

Science Faculty Curriculum Overview:

Key Stage 3:

The aim of the KS3 science curriculum is to encourage students' natural curiosity about the world around them. Through following the curriculum, we aim to inspire students to want to know more. To build an inquisitive mindset that asks "why" and "how" to explain science phenomena. Through experimental design, analysis and evaluation we strive to develop students who can think scientifically and question the validity of data and evidence.

The science curriculum across key stage 3 and 4 is based on students frequently coming across repeating themes. These themes are:

Biology: Living Organisms: Cellular, Living Organisms: Systems, Ecosystems, Natural Cycles, Genetics

Chemistry: Atoms, Chemical Reactions, Chemical Analysis, Environmental Chemistry

Physics: Forces, Energy, Matter, Electricity and Electromagnetism, Space

Every unit has an overall theme, however, due to the nature of science students come across these themes regularly even when it is not the main theme of a unit.

For example, when studying global warming, students will come across the themes of Environmental Chemistry, Chemical Reactions, Energy, Natural Cycles and Ecosystems.

Each year is planned specifically to allow knowledge to be built upon with further layers of complexity, in a manner that will support students long term memory.

For example, in year 7 students learn about energy and the basics of energy transfers, this is essential, threshold knowledge that they will frequently be exposed to throughout the 5 years at Biddick Academy. In year 8, this is focused more on Energy transfers based around heat and fuels, while year 9 this is further expanded into calculating energy and energy changes. When students move into KS4, they will further apply this knowledge to a variety of scenarios including radiation, electrolysis, waves, electromagnets.

Working scientifically is interwoven and built throughout the science curriculum, and are frequently returned too throughout the science curriculum. As students move through the years, the complexity of this knowledge is developed further. Working scientifically can be divided into four themes:

Scientific Attitudes, Experimental skills and investigation, Analysis and Evaluation, Measurements.

All science lessons are structured to begin with intelligent retrieval to assess students prior knowledge, challenge misconceptions and intervene before knowledge is built upon with new knowledge.

To support students in developing their scientific understanding, all lessons are aspirational and aim for students to apply their knowledge to unfamiliar situations. Of these certain tasks are assessed, and staff mark these to provide students with feedback to act upon. The curriculum also utilises peer and self-assessment to ensure students are aware of their successes and how to progress further.

Y7

Term	Unit	Theme	Core knowledge and skills	Prior Knowledge	Key Disciplinary literacy	Big Questions	Assessments
Autumn	Lab Proficiency	Chemical Reactions	<p>Identify hazards in a lab</p> <p>Describe how to reduce risks in a lab</p> <p>Identify parts of the Bunsen</p> <p>Identify types of flame</p> <p>Describe how to light a Bunsen safely</p> <p>Use equipment safely to measure volume, temperature and time</p>	<p>KS2: Taking measurements of time, volume, temperature</p>	<ul style="list-style-type: none"> • Hazard • Risk • Irritant • Corrosive • Toxic • Flammable 	<p>How can I be safe in a laboratory?</p> <p>How do I use a Bunsen burner safely?</p> <p>How do I take measurements and use equipment accurately?</p>	<p>Method Writing: How to light a Bunsen burner safely?</p>
	Energy Transfers	Energy	<p>Apply the law of conservation of energy that energy can be created or destroyed to a range of scenarios and contexts</p> <p>Calculate the efficiency of a device using the equation: useful energy output/ overall energy input</p> <p>Calculate efficiency as a %</p> <p>Identify the different energy types -</p>	<p>KS2: Electricity</p>	<ul style="list-style-type: none"> • Energy • Energy stores • Energy transfers • Efficiency • Power • Nuclear • Gravitational potential • Kinetic • Joules • Dissipated • Thermal 	<p>What are the different types of energy?</p> <p>What is the law of energy conservation?</p> <p>How can energy be transferred?</p> <p>What do we mean by waste energy?</p> <p>How does energy transfer from one source to another?</p>	<p>Data Analysis: Bar chart and conclusion: Which fuel has the most energy?</p> <p>Method Writing: How to investigate energy transfers by bouncing a ball?</p>

