Science Curriculum Map

Year 7	Topics covered	Key knowledge and skills covered	Sequencing of units
Term 1	Enquiry Processes	Asking questions correctly in Science, identifying key variables, identifying and planning for risks, calculation of means and drawing graphs, evaluating data and drawing conclusions.	This introduces the key practical skills that will be used throughout Science in the next five years. They build upon KS2 skills which will have been taught at Primary school.
Term 1	Forces	Describing what forces do and the effect of having balanced and unbalanced forces. Describing the effect of gravity and friction on objects and linking forces to increases in speed. Calculating the speed of an object using the speed equation. Drawing and analysing distance-time graphs and using the gradient to calculate the speed of an object.	This introduces the fundamental idea of Forces and builds upon the ideas of contact and non-contact forces introduced at KS2. Maths skills taught in the enquiry processes topic are revisited when drawing graphs and manipulating equations is introduced.
Term 1	Organisms	Looking at the smallest units of living organisms, describing the differences and similarities between plant and animal cells by comparing organelles. Observing specialised cells using microscopes and describing how they are adapted to their functions. Observing single celled organisms and attempting to classify them based on the structures evident. The levels of complexity from cells to organ systems and focussing on the skeletal system by looking at tendons, ligaments and the actions of antagonistic muscles.	This links to the KS2 curriculum where they have studied living things and the differences between them. It introduces the fundamental topic of cells and starts to build on the complex relationships between cells within living organisms. Practical skills of microscopy and how it is carried out are introduced at this point.
Term 1	Matter	Describing the basic structure of solids, liquids and gases, then using this knowledge to justify the properties of these substances. Explaining state changes in terms of differences in energy of the particles and therefore the arrangement of the particles. Application of these ideas	This builds upon the work covered at KS2 on solids, liquids and gases, extending that knowledge to explain the particle model and the fundamental idea of the atom and the interactions that occur with it. The

		is then used to explain the differences between compounds, mixtures and atoms which then leads into separation techniques and the selection of different methods based on the substances being separated. This builds technical skills and the practical use of equipment but also the ability to select and explain the choice of different techniques.	arrangement of atoms and particles are explained and then used to explain how mixtures and solutions can be separated with an increasing complexity from the work initially covered in KS2.
Term 2	Ecosystems	Initially we look at the structures found in flowering plants and use these to explain how reproduction and pollination occur in plants. Germination is explained and the reasons that plants need to spread their seeds to avoid competition. Methods of see dispersal are explored both in theory and practically allowing for the opportunity to develop the experimental method. Plants are shown to be producers and form the bottom layer of food chains which are then developed to show the complex relationships in food webs within ecosystems. The interference of man on these food chains is explored and the effects of changing environment on competition between species and individuals. This is enhanced by looking at analysis and evaluation skills by looking at predator-prey interactions.	This picks up on the work covered in the organisms topic looking more closely at the organs and cells found in plants. The processes of reproduction in plants are looked at in further depth (this was started at KS2) and then developed to show how the dispersal of seeds can affect food chains and therefore the organisms that exist within an ecosystem.
Term 2	Energy	The energy store model of energy is examined and pupils are introduced to the different types of energy store. They examine experimentally and through data the measurement of energy values in food and how these are transferred to humans when eaten. They look at	This introduces the key topic of energy and the different stores of energy that exist. This introduces pupils to the idea that energy is transferred through stores but the amount of energy remains constant and therefore

		fossil fuels and the transfer of energy from these into electrical energy. We then look at renewable sources of energy and their efficiency for the long term production of sustainable energy.	provides a basis for the next units to be built upon. It looks at where we get and generate our energy from by looking at power stations enabling pupils to gain an understanding that electricity is derived from other sources and ultimately from the Sun.
Term 2	Electricity & Electromagnetism	Explaining how static electricity can be produced by charging rods, analysing how charges interact with each other and ways in which to avoid electrostatic shocks. Using the idea of flowing charges to explain current, linking this to potential difference and the ways in which these two quantities change when components are added into different arrangements of circuits, both series and parallel. The derivation of resistance is examined and the use of Ohm's law to predict the effects of changing one of the factors on the others.	This builds upon ideas brought up in the unit of energy but also on the KS2 work which introduced electricity and circuits to the pupils. Series circuits are built as previously but we now extend their skills by introducing parallel circuits in addition. The unit also extends pupil knowledge by introducing the concepts of potential difference, current and resistance and the use of Ohm's Law.
Term 2	Reactions	Pupils examine how to tell the difference between acids and alkalis using homemade and industrially produced indicators. This links to the pH scale and how the strength of acids varies due to the presence of Hydrogen ions which are briefly introduced here. Chemical reactions are then examined through using neutralisation to produce new substances. The production of these salts is then explained using equations and by further developing the idea of different elements that we call metals and non-metals. Metals then come under greater scrutiny by observing their	This leads on from the idea of acids reacting with bicarbonate of soda to examine acids in further detail. We build practical skills to examine the differences between acids and alkalis which then leads to an examination of indicators, the pH scale and acid strengths. This leads on to examine neutralisation and the chemical reactions of metals and acids. Metals are then examined in further detail, practically, by comparing their reactions with acids, oxygen, water and each other, thereby

