strength × height kinetic energy = 0.5 × mass × speed^2 power = energy transferred ÷ time power = work done ÷ time efficiency = (useful power ÷ output power) x 100 I can recognise and substitute values into equations: elastic potential energy = 0.5 × spring constant × extension2 change in thermal energy = mass × specific heat capacity × temperature change I can give examples that illustrate the definition of power e.g. comparing two electric motors that both lift the same weight through the same height but one does it faster than the other. •I can describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls. •specific heat capacity of one or more materials. • •I can define a closed system, give examples where there are energy transfers in a closed system, that there is no net change to the total energy. •I can describe, with examples, how in all system changes energy is dissipated, so that it is stored in less useful ways. This energy is often described as being 'wasted'.

		• • I can mostly plan the investigation of dropping a ball to determine the transfer of gravitational energy store • to kinetic energy store. • I can describe some of the changes involved in the way energy is stored when an object or domestic appliance changes. • • I can state the law of conservation of energy. • • I can state what I meant when people say "energy is lost" • I can state which resources are more reliable and give example when of some energy resources are not • reliable.	
1	**POTENTIAL**	I can substitute values into the following equations when given: g. p. e. = mass × grav. field strength × height kinetic energy = 0.5 × mass × speed^2 power = energy transferred ÷ time • power = work done ÷ time • efficiency = (useful power ÷ output power) x 100 • • I can state the names of energy resources that are used on Earth and distinguish between renewable and non-renewable energy resources. • • I can state the names of energy stores in common situations. • • I can define and recall units of energy, mass, height, extension, temperature, work done, power, time and know efficiency is either a decimal or a percentage. • I can state the names of apparatus/equipment needed to determine the specific heat capacity of one or more materials. • • I can state examples of reducing unwanted energy transfers in the building of heat efficient homes.	

END OF COURSE EXPECTATIONS

Aims

GCSE study in combined science provides the foundations for understanding the material world. Scientific understanding is changing our lives and is vital to the world's future prosperity, and all students should be taught essential aspects of the knowledge, methods, processes and uses of science. They should be helped to appreciate how the complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas relating to the sciences which are both inter-linked, and are of universal application. These key ideas include:

- the use of conceptual models and theories to make sense of the observed diversity of natural phenomena
- the assumption that every effect has one or more cause
- that change is driven by differences between different objects and systems when they interact
- that many such interactions occur over a distance and over time without direct contact
- that science progresses through a cycle of hypothesis, practical experimentation, observation, theory development and review
- that quantitative analysis is a central element both of many theories and of scientific methods of inquiry.

GCSE specifications in combined award science should enable students to:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science, through different types of scientific enquiries that help them to answer scientific questions about the world around them
- develop and learn to apply observational, practical, modelling, enquiry and problem-solving skills, both in the laboratory, in the field and in other learning environments
- develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.

Biology, chemistry and physics should be studied in ways that help students to develop curiosity about the natural world, insight into how science works, and appreciation of its relevance to their everyday lives. The scope and nature of such study should be broad, coherent, practical and satisfying, and thereby encourage students to be inspired, motivated and challenged by the subject and its achievements

Assessment Objectives

Assessment objectives (AOs) are set by Ofqual and are the same across all GCSE Combined Science:

Trilogy specifications and all exam boards. The exams will measure how students have achieved the following assessment objectives.

- AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.
- AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.
- AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures.

DEPARTMENT FEEDBACK POLICY

Formative Feedback

The department will provide continuous formative feedback to students every lesson and track progress each lesson using a holistic 1-4 age related expectation grade.

The department will set topic / unit summative assessments at the end of the topic / unit at set points throughout the year. These will be marked in green pen and improvements fed back to students. These marks will go towards the holistic 1-4 age related expectations formative assessment grade. A formative assessment data drop will be completed once per half term.

Assessment Feedback Frequency

KS3 will sit a Summative end of year assessment where the percentage achieved in the assessment will be reported to parents/carers as well as a holistic 1-4 formative assessment grade.

In KS4 Year 10 will sit two summative assessments during the year and the percentage mark of the first Assessment Point (AP1) will be reported and shared with parents/carers as well as a working at 1-9 grade. The second will be an end of year assessment mock style exam. Predictive 1-9 grades will then be calculated at the end of the year.

Year 11 will sit one examination rehearsal half way through the year in preparation for their actual exams again providing a more accurate working at grade and prediction for end of year results.