			<p>electrical, heat/thermal, sound, chemical, light, kinetic, elastic, gravitational potential, nuclear</p> <p>Compare amounts of energy transferred (J, kJ)</p> <p>Convert joules to kilo joules and watts to kilo watts</p>			How do energy transfers relate to electricity?	
Particle model of matter	Matter	<p>Compare the particle models of solids. Liquids and gases.</p> <p>Draw the particle models of solids, liquids and gases.</p> <p>Explain how energy is integral to substances changing state.</p> <p>Define diffusion and give examples of diffusion occurring.</p> <p>Explain the difference between evaporation, condensation, boiling, freezing.</p> <p>Plot accurate graphs using the key components of a graph.</p>	<p>Y7: Energy transfers Lab Proficiency</p> <p>KS2: Everyday Materials Properties and changes of materials States of matter</p>	<ul style="list-style-type: none"> • Particle • Atom • Compressed • Density • Vibrate • Kinetic energy • Melting • Freezing • Evaporation • Boiling • Condensation • Diffusion • Displacement • Collisions 	<p>What are materials like on the inside?</p> <p>What gives a material its properties?</p> <p>How does a change in temperature affect the energy of the particles?</p> <p>What are the factors that contribute to a good graph?</p> <p>What is diffusion?</p> <p>What is the difference between physical and chemical changes?</p>	<p>Method writing: Melting and boiling ice experiment</p> <p>Writing to compare: Comparing Physical and Chemical changes</p>	

			Carry out safe practicals on density and chemical reactions and diffusion Compare physical and chemical changes in a substance				
Cellular Structure	Living Organisms: Cellular	Describe the structure of plant and animal cells Compare the differences between plant and animal cells Describe the structure of specialised cells Explain the adaptations of specialised cells and relate these to their function Describe how to use a microscope to look at cells Explain how a given unicellular organism is adapted to survive Explain the different factors that affect the rate of diffusion Describe the levels of organisation in multicellular organisms	Y7: Lab Proficiency Energy Transfers KS2: States of matter Living things and their habitats	<ul style="list-style-type: none"> • Cells • Organelles • Cytoplasm • Cell membrane • Nucleus • Cell wall • Chloroplast • Vacuole • Magnification • Focus • Field of view • Unicellular • Flagellum • Function • Adaptation • Diffusion • Concentration • Multicellular • Tissue • Organ • Organ system • Organism • Chromosome • Lens 	What are the building blocks of multicellular organisms? What are the different organelles roles? How are cells adapted to specific functions? How do plants and animals differ on a cellular level? How do we observe cells? How are unicellular cells adapted to survive? How do chemical enter and leave the cell and what factors affect the rate of this?	Method writing: How to prepare a slide of an onion cell and use a microscope to get a clear magnified image	
Atoms and Matter	Atoms	Describe how substances change state	KS3: Particle model of matter	<ul style="list-style-type: none"> • Atom • Particle 	What are substances made of?	Writing to Compare:	

			<p>Describe what are substances made up of</p> <p>Identify the properties of a solid, liquid and a gas</p> <p>Difference between atoms, elements and compounds</p> <p>Describe the Dalton model of the atom</p> <p>Identify chemical symbols</p> <p>Describe concept of a pure substance</p> <p>Describe how do substances move</p> <p>Describe how to identify a pure substance</p> <p>Identify when to use different separation techniques</p>	<p>Energy Transfers Lab Proficiency</p> <p>KS2: Everyday materials States of matter</p>	<ul style="list-style-type: none"> • State of Matter • Melting • Condensing • Freezing • Boiling • Energy • Solid • Liquid • Gas • Diffusion • Element • Compound • Density • Bond • Molecule • Dalton • Proton • Neutron • Electron • Shell • Pure substance • Distillation • Chromatography • Chromatogram • Filtration • Evaporation • Solubility • Solution • Solute • Soluble • Insoluble • Concentration 	<p>How do particles move?</p> <p>What are materials like inside?</p> <p>What gives a material its property?</p> <p>How to substance change from a solid to a liquid to a gas?</p> <p>What is the difference between a pure substance and a mixture?</p> <p>How are mixtures separated?</p> <p>How do substances move?</p>	<p>compare atoms, elements, compounds and mixtures</p> <p>Method writing: Writing a method to separate sand and salt from seawater</p>
Spring	Speed and Motion	Forces	<p>Describe forces as pushes or pulls, arising from the interaction between two objects</p> <p>Use force arrows in diagrams, adding</p>	<p>KS2: Forces and Magnets Forces</p>	<ul style="list-style-type: none"> • Speed • Force • Acceleration • Deceleration • Relative Motion • Non-Contact Force 	<p>What affects the speed of an object?</p> <p>How do forces affect the motion of objects?</p>	<p>Data Analysis: Analysis of measuring forces</p>