		reactions with acids, oxygen, and water. The naming of formulae using word and symbol equations are examined in detail through these reactions and we finish the unit by comparing metal displacement reactions to derive the reactivity series of metals.	introducing the idea of displacement and the reactivity series.
Term 3	Genes	The pupils are taught the reproductive organs of the human body with reference to the function of the various parts of the anatomy. This is then highlighted in how the body changes during adolescence including the emotional changes as well as physical. The monthly cycle of the menstruation is highlighted explaining how hormone levels control the physical changes. What happens when an egg is fertilised and then implants in the uterus is explored leading to the development of the fetus throughout the nine months of pregnancy. We then explain how variation is caused within species and how different species are adapted to their environments leading to the introduction of competition.	This builds on work covered within year 5 & 6 on sexual reproduction in animals. Pupils will be able to name reproductive organs and we now extend their knowledge by explaining the functions of the various parts of the human anatomy. We deal with adolescence and the changes within the body, leading to the way in which the menstrual cycle works each month. This leads to fertilisation and implantation of the fetus in the uterus and the ways in which the fetus develops before birth. Finally the course leads us to how and why there is variation between organisms within a species and how different individuals may show adaptations that give them an advantage.
Term 3	Waves	This reinforces their previous knowledge of sound waves and links this to how varying the speed of waves changes various aspects of the waves. These are then examined in terms of amplitude, frequency and wavelength, and how these can affect what we hear. The hearing is then	Picking up from ideas introduced in Year 4 on sound waves, this unit extends their knowledge by first examining how sound waves are produced but then showing how sound waves travel. This follows on from the

		examined and how the ear is structured to enable organisms to hear certain frequencies and how these frequencies enable us to use them for medical purposes such as ultrasound and increasingly infrasound.	work in the Matter unit on particles when they examine the speed of sound through different objects and materials. They then extend their knowledge by looking at the characteristics of sound waves and build upon the fundamentals that they have learned about volume and pitch by relating this to amplitude and frequency of waves. This then is linked to the organisms unit where we examine the way in which animals detect sound and the uses of frequencies of sound.
Term 3	Earth	The structure of the Earth is examined, explaining the various layers and the continual movement of the mantle to produce the tectonic plates and their movement. This is further developed to explain the rock cycle and reinforces previous knowledge on the types of rock. This is then experimentally examined and used to explain the properties of ceramics, polymers, and composites. The position of the Earth in the Solar System is then used to explain how we get day and night but also the tilt of the axis to explain how seasons are produced and why they vary across the globe. Our natural satellite is then examined to show how the Moon phases are produced including eclipses (both solar and lunar). Finally the fundamental force of gravity is examined to explain the difference between weight and mass and how it holds the various planets in the Solar System. This is taught	We start this unit by introducing the structure of the Earth which builds upon pupils' knowledge from Year 3 on the types of rocks that exist. This is extended to show how the rock cycle dynamically changes the face of the Earth. We the look further at different types of materials including ceramics and the properties that they have. The Earth's position in the solar system and how it is influenced by the Sun to produce day, night and seasons is examined in greater depth than in year 5 and this is then used to explain how the Moon and its phases influence the Earth. Finally the effect

		with reference to the different visitors we have in the Solar System such as comets, meteors and satellites.	of gravity is outlined and its importance in the Solar System.

Year 8	Topics covered	Key knowledge and skills covered	Sequencing of units
Term 1	Forces – Movement & Pressure	In this unit we start with the idea of specific forces being resistive and they prevent the movement of objects. This is used to bring about the idea of resultant forces and streamlining. This then leads into compression and extension and touching on the idea of elastic limits linked to Hooke's Law. This then leads into the law of moments and the effects of turning forces using calculations to derive which way an object will turn. Then we lead into pressure in both gases and liquids and the calculation of pressure using the equation. This is then developed further within the stresses in solids and how we can use these ideas to design footwear.	This unit builds on the knowledge first covered in Year 7 Forces. We develop the idea of balanced and unbalanced forces to explain resultant forces and effect of drag. This goes further to look at the effect of pressure and how this arises building on ideas taken from the Year 7 Matter topic.
Term 1	Organisms – Systems	This unit deals with the two different key systems in the body – digestive and respiratory. We start by looking at the nutrients needed by the human body and how we can test whether food contains these substances. Then we move to the dangers of an unhealthy diet and the illnesses caused if it was to continue. We then move into the mechanisms of digestion and the importance of enzymes and bacteria in the gut. We then consider the effect of alcohol and drugs on our various systems before looking at the exchange of gases and how breathing is	Here we look at the effect of poor diets on the body by building on the energy content of foods which was taught in Energy in Year 7. We pick up on the work introduced in Year 4 on the basic parts of the digestive and develop them further introducing the concept of enzymes and their function in the human body. We then look at the importance of the blood in transporting the products of digestion as was previously

		achieved within the lungs. Finally, we examine the effect of smoking on the body and in particular the lungs and therefore your breathing.	started in Year 6. Drugs and their effect on our bodies has been started in Year 6 but here we develop it further to include the dangers of alcohol and also after teaching how we breathe, we introduce the effects of smoking on the body.
Term 1	Matter – Elements & The Periodic Table	Here we look at what an element is and the symbols that are given to these. We then look at the differences between atoms, molecules and compounds, and link these to chemical formulae and how pupils can interpret these using both symbol and word equations. Pupils are then encouraged to look at the long chains that are made when polymers are produced both in nature and in synthetics. The periodic table is examined and pupils will experiment with the various reactions of the alkali metals, the halogens and the absence of reactions in the noble gases.	In this unit we explain the idea of formulae and the periodic table developing the ideas of the atom that we introduced in Year 7. We explain what polymers are and then look in greater depth at the periodic table and look specifically at the groups and their reactions linking to the work completed in Year 7 term 2.
Term 2	Ecosystems – Processes	This unit is all about the processes that take place in living organisms to ensure their survival. Plants are the first organism looked at and pupils study what photosynthesis actually is, the chemistry behind it and how plants have adapted both their cells and their organs to maximise the rate at which it is done. We then also study the importance of minerals and their role in the health of plants. Respiration is studied then, both anaerobic and aerobic, and its importance in both plants	Photosynthesis is the starting point for this unit picking up from the requirements of plants to survive taught in Year 3. We develop this further linking to the structures inside the leaves and the specialised cells (taught in Year7 term 1) and how they contribute to the plant's ability to photosynthesise. From there we develop pupil's knowledge of the processes in plants