Planning for Feedback

- Feedback must be planned for using the **FEEDFORWARD ASSESSMENT** planning sheets
- This needs to be completed on a specific independent learning activity undertaken in the students' books which should happen every 6-10 lessons.
- Books should be checked at the same time for presentation with an acknowledgement to the student that you have seen their work.
- Feedback should be provided in the following lesson using DIRT (Dedicated Improvement and Reflection Time) activities.
- Red pen by the students should be used to highlight any work done during DIRT activities.

Feedback Expectations

- **Verbal feedback** - Either one to one or as a class. Misconceptions can be addressed easily.
- **Live Feedback** - The teacher gives feedback as they circulate the room. This feedback is then acted on immediately.
- **Questioning** - The teacher uses a range of questioning techniques (cold call, no opt out, say it again better etc) or mini whiteboards to check understanding.
- **Modelling** - The teacher demonstrates what success looks like and scaffolds how to get there. This can be done verbally or in a written format.
- **Visualiser** - This can be used to do a "we write" model answer, to showcase good work or to address misconceptions.
- **Whole class feedback** - After reading all the books and making notes, the teacher gives feedback on strengths, areas for improvement and misconceptions. Time is given to act on improvements.
- **Written feedback** - Teachers use individual written feedback on a specific piece of work and give students time to act on it (DIRT). The time cost here should be carefully considered.

Presentation in Books

- Books should be able to be used as **revision aids** by the students.
- Look for **common misconceptions** in all books; assessing the **quality** of the books; ensuring that **high expectations** for **presentation** are upheld and **SPAG** is addressed.
- Selective independent work will be checked using the **FEEDFORWARD ASSESSMENT** Planning sheet

NATIONAL CURRICULUM LINKS

Science National Curriculum

Department for Education (publishing.service.gov.uk)

Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Aims

The national curriculum for science aims to ensure that all pupils:

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

Scientific attitudes

- pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility
- 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
- evaluate

Experimental skills and investigations

- ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
- make predictions using scientific knowledge and understanding
- select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate
- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety

- make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
- apply sampling techniques.

Measurement

- understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature
- use and derive simple equations and carry out appropriate calculations
- undertake basic data analysis including simple statistical techniques.

Analysis and evaluation

- apply mathematical concepts and calculate results
- present observations and data using appropriate methods, including tables and graphs
- interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
- present reasoned explanations, including explaining data in relation to predictions and hypotheses
- evaluate data, showing awareness of potential sources of random and systematic error
- identify further questions arising from their results.

MATHS: Science often requires mathematical skills for data analysis, measurement, and problem-solving. Concepts such as algebra, geometry, and statistics are applied in scientific investigations and experiments

TECHNOLOGY: Science and technology are closely linked, with advancements in one often driving progress in the other. Students may explore the application of technology in scientific research, such as using data logging equipment or simulations

ENGINEERING: Engineering principles are integral to many scientific fields, especially in areas like robotics, materials science, and environmental engineering. Students may engage in engineering challenges that require scientific knowledge and problem-solving skills.

GEOGRAPHY: Science and geography intersect in areas like environmental science, climate change, and earth sciences. Students may study the impact of human activities on the environment or analyse geographical data to understand scientific phenomena

COMPUTING: Computational skills are increasingly important in science, particularly in fields like bioinformatics, computational biology, and data analysis. Students may use programming languages and software tools to analyse scientific data and model complex systems.

LITERACY: Science requires effective communication skills for writing reports, explaining concepts, and presenting findings. Literacy skills are essential for interpreting scientific texts, writing hypotheses, and communicating scientific ideas accurately

PERSONAL DEVELOPMENT CURRICULUM

Aims

The Science curriculum is designed to support and promote the vision of Southchurch High School, "A community of Opportunity, Learning and Aspiration". The curriculum recognises not only the importance of allowing students to flourish academically but also our wider role in preparing our students for their adult life beyond school. Our Personal Development programme is underpinned by five core pillars;

- **Equality and Diversity**
- **Cultural Capital**
- **Community and Wellbeing**
- **Careers and Employability**
- **Character Development.**

Equality & Diversity

The Science curriculum aims to develop an understanding through the science theories showing how people of different faiths, convictions, ability, gender, heritage and ethnicity can form a successful, cohesive and happy community that draws from the best in each of us.

Cultural Capital

The Science curriculum supports the school's vision in ensuring that all students gain the knowledge and cultural capital they need to succeed in life through a wealth of experiences both in and outside the taught curriculum.

Trips & Visits:

STEM KARTS (YEAR 7)
Big bang science show
Zoo trip
Science museum

Extra-Curricular:

Stem club for KS3
Science projects

British Values:

Mutual Respect: Students are respectful when listening to the opinions and views of other students.
The Rule of Law: The classroom rules enable all students to develop their skills in an environment where equipment and each other's feelings are respected. The classroom rules ensure students are all responsible for the learning environment.
Tolerance: Students are tolerant of the opinions and creative ideas of each other. Students value the wide variety of cultures that we explore from all over the world and are tolerant of different faiths and beliefs in the styles we study.
Democracy: Students are all part of the learning experience and are listened to. Students assess each other's work and celebrate each other's successes.