			<p>forces in one dimension to show balanced and unbalanced forces</p> <p>Describe non-contact forces as gravity forces acting at a distance on earth and in space and as forces between magnets and forces due to static electricity</p> <p>Calculate speed and describe its quantitative relationship between distance and time (speed = distance / time)</p> <p>Represent and describe a journey on a distance – time graph</p> <p>Describe relative motion of trains and cars passing each other</p> <p>Describe how forces are needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) and that the change is dependent on the</p>		<ul style="list-style-type: none"> • Contact Force • Mass • Weight • Field • Resultant Force • Equilibrium • Deformation • Friction • Tension • Compression 	<p>How can we represent motion?</p>	<p>Writing to describe: Describe motion using a distance time graph</p>
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			direction of the force and its size				
Reproduction	Living Organisms: Systems	<p>Explain how new life is created and develops in utero</p> <p>Describe how babies are born</p> <p>Describe and explain the changes in humans during adolescence and puberty</p> <p>Describe the process of menstruation</p> <p>Describe the processes of pollination and fertilisation</p> <p>Compare the structure of wind and insect pollinated flowers</p> <p>Investigate seed dispersal</p>	<p>KS3: Cellular Structure</p> <p>KS2: Living things and their habitats</p>	<ul style="list-style-type: none"> • Oviduct • Ovary/ovaries • Uterus • Cervix • Vagina • Urethra • Sperm duct • Glands • Penis • Testicles/testes • Scrotum • Sperm • Semen • Egg/ovum • Gametes • Fertilisation • Zygote • Embryo • Gestation • Placenta • Umbilical cord • Amniotic fluid • Foetus • Oestrogen • Testosterone • Menstruation • Ovulation • Contraception • Contraceptive • Pollination • Germination 	<p>What are the main stages in the life cycle of a human?</p> <p>How does the human body change during adolescence?</p> <p>How are new plants made?</p> <p>How do plants move seeds away from the parent plant?</p>	<p>Graph analysis: Describe the effects of drug misuse/ smoking/ alcohol on the development of a foetus using graphical data.</p> <p>Method writing: Describe a method to investigate the effect of size/shape of seed dispersal</p>	
Acids and Alkalis	Chemical Reactions	<p>Interpret pH scales to determine substances as acid, alkali, neutral using UI and the pH scale</p>	<p>Y7: Lab Proficiency Particle model of matter Energy Transfers Atoms and matter</p>	<ul style="list-style-type: none"> • Acid • Alkali • Base • Acidic • Particles • pH scale 	<p>What is an acid?</p> <p>What is an alkali?</p> <p>What substances are acids and alkalis?</p>	<p>Method writing: How to investigate the effect of temperature on the rate of</p>	

			<p>Describe how to carry out a neutralisation reaction</p> <p>Describe methods to determine the effect of different factors on reactions between acid and metals</p> <p>Describe how to collect gas released and how to make salts</p> <p>Describe the reactions of acid + metal</p>		<ul style="list-style-type: none"> • neutral • neutralization • universal indicator • Alkalinity • Acidity • Soluble • Insoluble 	<p>What is a neutralization reaction?</p> <p>What happens to metals when reacted with acid?</p> <p>What happens to metal carbonates when reacted with acids?</p> <p>What happens to metal oxides when reacted with acids?</p>	<p>reaction between an acid and metals</p>
	Skeletal and Muscular System	Living Organisms: Systems	<p>Describe the structure and function of the skeleton</p> <p>Compare antagonistic muscles</p> <p>Explain how muscles cause the skeleton to move by referring to ligaments, tendons and joints</p> <p>Analyse force applied by muscles</p>	<p>Y7: Cellular Structure</p> <p>KS2: Animals, including humans</p>	<ul style="list-style-type: none"> • Antagonistic muscles • Ligaments • Joints • Tendons • Force • Tissue 	<p>How is the skeleton structured?</p> <p>How does the skeleton move?</p> <p>How do antagonistic muscles work?</p>	<p>Writing to Compare: Comparing antagonistic muscle pairs</p>
Summer	Electricity	Electricity and electromagnetism	<p>How circuits can be used to measure current and potential difference.</p>	<p>KS2: Construction of simple circuits Circuit symbols</p>	<ul style="list-style-type: none"> • Current • Ampere • Ammeter • Potential difference • Volts 	<p>What allows electrical energy to be transferred to different devices?</p>	<p>Writing to describe: Describe a model of moving</p>

			<p>Describe and predict the effects of resistance.</p> <p>Describe electric fields, and describe how they are produced.</p>	<p>Identification of electrical conductors and insulators Magnetic forces Magnetic poles</p> <p>Y7: Energy</p>	<ul style="list-style-type: none"> • Voltmeter • Series • Parallel • Branch • Charge • Resistance • Ohms • Positive • Negative • Electric field 	<p>How do we get different outputs from electrical circuits? How do we generate a static charge?</p>	<p>electric charge.</p>
Periodic Table	Chemical Reactions	<p>Describe and compare chemical and physical changes</p> <p>Describe the structure of the periodic table</p> <p>To predict properties from the periodic table</p> <p>Describe the trends in group 1, 7 and 0</p> <p>Compare group 1 and group 7</p> <p>Describe and compare the properties of metal oxides and non-metal oxides</p> <p>Interpret graphical data to make predications</p> <p>Write chemical equations based on reactions</p>	<p>Y7: Lab safety Energy transfers Model of matter Atoms and matter Acids and alkalis</p> <p>KS2: Everyday Materials Properties and changes to materials</p>	<ul style="list-style-type: none"> • Periodic table • Metals • Non-metals • Metalloids • Alkali metal • Halogen • Noble gases • Inert • Properties • Chemical change • Physical change • Evaporation • Condensation • Melting • Freezing • Hardness • Density • Conductivity • Sonorous • Brittle • Malleable • ductile • Reactivity • Boiling point • Melting point • Element • Oxidation 	<p>What are chemical changes?</p> <p>What are physical changes?</p> <p>How are chemical and physical changes different?</p> <p>What is the periodic table and how does it tell use properties of materials?</p> <p>What are the trends and patterns in groups 1,7 and 0?</p> <p>What properties are related to metal oxides and non-metal oxides?</p>	<p>Writing to compare: Compare the properties of group 1 (alkali metals) and group 7 (halogens) using data.</p>	