		and animals is emphasised. This leads to the industrial uses in baking and fermentation.	to include both types of respiration and how this differs in animals.
Term 2	Energy – Work & Heat	This unit starts by looking at the definition of work and how it applies to forces. The use of machines such as levers and pulleys are then examined and the turning effect of forces resulting in moments and the calculations that these entail is studied in detail. From there we move to temperature and the difference between temperature and heat linking this to the thermal energy stores. The conversion of this energy through conduction, convection and radiation is then examined and linked to the different ways in which houses can be made more energy efficient.	This unit builds upon the work started in Year 8 term 1 extending the ideas of energy to turning forces and moments. We look in greater depth at levers and pulleys (started in Year 5) and apply this to machines in work places. Finally we look at the way in which energy is transferred through conduction, convection and radiation to explain heat losses in systems.
Term 2	Electromagnets	Magnetism and what magnetic fields represent is the starting point here with pupils completing practical lessons to plot magnetic fields around bar magnets. This is then developed by looking at how to make an electromagnet and the temporary nature of the magnetic field around them. Investigations take place to examine how you can increase the strength of these fields and how electromagnets are used in objects such as loudspeakers, microphones and doorbells.	This takes as the starting point the work completed in Year 3 on magnets which was developed again in Year 5. Here we look at magnetic fields and how they can be used with electromagnets to make different devices.
Term 2	Reactions – Reaction types & energy	We start by looking at the conservation of mass in reactions and the way that masses and importantly numbers of molecules can be predicted. Balancing of equations will be taught here alongside formulae and their use in equations. Then we move into reactions	We use this unit to consolidate and deepen the pupils understanding of chemical reactions picking up from the work in Year 7 term 2 and Year 8 term 1. This includes work on the conservation of mass and the

		including combustion and thermal decomposition where pupils continue to develop their practical skills. Reactions are then classified as either exothermic or endothermic and we look at the energy changes involved, linking this to energy levels and we use calculations to predict what happens in various reactions by examining the bond energies.	difference between endothermic and exothermic reactions linked to bond energies.
Term 3	Genes – Evolution & Genetics	We start this unit by looking at chromosomes and genes, where they are found and what they do. This is linked to the structure of DNA, how it was discovered and by whom and looking at greater depth at the base pairing of DNA. We then examine how we can predict the outcomes of genetic crosses based on the dominance or recessive nature of alleles in a punnett square cross. The advantages and disadvantages involved in genetic manipulation are considered before we move into how genes are selected for in nature. This enables us to examine the work of Darwin and his theory of evolution leading to the importance of biodiversity and the dangers of extinction that exist upon the Earth.	Pupils originally studied inheritance in Year 6 and we build on this by linking to the ideas that organisms change due to inherited characteristics in your DNA (focussing on the work of Franklin, Watson & Crick). This is then developed further to explain how we can predict characteristics and manipulate them through genetic engineering. We then look at Darwin's work on natural selection and evolution, and show the importance of biodiversity.
Term 3	The Earth – Climate & Resources	This unit examines human's effects on the planet and the valuable resources that we must try to look after. The carbon cycle is examined to show the natural flow of compounds in the Earth and its' atmosphere and then we examine the dangers inherent in increasing the amount of carbon dioxide in the atmosphere. Pupils examine the effects of increased global warming and the	This unit links the carbon cycle to the previous year 7 term 3 topic of the rock cycle. We build on pupil's knowledge of the climate to look at the effect of global warming on climate change and how the idea of reduce, reuse and recycle are protecting the Earth's resources.

		effects of climate change on the planet. We then look at the importance of the resources within the Earth and look at how metals are extracted using electrolysis and carbon reduction. Finally we focus on the importance of recycling and look at ways to reduce our impact on the Earth.	
Term 3	Waves – Light & EM waves	This unit starts by comparing different types of surface and how light does or does not travel through them. We then examine practically the laws of reflection and compare the effects of specular and diffuse reflection. We then look at what happens in refraction and how this can be used in concave and convex lenses to change the focal point of light. This is then linked to how the eye works and how an optician uses lenses to make glasses to aid short and long-sighted people. Finally we examine how colour is seen by the eye and how this can be changed using filters. This leads into examining the different waves that are found in the electromagnetic spectrum and their uses and dangers in our everyday lives.	Here we link the learning on Sound waves in Year 7 term 3 to the KS2 topics of Light (Year 6) and extend it further to show the effects of refraction, reflection and how colour is observed in the eye. We then delve deeper into what light is and examine the EM spectrum and the dangers that come with this.

Year 9	Topics covered	Key knowledge and skills covered	Sequencing of units
Term 1	Maths skills	Here we cover the skills of converting units from one unit to the next e.g. converting nanometres to millimetres. We then move to standard form, its uses and conversions between the various powers within a scientific context. From there we move to rounding,	This unit ensures that the pupils have the Mathematics skills needed to access the Science course. It builds upon knowledge from KS3 Maths and develops some of this further to include aspects from GCSE Maths.

		significant figures, and decimal places that should be used within scientific contexts, before looking at the use of probability and algebra within scientific write-ups. We finish on the use of the three different types of averages and the appropriate contexts in which to use them followed by the different types of graph. This focuses on the difference between line graphs and bar charts and how and when to draw best fit lines and curves.	
Term 1	Cells	In this unit, students will learn about microscopy and cells, and will be able to explain how the development of microscopy techniques, particularly electron microscopy, has enabled scientists to investigate the sub-cellular structures. Students will be able to differentiate between animal and plant cells, differentiate between eukaryotic and prokaryotic cells, and identify adaptations of specialised animal and plant cells. They will also be able to use the formula for magnification. Students will also learn about the transport of material into and out of cells by diffusion, osmosis, and active transport. When studying the processes for transferring material, students will also be able to explain how adaptations of exchange surfaces and link these to the processes of material transport. Students will learn about the process of cell division and they should be able to describe the three overall stages of the cell cycle. Students will develop an understanding of mitosis as a stage within the cell cycle.	This picks up on the starting points from Year 7 term 1 and Year 8 but develops the knowledge of the specialist cells within organisms. It also picks up on the movement of molecules first touched on in Year 7 Term 1 linking to diffusion and osmosis. Finally we deal with cell division and looking at the importance of DNA which was started in Year 8 Term 3.