Community and wellbeing

The Science curriculum recognises the importance of our students knowing how to care for themselves both mentally and physically, whilst they also develop personal traits and virtues that will motivate and guide students with confidence and resilience.

Careers & Employability

The science curriculum is designed to ensure students have a breadth of opportunities and experiences that our pupils can start to build their own future pathways on. Through science, our students are supported to develop the following skills;

Communication
Confidence
Teamwork and Leadership
Listening and Responding
Creativity
Critical thinking and problem solving
Time management
Research

Events linking to careers:

WEBINARS ON CAREERS IN SCIENCE
NETWORK RAIN LIGHTBULB WORKSHOP (YR 8)

Character Development:

All members of the school community (regardless of background or ability) understand, develop and demonstrate the values that underpin our student mission of a Community of Opportunity, Learning and Aspiration.

Community of Opportunity – All students are supported and encouraged to perform Infront of their peers and watched with mutual respect. Students are provided with various, collaborative group tasks each lesson in which all learners are supported to engage equally and freely share their ideas and opinions.

Learning – All students have equal opportunity to access the curriculum. Students are taught and placed into mixed ability classes, ensuring all students are supported with adapted practice, where necessary, to ensure curriculum access. All students are invited to an array of enrichment opportunities including; clubs, trips and visits and workshops.

Aspiration – Students are encouraged to develop their love of science through careers talks, trips and external speakers. They take every opportunity within lesson to learn and take control over their own personal development.

SMSC CURRICULUM LINKS

Spiritual development

Spiritual development in science education involves fostering a sense of wonder and curiosity about the natural world and the universe. This can be achieved by:

- Exploring Big Questions: Encouraging students to explore profound questions about life, the universe, and our place in it.
- Sense of Wonder: Promoting a sense of awe and wonder through lessons on the complexity and beauty of natural phenomena.
- Reflection on Impact: Helping students reflect on how scientific advancements impact human life and the natural world.

Moral development

Moral development in science education involves teaching students about ethical considerations and the implications of scientific work. This includes:

- Ethical Issues: Discussing the ethical implications of scientific research, such as genetic engineering, cloning, and the use of animals in experiments.
- Environmental Responsibility: Educating students about the moral responsibility to protect the environment and promote sustainability.
- Scientific Integrity: Emphasizing the importance of honesty and integrity in conducting and reporting scientific research.

Social development

Social development in science education involves promoting teamwork, communication, and an understanding of the role of science in society. This can be fostered through:

- Collaboration: Encouraging collaborative projects and experiments that require teamwork and effective communication.
- Science in Society: Teaching students about the role of science in addressing societal challenges, such as healthcare, energy, and climate change.
- Community Engagement: Involving students in community-based science projects or citizen science initiatives that benefit society.

Cultural development

Cultural development in science education involves recognizing and celebrating the contributions of diverse cultures to scientific knowledge. This includes:

- Historical Contributions: Teaching about the contributions of scientists from different cultures and historical periods.
- Global Perspectives: Encouraging a global perspective on scientific issues, understanding how different cultures approach scientific problems and solutions.
- Diverse Role Models: Highlighting the achievements of scientists from diverse backgrounds to inspire all students.

SMSC IN SCIENCE

Incorporating Spiritual, Moral, Social, and Cultural (SMSC) development within science education enriches students' learning experiences and nurtures their holistic development. Science exploration can evoke wonder about the natural world, fostering students' spiritual growth. Ethical discussions on scientific advancements, such as genetic engineering and environmental conservation, help students develop moral reasoning skills. Collaborative scientific inquiry promotes teamwork and communication, enhancing students' social skills. Moreover, studying the cultural perspectives in science, including indigenous knowledge systems and traditional ecological practices, deepens students' appreciation for diversity. By integrating SMSC development within science education, students not only deepen their scientific knowledge and skills but also cultivate values such as curiosity, integrity, empathy, and respect for diverse perspectives. This prepares them to become informed, responsible, and compassionate members of society, equipped to address real-world challenges with empathy and understanding.

Equality, Diversity and Inclusivity Links

Aims

Within the different projects we look to ensure that there is a broad range emphasising equality, diversity and inclusivity. We ensure that all students work together within pairs, groups and teams to strengthen professional relationships within the classroom and promote an acceptance for all students and the wider world around them.