	Light Waves	Energy	<p>Compare the properties and behaviours of light and sound waves</p> <p>Describe and explain transmission of light waves through a substance</p> <p>Explain the behaviour of different colours of light interacting with different materials</p>	<p>KS2: Reflection of light Vision Shadows Reflection</p> <p>Y7: Energy</p>	<ul style="list-style-type: none"> • Wave • Vacuum • Transmission • Translucent • Transparent • Opaque • Diffuse • Specular • Reflection • Refraction • Photosensitive • Absorption 	<p>What is a light wave?</p> <p>Why does light behave differently in different substances?</p> <p>Why does light of different colours display different behaviours?</p>	<p>Writing to explain: Explain the formation of an image by a mirror, and pinhole camera.</p>
	Interactions and Interdependencies	Ecosystems	<p>Describe the changes in population if species X went extinct from the food chain</p> <p>Describe and explain the methods and techniques used to increase food yield</p> <p>Evaluate the impact on the environment by farming techniques on food chains</p> <p>Describe the process of eutrophication</p>	<p>Y7: Energy transfers Cellular structure Reproduction</p> <p>KS2: Animals, including humans</p>	<ul style="list-style-type: none"> • Ecosystem • Food chain • Food web • Habitat • Extinction • Food security • Insecticide • Pesticide • Herbicide • Fungicide • Biomagnification • Bioaccumulation • Eutrophication • Energy • Yield • Trophic level • Species • Predator • Prey • Fertilizer • Photosynthesis 	<p>How do organisms interact in an ecosystem?</p> <p>How does human activity impact upon food chains?</p>	<p>Writing to Describe: Describe the potential impact of an extinction on other species in a food web</p>

Term	Unit	Theme	Core knowledge and skills	Prior Knowledge	Disciplinary literacy (10)	Big Questions	Assessments
Autumn	Heat Transfers	Energy	<p>Calculate work done</p> <p>Describe how heat energy is transferred by conduction, convection and radiation</p> <p>Describe and investigate insulation on energy loss</p>	<p>Y7: Energy transfers Particle model of matter Light Wave</p> <p>KS2: Properties and changes of materials</p>	<ul style="list-style-type: none"> • Conduction • Convection • Radiation • Density • Currents • Insulation • Kinetic energy 	<p>How is heat transferred in different materials?</p> <p>Why does heat rise?</p> <p>How does insulation work?</p>	<p>Data Analysis: Draw and describe heating and cooling graph</p> <p>Data Analysis: Analysing data on effects of different insulations on temperature change</p>
	Periodic Table	Matter	<p>Describe and compare chemical and physical changes</p> <p>Describe the structure of the periodic table</p> <p>To predict properties from the periodic table</p> <p>Describe the trends in group 1, 7 and 0</p> <p>Compare group 1 and group 7</p> <p>Describe and compare the properties of metal oxides and non-metal oxides</p> <p>Write chemical equations based on reactions</p>	<p>Y7: Lab safety Energy transfers Model of matter Atoms and matter Acids and alkalis</p> <p>KS2: States of matter Everyday materials</p>	<ul style="list-style-type: none"> • Periodic table • Metals • Non-metals • Metalloids • Trend • Alkali metal • Halogen • Group • Noble gases • Inert • Properties • Metal oxide • Evaporation • Condensation • Melting • Freezing • Hardness • Density • Conductivity • Sonorous • Brittle • Malleable • ductile • Reactivity 	<p>What are chemical changes?</p> <p>What are physical changes?</p> <p>How are chemical and physical changes different?</p> <p>What is the periodic table and how does it tell use properties of materials?</p> <p>What are the trends and patterns in groups 1,7 and 0?</p> <p>What properties are related to metal oxides and non-metal oxides?</p>	<p>Writing to Compare: Comparing the properties of metals and non-metals</p> <p>Writing to compare: Compare the trends in group 1 and group 7</p>