		Along with cell division, students will study cell differentiation and learn that stem cells are undifferentiated cells that have the potential to become a specialised cell within an organism. Students will be able to describe some potential uses of stem cells, as well as the disadvantages and objections to the use of stem cells, particularly in relation to medical treatments.	
Term 1	Particle Model of Matter	In this unit the students will increase their understanding of the concept of density as a property of a material or object by measuring and calculating the density of solids and liquids. This leads to a discussion of the states of matter, solid liquid and gas, the properties of matter which is in these states and the changes which occur as a material changes from one state to another. The changes in the properties of matter are used to introduce the kinetic theory and to analyse the changes in temperature occurring during heating and the concept of latent heat. The students move on to discuss the concept of internal energy in more detail; analysing the behaviour of particles in a solid, liquid or gas as the temperature changes. Students should describe latent heat of fusion and vaporisation mathematically, calculating energy changes during the appropriate phase changes and attempt to measure the latent heat of fusion for ice using electrical heating. The students will analyse the relationships between the pressure and temperature of a fixed mass of gas. They can describe the cause of pressure in terms of random particle behaviour and	In this unit we pick up on work started in Year 7 term 1 Matter dealing with the different states of matter and how they change. We then move to focus on how the density of an object is calculated (Year 8 term 1) and how pressure is created in gases but importantly how that is affected by temperature and the internal energy of the substance.

		impact between the particles and the container, explaining the changes in pressure in terms of changes in the motion of the gas particles as the temperature decreases.	
Term 2	Atomic Structure & The Periodic Table	In this unit, students will develop their understanding of atoms as fundamental chemical building blocks. They will see how to interpret chemical formulae and extend their knowledge of the law of the conservation of mass, leading them to balance chemical equations. Students will also develop their understanding of the differences between compounds and mixtures, and how mixtures can be separated using techniques such as filtration, crystallisation, distillation, and chromatography. Students will learn about the development of the atomic model, providing ample opportunity to foster their Working scientifically skills – specifically around the development and use of models within science. Students will be able to describe the evidence that lead to each new stage in the development of the atomic model. Studying the development of the atomic model will lead into the model currently accepted, and students will be able to use this to write and draw electronic structures up to element 20. Students will learn about the development of the periodic table, including the work of Dalton, Newlands, and Mendeleev. Students will understand how each stage in the development of the periodic table was facilitated by new evidence becoming available. Students should also develop their	This unit picks up on work from Year 7 term 1 on the separation of mixtures in a variety of ways but extends this knowledge by including chromatography. It then continues on to link with ions and isotopes which leads to the arrangement of the periodic table where we focus on the groups of the periodic table (initially looked at in Year 8 term1) and the trends found within the groups.

		understanding of electronic structures, and apply this to the arrangement of the periodic table and the chemical properties of Group 0, Group 1, and Group 7 elements. They should also be able to identify trends in properties and reactivity, and be able to explain these in terms of the electronic structure of the elements.	
Term 2	Bioenergetics	In this unit, students will study photosynthesis in both plants and algae. They will be familiar with the word and symbol equation for photosynthesis. They will be aware that photosynthesis is an endothermic reaction. Students will study the adaptations of leaves to achieve maximum efficiency in photosynthesis and will identify the factors that affect the rate of photosynthesis and the limiting factors involved. All students will study the use of glucose in respiration, and also how it can be assimilated into starch and cellulose. Students will consider the use of greenhouses and study how the conditions can be monitored and manipulated to achieve the highest rate of photosynthesis. Students will study respiration, and should be able to recall that this is one of the most important processes in living cells. They will be able to describe the process of respiration and write the word and symbol equations. Students will look at mitochondria as the site of respiration and be able to list examples of living processes that need the energy released from respiration. They should link this with active transport, in particular the transport of mineral ions into the root hair cell. Students will study the	Photosynthesis and respiration are the main foci in this module picking up from work started in Year 8 term 2. We develop this further by looking at how plants use photosynthesis to build proteins and how aerobic respiration is used during exercise combined with anaerobic to help our bodies. Finally we look at the use of the Liver to regulate metabolism, something not previously covered.

		response of humans to exercise, including changes in heart rate, breathing rate, and breakdown of glycogen, all to increase the rate of respiration in muscle cells. When studying anaerobic respiration, they will be able to describe this process in mammalian muscles, and be able to write the word equation. They will explain that anaerobic respiration occurs in yeast cells and some plant cells. They should explain that fermentation is an economically important reaction and will be able to write the word equation. Some students will also be able to link aerobic respiration in mammalian muscles to the oxygen debt.	
Term 2	The Atmosphere	In this unit, students will have learnt about the Earth's atmosphere. Students should be able to interpret evidence concerning theories, and be able to evaluate them. To describe the history of the atmosphere students will be able to describe the timescales involved and how it evolved over time. This includes both how the general composition of the atmosphere has changed and how the atmosphere is currently being affect by human activity. Students should be able to describe the human activities that are thought to cause global warming, and be able to explain some of the effects this has on the climate of the Earth. Students should also be able to explain the effect of other pollutants on the Earth, including carbon monoxide, sulfur dioxide, nitrogen oxides, and particulates. Throughout this unit, students will be given many opportunities to develop their	This unit picks up from the work on the Earth (Year 7 term 3 and Year 8 term 3) where we looked at the effects of the greenhouse gases on Earth's temperature. This is then further developed by looking at the evolution of our atmosphere and how it continues to change plus focusing on the pollutants we find in the air that produce acid rain as well as climate change.