					<ul style="list-style-type: none"> • Boiling point • Melting point • Element • Oxidation 		
	Health and diet	Living Organisms: Systems	<p>Explain the process of breathing</p> <p>Explain the adaptations of the lungs for gas exchange</p> <p>Describe the effects of drugs, alcohol and smoking on health</p> <p>Explain why different nutrients are needed for a healthy diet</p> <p>Describe methods to test foods for certain nutrients</p> <p>Describe the digestive system and the roles of different organs and chemicals</p>	<p>Y7 Cellular structure Reproduction Energy transfers</p> <p>KS2: Animals, including humans</p>	<ul style="list-style-type: none"> • Enzymes • Bile • Churn • Mechanical digestion • Chemical digestion • Diffusion • Alveoli • Saliva • Hydrochloric acid • pH 	<p>How does breathing work?</p> <p>What is the effect of drugs, alcohol and smoking on health?</p> <p>What is the effect of diet on health?</p> <p>How does the digestive system work?</p>	<p>Writing to describe: Describe how air is expelled</p> <p>Writing to describe: Describe the digestion of a meal as it goes through the digestive system</p>
Spring	Types of Chemical Reactions	Chemical Reactions	<p>Describe how atoms reorganise in a chemical reaction</p> <p>Use chemical word equations to explain chemical reactions</p>	<p>Y8: Periodic table Heat Transfers</p> <p>Y7: Energy Transfers Atoms and matter Lab Proficiency Acids and Alkalis Periodic table</p>	<ul style="list-style-type: none"> • Endothermic • Exothermic • Conservation of mass • Thermal decomposition • Combustion • Atoms • Reactants 	<p>What reactions involve heat?</p> <p>What happens to the atoms in a reaction?</p> <p>What is conservation of mass?</p>	<p>Writing to compare: Compare exothermic and endothermic reactions</p>

			Describe combustion and thermal decomposition Use calculations to demonstrate conservation of mass Describe endothermic and exothermic reactions Describe group 0	KS2: Properties and changes of materials	<ul style="list-style-type: none"> • Products • Energy • Bond • Compound 	What is an exothermic and endothermic reaction?	
Forces and Pressure	Forces	Compare friction in terms of order of magnitude Calculate weight Describe drag and how streamlining works Describe Hooke's law Calculate moments Describe gas behaviour Describe changes in pressure in fluids Describe and calculate stress in solids	Y8: Health and Diet Heat Transfers Y7: Speed and motion Energy Transfers Particle model of matter KS2: Forces	<ul style="list-style-type: none"> • Friction • Drag • Work done • Streamline • Moments • Pressure • Pascals • Area 	What is friction? What is drag? How can streamlined objects move easier through a substance? What happens to a spring when force is applied? What is a turning force? What is pressure? How is pressure increased/decreased?	Writing to compare: Compare friction in terms of magnitude from given data Writing to explain: Explain the change in gas pressure	
Respiration and Photosynthesis	Cycles	Describe aerobic and anaerobic respiration using word equations	Y8: Health and Diet Types of Chemical reactions	<ul style="list-style-type: none"> • Respiration • Aerobic • Anaerobic • Ethanol 	Why do plants need light? What is respiration?	Writing to Compare: Compare Aerobic and	

			<p>Compare aerobic and anaerobic reactions</p> <p>Describe how respiration in yeast is used in biotechnology</p> <p>Describe photosynthesis using a word equation</p> <p>Describe the structure and some adaptations of the leaves</p> <p>Describe how to test for starch in a leaf</p> <p>Describe the importance of plant minerals in plant growth</p>	<p>Y7: Energy Transfers Cellular Structure Interactions and Interdependencies Reproduction</p> <p>KS2: Living Things and their Habitat</p>	<ul style="list-style-type: none"> • Yeast • Chloroplast • Chlorophyll • Endothermic • Exothermic 	<p>What is the difference between respiration and breathing?</p> <p>What is the difference in the types of respiration in different organisms?</p> <p>What is photosynthesis?</p> <p>How are plants adapted for photosynthesis?</p>	<p>Anaerobic Respiration?</p> <p>Method Writing: Describe the method for testing for starch in a leaf</p>
Summer	Global Warming and Climate change	Environmental Chemistry	<p>Describe how fossil fuels are formed</p> <p>Describe global warming and climate change</p> <p>Describe the carbon cycle</p> <p>Explain how humans have contributed to global warming</p>	<p>Y8: Periodic table Respiration and Photosynthesis Chemical reactions Heat transfers</p> <p>Y7: Interactions and interdependencies Atoms and matter Periodic table Light waves Energy transfers</p>	<ul style="list-style-type: none"> • Climate change • Long wave radiation • Short wave radiation • Global warming • Photosynthesis • Combustion • Respiration • Decomposition • Electrolysis 	<p>What is the natural carbon cycle?</p> <p>How has the burning of fossil fuels added to the carbon cycle?</p> <p>What is global warming?</p> <p>What is the difference between global warming and climate change?</p>	<p>Writing to describe: Describe the Carbon cycle</p>

			Describe how humans extract metals from ores Explain the importance of recycling on the carbon cycle				
Electromagnets	Electricity and Magnetism	<p>Predict and describe the behaviour of permanent magnets</p> <p>Draw and describe magnetic fields</p> <p>Describe and explain the uses of an electromagnets</p> <p>Investigate the factors that affect the strength of electromagnets</p>	<p>Y8: Forces and Pressure</p> <p>Y7: Electricity Speed and motion Forces and pressure</p> <p>KS2: Electricity</p>	<ul style="list-style-type: none"> • Solenoid • Permanent magnet • Poles • Magnetic field • Electromagnet • Current • Potential difference • Current 	<p>How do magnets behave?</p> <p>What does a magnetic field look like?</p> <p>How to make an electromagnet?</p> <p>How are electromagnets useful in everyday life?</p>	<p>Method Writing: Writing a method to investigate a factor on the strength of an electromagnet</p>	
Inheritance and variation	Genetics	<p>Describe the process of natural selection</p> <p>Explain the evidence from Darwin/Wallace for natural selection</p> <p>Describe and explain the causes of extinction</p> <p>Describe and explain methods to preserve biodiversity</p>	<p>Y7: Interactions and interdependencies Cellular structure Reproduction Health and Diet</p> <p>KS2: Evolution and Inheritance</p>	<ul style="list-style-type: none"> • Natural selection • Gene • D.N.A • Chromosome • Extinction • Biodiversity • Gamete • Punnet Square • Genetic modification • Mutation 	<p>How do new species evolve?</p> <p>What evidence is there for natural selection?</p> <p>What causes extinction?</p> <p>How can humans preserve biodiversity?</p>	<p>Writing to describe: Writing to describe natural selection for specific examples</p> <p>Writing to Explain: Determine the probability of inheriting</p>	

			<p>Describe how inheritance works</p> <p>Calculate the probability of inheriting certain traits using punnet squares and genetic diagrams</p> <p>Describe and explain the method of genetic modification</p> <p>Evaluate the use of genetic modification</p>			<p>How are traits inherited?</p> <p>What is the structure of genetics?</p> <p>What is the probability of inheriting certain traits?</p> <p>What are the pros and cons of genetic modification</p>	<p>certain genetic traits and explain the results</p>
Light Waves and the EMS	Energy	<p>Compare longitudinal and transverse waves</p> <p>Describe why certain colours are seen</p> <p>Describe the uses of EMS waves</p> <p>Describe the rules for angle of reflection/refraction</p> <p>Measuring angles of reflection/refraction and incidence</p>	<p>Y7: Energy transfers</p>	<ul style="list-style-type: none"> • Longitudinal • Transverse • Oscillations • Energy transfer • Electromagnetic spectrum • Wave length • Frequency • Reflection • Refraction • Incidence • Absorb 	<p>How does light travel?</p> <p>Why are different objects different colours?</p> <p>What is an EM wave?</p> <p>What is reflection/refraction?</p>	<p>Writing to compare: Comparing Longitudinal and transverse waves</p>	

Note: Due to continuous curriculum modifications and development the Year 8 curriculum for 2023-2024 will have some changes to teaching order. The Y8 curriculum stated is for current Y8 students 2022-23

Y9

Term	Unit	Theme	Core knowledge and skills	Prior Knowledge	Disciplinary literacy (10)	Big Questions	Assessments
Autumn	Atoms and the Periodic Table	Atoms	<p>Describe the structure of the atom to include the masses and charges of sub atomic particles</p> <p>Describe the electronic configuration of elements (1- 20)</p> <p>Calculate relative atomic masses/% abundance of elements</p> <p>Evaluate techniques for separating mixtures</p> <p>Explain how the periodic table has developed over time</p> <p>Describe, explain and compare the trends in group 0, 1 and group 7</p>	<p>Y8 Types of Chemical Reactions Energetics</p> <p>Y7 Lab Proficiency Periodic table Acids and Alkalis Atoms and Matter Particle model of matter</p>	<ul style="list-style-type: none"> • Atoms • Element • Compound • Proton • Neutron • Electron • Subatomic particle • Nucleus • Orbital • Symbol • Reactant • Product • Formula, formulae • Isotope • Filtration • Crystallisation • Distillation • Evaporation • Condensation • Chromatogram • Solvent • Solute • Soluble/insoluble • Shielding • Displacement • Halogens • Alkali metals • Noble Gases • Transition • Inert 	<p>What is an atom?</p> <p>What would you find inside an atom?</p> <p>How has the structure of an atom developed over time?</p> <p>How is isotope different from other elements?</p> <p>Why are elements arranged in the periodic table in groups and columns?</p>	<p>Writing to Compare: Compare models of the atom</p> <p>Writing to describe: Describe the differences between the early periodic tables and the current periodic table</p>