		working scientifically skills, including evaluating models and interpreting and evaluating evidence for scientific theories.	
Term 3	Using resources	In this unit, students will learn about the difference between finite and renewable resources. They should understand that renewable resources are not an infinite supply, but are replaceable at a rate similar to the rate they are used up, whereas finite resources are used up faster than they can be replenished. Students understanding of finite and renewable resources should be applied to the need to reuse and recycle, and they will be able to describe and evaluate ways of reducing the use of finite resources, and carry out life cycle assessments on products. Students then look at specific resources that we use, including water and metals (in particular copper). Students should be able to describe the different ways that water is treated, both to create potable water and to remove waste products so it is safe to release into the environment.	The work completed in Year 8 term 3 is now further developed by looking at the extraction of metals from their ores using carbon reduction and electrolysis. We then teach pupils how to carry out life cycle assessments and how water is treated to enable us to have potable water.
Term 3	Waves	In this unit the students will observe and describe the properties of mechanical and electromagnetic waves in terms of energy transfer with or without the need for a transfer medium. They will compare transverse waves and longitudinal waves by examining the relationship between the direction of propagation and the direction of the oscillations. The students will analyse wave properties such as wavelength, amplitude, and period leading to the relationships between period, frequency and wave speed, frequency, and wavelength. They will	Here we consolidate the work completed in Year 8 Term 3 on the EM spectrum and the reflection and refraction of light. We extend this knowledge using ripple tanks to show how refraction of waves occurs at different depths and how the speed of sound can be measured and tested. The EM spectrum is studied in greater depth to investigate the

		also measure the speed of sound in air and the speed of ripples on water. Some students will investigate and describe both the reflection and refraction of waves describing these effects in terms of wave fronts. The processes of absorption, transmission, and reflection of waves in terms of energy will also be described. The students then move on to describing the electromagnetic spectrum in terms of different regions related to wavelength. The speed of electromagnetic waves in a vacuum will be described as constant allowing the use of the wave equation to link wavelength and frequency which will then be tied to the energy carried by the wave. Each of the regions of the electromagnetic spectrum will be described along with associated uses and the students will investigate the relationship between surface colour, temperature, and the rate of emission of infra-red radiation. The use of radio waves in communications for television and mobile phones will be described along with outlining transmissions of signals through optical fibres. The students will describe the application of ultra violet waves in phosphorescence and the damage these waves can cause to skin and eyes before describing the uses of X-rays and gamma rays in medical applications. The process of ionisation will be outlined and as the cause of tissue damage but also as a useful technique in killing bacteria or cancerous cells. The use of X-rays is described including contrast media and detection devices and the concept of radiation dose.	absorption and emission of infrared radiation, and examine the use of x-rays and gamma rays in medicine.

Science Curriculum Map

Year 10	Topics covered	Key knowledge and skills covered	Sequencing of units
Term 1	Structure & Bonding	In this unit, students will develop their understanding of the states of matter. They will have built upon their understanding of the particle model, using this to explain the energy transfers involved when substances change state. Students will have also learnt about the different types of bonding in substances. They should understand that covalent bonding is the sharing of one or more pairs of electrons between non-metal atoms; ionic bonding involves a metal and non-metal atom, with the metal atom losing one or more electrons and the non-metal atom gaining one or more electron; and metallic bonding involves a delocalised sea of electrons surrounding the positive metal ions. Students will also learn how the bonding of a substance affects its bulk properties. They can describe the difference in bonding and properties of giant ionic structures, simple covalent molecules, and giant covalent structures (including different arrangements of carbon). Students should also understand that covalent, metallic, and ionic bonding is strong, but that it is how the particles interact (intermolecular forces) that determines properties such as melting point, boiling point, and electrical conductivity.	We start this unit by reinforcing the work started in Year 9 term 2 in Atomic Structure and developing the work on ions to show pupils the three main types of bonding – ionic, covalent and metallic. The arrangement of the atoms in these are studied extensively to enable the pupils to draw diagrams of the bonding and also explain how the properties of these substances can be inferred. The allotropes of carbon are then studied to highlight how they will be used in the future.
Term 1	Organisation	In this unit, students will learn about the principles of organisation. Building on their knowledge of differentiation and specialisation of cells, they should be able to define a tissue, an organ, and an organ system.	Here we pick up from the work started in the Cells topic (Year 9 term 1) and develop this to look at tissues and different organs found in both plants and animals. We develop the

		They will study the human digestive system as an organ system in which several organs work together to digest and absorb food, breaking down large insoluble molecules so they can be absorbed into the bloodstream. Students should understand the hierarchical organisation of the digestive system In studying chemical digestion, students will recognise carbohydrates, proteins, and lipids as large molecules that need to be digested, and be able to name the molecules they are broken down into. They should be familiar with the enzymes that digest carbohydrates, proteins, and lipids, along with the sites of production of these enzymes in the digestive system. Students will understand enzyme action and that enzymes are proteins with a specific shape including the active site. They will be taught the lock and key model in which the substrate has a specific shape complementary to the active site, allowing it to bind to the active site where the reaction takes place, releasing products. They will study the effect of high temperature and extremes of pH on enzymes in changing the active site, which denatures the enzyme. Furthermore they will learn about the organisation of animals and plants. They will be taught the components of blood, describing their functions, and summarising the process of blood clotting. Students will recognise the three main types of blood vessel, link their structures with their functions, and understand the importance of a double circulatory system. They will describe the main structures of the human heart and their functions and be aware of	ideas taught in Year 8 term 1 and examine the use of enzymes in the digestive system to a much greater detail, looking at the effects of heat and pH on their structures. We then study further the transport systems in plants and how these can be altered by changing various factors.