	Cell Biology	Living Organisms: Cellular	<p>Make order of magnitude calculations, including the use of standard form.</p> <p>Explain the sub-cellular structures and their function</p> <p>Describe the differences in magnification between a light microscope and an electron microscope (resolution)</p> <p>Calculate magnification including rearrangement of values and express answers in standard form</p> <p>Convert units of measurements</p> <p>Describe the stages of the cell cycle</p> <p>Describe the functions of stem cells in embryos and meristems in plants</p>	<p>Y8: Respiration and gas exchange Photosynthesis Inheritance and variation</p> <p>Y7: Cellular structure Reproduction</p>	<ul style="list-style-type: none"> • Nucleus • Cytoplasm • Ribosomes • Cell membrane • Cell wall • Mitochondrion • Mitochondria • Semi-permeable membrane • Chloroplasts • Vacuole • Magnification • Focus • Resolution • Plasmid • Prokaryote • Eukaryote • Flagella • Flagellum • Xylem • Phloem • Root hair cell • Chromosomes • Mitosis • Stem cell • Meristem • Concentration gradient • Osmosis • Active transport • Semi/Partially permeable membrane • Turgid • Flaccid 	<p>What are living organisms made from?</p> <p>How do substances move?</p> <p>Why are stem cells important for medical treatments?</p> <p>How has microscopy allowed us to develop an understanding of cells and sub-cellular structures?</p> <p>How do we work out the size of microorganism and cells?</p>	<p>Writing to Evaluate: Evaluate embryonic and adult stem cells</p> <p>Data Analysis: Calculate the concentration using +/- graph</p>
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			<p>Evaluate the use of stem cells as a treatment for disease</p> <p>Describe how substances move through diffusion, osmosis and AT</p> <p>Explain factors which affect the rate of diffusion</p> <p>Compare light and electron microscopes.</p>				
	Energy and Calculations	Energy	<p>Identify and describe energy transfers and how to minimize wasted energy.</p> <p>Calculating changes in energy (KE, GPE, EPE, heat/ thermal energy)</p> <p>Define and calculate power</p> <p>Define and calculate efficiency, use efficiency as a measure of effectiveness of a device or system.</p>	<p>Y8: Energy in Everyday Life Sound waves Magnets and Electromagnets Energetics Photosynthesis Respiration and gas exchange Forces and pressure</p> <p>Y7: Speed and motion Energy transfers Light waves Particle model of matter Electrical circuits</p>	<ul style="list-style-type: none"> • Conservation • Gravitational • Electromagnetic • Elastic • Kinetic • Sound • Light • Nuclear • Chemical • Thermal • Potential Energy • Work done • Efficiency • Power • Weight • Speed/ velocity • Greenhouse effect 	<p>What does energy conservation mean?</p> <p>How is energy conserved?</p> <p>How are energy transfers calculated?</p> <p>Which energy source is the best and why?</p>	<p>Writing to Describe: Describe the energy transfers as an object falls such as a skier or an object being dropped</p> <p>Writing to evaluate: Compare and evaluate energy sources in different scenarios</p>

			<p>Describe and explain methods of heat transfer and how to reduce wastage through heat loss.</p> <p>Evaluate methods of energy generation in specific locations</p> <p>To analyse data to predict the impact of energy generation changes</p> <p>To calculate values using multistep equations</p>				
Spring	Bonding and Properties	Atoms	<p>Drawing ions from atoms</p> <p>Drawing ionic bonds</p> <p>Describing ionic bonds</p> <p>Describing and explaining properties of ionic substances</p> <p>Drawing covalent bonds</p> <p>Describing covalent bonds</p> <p>Comparing ionic and covalent bonding</p>	<p>Y9: Energy Atomic structure and the periodic table</p> <p>Y8: Types of chemical reactions</p> <p>Y7: Atoms and matter Periodic table</p>	<ul style="list-style-type: none"> • Aqueous • Evaporation • Condensing • Atom • Ion • Positive • Negative • Transfer • Protons • Electrons • Regular Lattice • Electrostatic forces of attraction • Intermolecular forces • Covalent • Delocalised electrons • Alloy • Allotrope 	<p>What are the different types of bond that can be formed?</p> <p>How does the type of atoms bonding change the type of bond formed?</p> <p>How do properties of the substance change with different types of bond?</p> <p>How does reactivity change within groups?</p>	<p>Writing to Describe: Describe ionic bonds</p> <p>Writing to Compare: Compare the properties and bonding of diamond and graphite</p>