		problems that can develop in the blood vessels and their treatments. They will examine breathing and gas exchange, and recognise the main structures of the gas exchange system along with their functions. They will explain that gas exchange happens in the alveoli and describe adaptations of alveoli. They should be able to describe the processes of ventilation and gas exchange and the differences in composition of inhaled and exhaled air. In studying plant tissues and organs, they will be taught the different plant tissues and their functions and recognise plant organs such as a leaf. They will be able to explain that the roots, stem, and leaves form a plant organ system for transport of substances around the plant, stating the functions of xylem and phloem tissue. When studying transpiration, they should explain the function of stomata and recognise factors that affect transpiration rate.	
Term 1	Energy	In this unit, students will continue to develop their understanding of energy and energy transfer. Students will learn how to measure the work done by a force acting over a distance and how this concept can be used to analyse energy changes in gravitational stores, through lifting and falling, and elastic potential stores during stretching using the relevant mathematical relationships. The conservation of energy through changes in the gravitational, kinetic, and elastic stores will also be discussed. They will consider the dissipation of energy during transfers such as those caused by friction or electrical heating, leading to the idea of efficiency during different energy changes and its	The different energy stores are examined in this unit, looking at how energy is transferred from one store to another through the use of different systems. We develop the ideas of E_p, E_k and E_e that were initially introduced in Year 7 term 2, and the movement of thermal energy taught in Year 8 term 2. These are then linked to efficiency and how energy and hence power is used in electrical devices. They will then look at the different energy sources that can be used to

		calculation. The concept of efficiency will then be applied to the selection of electrical devices. The students will learn about the rate of energy transfer in different systems through the through the concept of power and how this power rating can be used to determine total energy change over time. The students will then develop their understanding of the heating and cooling processes, which transfer energy within a material or from one object to another. They will investigate thermal conductivity and the differences in the processes of thermal conduction in metals and non-metals. Some students will go on to describe the transfer of energy between objects through absorption and emission of infra-red radiation as a part of the electromagnetic spectrum. This includes the factors that affect the rate of this transfer such as temperature and surface colour. The students will analyse the changes in temperature when a material is heated. The concept of specific heat capacity will then be used to explain the choice of materials used in heating systems. The reduction of energy transfers to the surroundings by insulation, such as loft or cavity wall insulation, will be studied and applied to the context of reducing energy loss in buildings to reduce heating costs including the idea prioritising home improvements in line with payback time. Finally the students will examine the different sources of energy that are used to generate electricity or provide heating for homes. They will consider the effect of the production and use of biofuels on the environment along with the concept of carbon-neutrality before outlining the use of nuclear power in comparison to fossil fuels. Students will describe and evaluate renewable resources such as wave power, wind	generate electricity and consider which is a better source of power by comparing nuclear and fossil fuels.

		power, hydroelectricity and tidal technology and how these can be used to generate electricity in specific locations.	
Term 2	Quantitative Chemistry	In this unit, students will build upon their understanding of the structure of atoms and sub-atomic particles to understand relative atomic mass and relative formula mass. Students should be able to use relative atomic masses to calculate relative formula masses of compounds. For some students, this is then related to the mole and Avogadro's constant, and the relevant calculations introduced. Students should be able to use the equation number of moles = mass (g) / A_r and use moles to balance symbol equations and calculate reacting masses. Students will apply their understanding of relative atomic mass, relative formula mass, and moles to concentrations. All students should be able to carry out calculations with concentrations in g/dm^3.	This unit links to the Matter unit taught in Year 8 term 1 and the Atomic structure unit taught in Year 9 term 1. We deal with the way in which equations can be used to calculate reacting masses and from there link to the idea of the chemical mole. This then is used to balance equations and calculate concentrations of substances.
Term 2	Infection & Response	In this unit, students will see how the concept of health is affected by communicable diseases. They look at the different pathogens that can cause communicable disease, including bacteria, viruses, fungi, and protists, and how these can be spread between organisms – both animals and plants. As part of this, they look at the development of simple hygiene methods to prevent the spread of pathogens as well as the isolation of individuals who are infected, the destruction of or control of vectors, and the use of vaccination. Students will be able	This unit starts by looking at the importance of health and wellbeing which links to Year 8 term 1. It then deals with pathogens and how they infect our systems on a cellular level (Year 9 term 1). We then move on to see how our bodies defend themselves and the importance of vaccination. The production of antibiotics and the testing of new drugs are included before linking to non-communicable diseases such as cancer

		to describe the different defence mechanisms of the human body and plants. Students study the prevention of disease by vaccination. They will know how the immune system works and what is meant by an antigen. They understand what a vaccine contains and how it works and the concept of herd immunity. They should be able to explain what memory cells are and that they remain in the body to provide long-term immunity. Students will study the treatment of disease by drugs including painkillers and antibiotics. They will be aware that antibiotics are drugs used to cure bacterial infections. They will be taught how they work and be aware of the current crisis of antibiotic-resistant strains of bacteria. They will be aware of how drugs are made today to be effective and safe, and be able to outline the processes of clinical trials including double blind trials and using placebos. Students will study cancer and the different types of tumour, along with the general causes and treatment of cancer. Students will be made aware of the risks of diseases from smoking. They can explain the effects of nicotine, carbon monoxide, and tar, and understand how each specifically affects health, as well as recalling the dangers of smoking whilst pregnant. Students should understand the impact of smoking on the heart. In considering the effect of diet and exercise on disease, students should appreciate the connection between obesity and other diseases such as type 2 diabetes. Students will explain the effect of alcohol on	and the uncontrolled cell division and growth (Year 9 term 1).

		health, and will understand the effect of alcohol on the brain and liver, and of drinking alcohol during pregnancy.	
Term 2	Chemical Changes	In this unit, students will develop their understanding of the reactivity series. They will study the reactions of the metals potassium, sodium, lithium, calcium, magnesium, zinc, iron, and copper with water and acids and should be able to recall and describe these reactions. They will apply their understanding of the reactivity series to displacement reactions and the extraction of metals, as well as introducing them to the concepts of oxidation and reduction as the loss and gain of electrons respectively. Students will also learn about salts and how they are prepared, including from metals and acids, acids and bases, and acids and carbonates. Students will learn about the pH scale and be able to explain how pH relates to H+(aq) ion concentration and the difference between strong and weak acids. They will then build upon their knowledge to explain why ionic compounds can undergo electrolysis when molten or in solution. They will also be able to explain the movement of particles during electrolysis, and the reactions that occur at the electrodes. Students will then apply their understanding of electrolysis to the extraction of aluminium, and learn how to investigate the electrolysis of a solution. They should be able to predict the products of electrolysis and be able to write balanced half equations.	The Chemical Changes unit picks up where the structure and bonding unit left off in term 1 of Year 10 and links to some content from Year 7 term 2. We introduce and deal with the use of electrolysis as an extraction technique and the importance of ions in this method. From there it deals with the reactivity of metals and displacement reactions but then goes on to explore how to produce different salts from metals leading to bases, alkalis and finally to the difference between strong and weak acids and their role in Neutralisation and pH.

Term 2	Electricity	In this unit the students will describe the structure of an atom in terms of charged particles and the process of charging by friction resulting in ions and the transfer of electrons. This leads to the concept of an electric field surrounding charged objects causing attractive or repulsive forces between them. The students will then describe electric circuits and the components used to construct them using the concept of current as the rate of charge flow through components due to a potential difference between points in the circuit. Resistance is introduced and the cause of a heating effect and corresponding energy transfer. Students will investigate the factors affecting the resistance of a wire and the corresponding current-potential difference graphs. Further investigations of the components and analysis of the current-potential difference graphs will show ohmic and non-ohmic behaviours for wires, filaments, and diodes. The relationship between the resistance of a thermistor and its temperature along with the relationship between the resistance of a light-dependent resistor and light level will be investigated. Next, the students investigate and analyse a range of series and parallel circuits describing the path of current at junctions, the potential difference across branches and components, and the effect on resistance of series and parallel branches. The students will compare direct and alternating currents in terms of current direction. The students will describe the UK mains supply and the wires used within it, outlining the National Grid and the high	This unit picks up on ideas introduced in Year 7 term 1 and Year 8 term 2, then developed in the energy topic in Year 10 term 1. We start by looking at the basics of current, Potential difference and resistance, then link this to different components and how they are measured in different types of circuit. The focus then switches to electricity domestically by looking at alternating current, cables and plugs plus how electricity is generated and transferred efficiently (year 8 term 2 and Year 10 term 1).

		voltages associated with it. Understanding of mains circuits, including the function of the neutral and earth wires, has been applied to three pin plugs and a simple ring-main. The choice of materials used for construction of mains circuits such as wires, cables and plugs will be discussed along with the need for a fuse to prevent overheating and insulation for protection from short circuits. Students will mathematically analyse circuits to determine the power supplied by a current and the relationship between power and the resistance of components. This will be linked back to the charge transfer in a circuit and the concept of electrical heating as charges move within or through components. Finally, students will consider the importance of efficiency within mains powered electrical devices linking this concept back to energy transfer by a current and to the simplified system of energy efficiency ratings used when considering the purchase of an appliance.	
Term 3	Radioactivity	In this unit the students will describe how the structure of the nucleus was discovered by the radiation emitted during nuclear decay and how experimentation and developments in our understanding of subatomic particles have driven to changes in the model used to describe the atom from the plum pudding model, through to the Rutherford model and then Bohr model. The students will describe the changes in the nucleus which occur during alpha, beta, and gamma decay along with neutron emission in terms of atomic (proton)	This unit looks at the atom and what happens when atoms breakdown. It builds upon work completed in Year 9 term 2 (atomic structure) and develops the ideas of the structure of the atom and how the nucleus can be changed. It then discusses the three types of radiation which links to Gamma radiation being part of the EM spectrum (Year 9 term 3). We then look at the long term effects of using nuclear power

		number and mass number using the appropriate nuclear notation for isotopes. The properties of alpha, beta, and gamma radiation will be demonstrated leading to a discussion of their use in thickness monitoring and then the safety measures required when using radioactive materials. Students will then move on to discuss the concepts of activity, count rate, and the patterns in radioactive decay that explain half-life and the associated graphs despite the random nature of individual decays. Some students will perform calculations involving the relationship between the initial activity, current activity, and half-life.	(Year 10 term 1) and the products that are made.
Term 3	Energy Changes	In this unit, students will learn about the energy transfers that occur during chemical reactions. They should understand that an exothermic reaction transfers energy from the system to the surroundings, and an endothermic reaction transfers energy from the surroundings to the system. Students will further develop their qualitative understanding of the energy transfers in a reaction into a quantitative understanding. They should be confident with sketching and interpreting reaction profile diagrams and some students should be able to use bond energies to calculate overall energy changes for a reaction, identifying if it is exothermic or endothermic. Students will also apply their understanding of the reactivity series and electrolysis to chemical cells and fuel cells.	This unit takes the learning from Year 8 term 2 and increases the depth and complexity. We deal with the energy changes involved in exothermic and endothermic and deepen that knowledge by looking at reaction profiles and then bond energy calculations.