			<p>Describing and explaining properties of simple and giant covalent molecules</p> <p>Describe the different structures of giant covalent molecules</p> <p>Describe the structure of metallic bonds</p> <p>Describe and explain the properties of metals</p> <p>Describe and explain the properties of alloys</p>				
	<p>Organisation: Digestive System</p>	<p>Living Organisms: Systems</p>	<p>State the organs of the digestive system</p> <p>Describe the functions of the organs of the digestive system</p> <p>Investigate how to test for the presence of different nutrients in food</p>	<p>Y9: Cell Biology Energy</p> <p>Y8: Diet and Nutrition</p> <p>Y7: Cellular structure</p>	<p>Enzyme Active site Substrate Denature Protein Lipids Carbohydrates Starch Amino acids Fatty Acids Glycerol Glucose</p>	<p>How is the digestive system organised?</p> <p>How can nutrients be detected in food?</p> <p>Where are enzymes produced and where do they work?</p>	<p>Method Writing: How to test cows milk for different nutrients</p> <p>Writing to describe: Describe how fat is digested</p>

			<p>Describe and explain the function of enzymes</p> <p>Describe and explain factors that affect enzymes</p> <p>Evaluate the adaptations of the small intestine to increasing the rate of diffusion/active transport in the absorption of nutrients</p> <p>Investigate the rate of enzyme activity with differing pH</p> <p>Describe and explain the function of bile</p> <p>Compare the action of enzymes with and without the presence of bile</p>		<p>Protease Amylase Lipase Villi Microvilli Neutralisation pH Emulsification Soluble Insoluble</p>	<p>What factors affect how an enzyme works?</p>	
Summer	Particle Model	Matter	<p>Describe and draw the arrangements of the particles within the three most common states of matter</p>	<p>Y9: Energy Atomic structure and the periodic table Bonding and properties</p> <p>Y8:</p>	<ul style="list-style-type: none"> • Density • Mass • Volume • Displacement • Zero error • Systematic error • Random error • Parallax error 	<p>How does temperature affect matter?</p> <p>Why do different states of matter heat up at different rates?</p>	<p>Method Writing: Writing a method to determine the density of a regular, and</p>

			<p>Calculate the density of regular and irregular objects.</p> <p>Describe how to determine volume and mass for regular and irregular objects</p> <p>Describe and explain why changes of state occur</p> <p>Describe and explains changes to kinetic and potential energy stored within material depending on the state of matter and the temperature.</p> <p>Calculate and determine the energy required for state changes (specific latent heat) and temperature changes (specific heat capacity)</p>	<p>Energy in everyday life</p> <p>Y7: Atoms and matter Periodic table Energy transfers Particle model of matter</p>	<ul style="list-style-type: none"> • Potential energy • Internal energy • Convection current • Fluid • Molecule • Pressure • Collision • Force • Specific heat capacity • Specific latent heat (SLH) • SLH of vaporisation • SLH of fusion 	<p>Why do we use water in most methods of heat transfer?</p> <p>How do we determine density of regular and irregular objects?</p> <p>Why can a gas be compressed but a solid and a liquid cannot?</p>	<p>irregular object</p> <p>Writing to explain: Explain changes in pressure as temperature is increased</p>
Organisation: Respiratory and Circulatory System	Living Organisms: systems	Describe and explain the adaptations of veins, arteries and capillaries	<p>Y9: Cell Biology Organisation: Digestive system Energy</p>	<ul style="list-style-type: none"> • Exothermic • Energy • Respiration • Aerobic • Mitochondria • Anaerobic 	How are blood vessels structured to their function?	<p>Writing to Evaluate: Evaluate the lifestyle and medical causes of</p>	

			<p>Label the different parts of the heart and the direction of blood flow</p> <p>Describe the composition of the blood and the functions of the different parts</p> <p>Explain health and lifestyle factors that increase the risk of coronary heart disease</p> <p>Describe and explain the consequences of CHD and the treatments for this</p> <p>Describe and explain the adaptations of the lungs</p> <p>Compare aerobic and anaerobic respiration in different organisms</p> <p>Explain factors that can effect metabolism and describe metabolic reactions</p>	<p>Y8: Photosynthesis Diet and nutrition Respiration and Gas exchange Inheritance and variation Energy in everyday life</p> <p>Y7: Energy transfers Reproduction Skeletal and muscular Cellular structure</p>	<ul style="list-style-type: none"> • Lactic acid • Oxidation • Oxygen debt • Fermentation • Organelles • Metabolism • Enzyme • Pressure • Oxygenated • Deoxygenated • Cholesterol • Pacemaker • Anti-coagulant 	<p>What is the composition of the blood?</p> <p>How is the heart adapted to its function?</p> <p>What factors contribute to CHD?</p> <p>What treatments exist for different heart illnesses?</p> <p>How are the lungs structured?</p> <p>How does heart rate and breathing rate change during exercise and why?</p> <p>What is the difference in respiration between animals, plants and yeast?</p>	<p>Coronary Heart Disease</p>
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			Explain changes that occur during exercise				
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