Term 3	Ecology	In this unit students study communities, environments, adaptations, and competition. There are a number of ecological terms including community, population, habitat, ecosystem, abiotic factor, and biotic factor, and students should be able to recall the precise meaning of each. Students should understand the importance of communities including the interdependence of all the species present, and be able to give real examples to illustrate interdependence. Students should recall the effects of abiotic and biotic factors on populations. Students should measure the distribution of organisms with quadrats and transects, and carry out a practical to investigate the population size of a common species in a habitat. Students will study competition in animals and plants and should be able to recall what factors they compete for and how they compete, and how they become successful in their environments. Students should understand how organisms are adapted to survive in many different conditions. They should be able to give examples of the ways in which animals and plants are adapted to their environments. In studying animals in cold climates students should make a link to surface area to volume ratio. They then move on to study how feeding relationships are represented in food chains. They need to understand the importance of photosynthesis in feeding relationships, and should recall the main feeding relationships within a community and understand how the numbers of predators and prey are inter-related, including interpreting predator–prey population graphs. Students then look at mineral cycling and the microbes involved. They should understand how materials are recycled through the abiotic and biotic components of an	The importance of communities and biodiversity is highlighted in this unit of work (originally referenced in Year 7 term 2 and Year 9 term 2). It looks at the effect of different species on each other by examining predator-prey interactions and how both plants and animals are adapted on a cellular and gross level (Year 9 term 1). It then moves on to look at the effect of humans on pollution, deforestation and global warming (Using resources Year 9 Term 3).

		ecosystem, and the importance of decay. Students then study the water cycle and should recall the main stages of condensation, precipitation, evaporation, transpiration, and respiration. They should understand what the carbon cycle is and recall the processes that remove carbon dioxide from the atmosphere and return it again. They should understand the role of microbes in the carbon cycle as carrying out respiration to release carbon dioxide. Students then study biodiversity and ecosystems, starting with the reasons for and the effects of the human population explosion. Students should understand the effect of different types of pollution including land, water, and air pollution. They should be able to outline the processes of deforestation and peat destruction. Students should understand what is meant by the greenhouse effect, global warming, and its predicted effects. On the topic of maintaining biodiversity, all students should understand how waste, deforestation, and global warming affect biodiversity, and be able to give examples of some of the actions being taken to stop the reduction in biodiversity. Some students should be able to describe how biomass is transferred from one trophic level to the next, pyramids of biomass, and the efficiency of this energy transfer. They should be able to outline ways of improving the efficiency of food production, discuss the ethics of factory farming, and understand the concept of sustainable food production with a focus on fisheries.	

Science Curriculum Map

Year 11	Topics covered	Key knowledge and skills covered	Sequencing of units
Term 1	Rates of Reaction	In this unit, students will have learnt about the factors that affect the rate of a reaction, including temperature, surface area, concentration, and pressure. Students should be able to explain the effect of each factor on the rate of reaction using collision theory – understanding that each factor increases the *frequency* of effective collisions, **not** just the number of collisions. They should also be able to explain the effect of catalysts on the rate of a reaction in terms of providing an alternative reaction pathway with a lower activation energy. Students have also learnt about reversible reactions and dynamic equilibrium. Students should apply their knowledge on endothermic and exothermic reactions to equilibrium reactions to be able to predict the effect of temperature changes on the reversible reactions and the position of the equilibrium. Some students should also be able to use Le Châtelier's principle to explain the effect of temperature and pressure on the position of equilibrium.	This unit links to many of the other units before as it encompasses many different reactions and explains how they can be mad to react quicker or slower. We look at the effect of temperature, pressure (linking to the particle theory covered in Year 9 term 1), concentration (Year 10 term 2) and catalysts (mentioned in organisation Year 10 term 1). This is made more complex by looking at reversible reactions, and how these can be altered by applying Le Châtelier's principle.
Term 1	Forces	In this unit students will compare vectors and scalars using the examples of distance and displacement along with the nature of forces. Representations of vectors using scale diagrams lead to descriptions of the forces acting in a wide variety of situations and the identification of Newton's third law. The concept of balanced and unbalanced forces is then used to determine the behaviour of objects and the application	This is a large unit which builds upon work previously covered in Year 8 term 1 and Year 9 term 2. We look at the types of forces and how they can be added, the effects of gravity and the centre of mass and how forces can be resolved to derive in which direction they will act. We then look at Newton's laws to analyse motion and

		of Newton's first law of motion. Some students will produce free body diagrams demonstrating the forces acting on an isolated object. All students will determine the centre of mass of an object experimentally. Some students will analyse the forces acting on an object in additional depth using a parallelogram of forces approach to determine the resultant force or a 'missing force' when an object is in equilibrium. In addition, these students will be taught to resolve forces at right angles to analyse systems and determine if a system is in equilibrium. The students then move onto analyse the motion of objects in depth starting from a recap of the concept of speed and this relationship to distance travelled and time taken. The representation of motion using distance-time graphs representing single and multiple objects will be analysed to give detailed descriptions of the movement of the objects. The students will define acceleration in terms of changes in velocity before analysing it graphically and mathematically. Students will then investigate acceleration caused by an unbalanced force on a ramp, linking acceleration to the gradient of a line on a velocity-time graph. They will then continue to analyse graphs representing motion by looking at the area beneath the line on a velocity-time graph and its relationship to the distance travelled by an object. Students will then use the gradient of a distance-time graph to determine the speed of an object. Some students will go on to use the tangent of a line on a distance-time graph to determine	velocity leading to work on momentum, forces in car crashes and car safety and finally elasticity and energy changes (Year 10 term 1).

		the speed. Students then experimentally determine the relationships between a force acting on an object and the acceleration, and the mass of the object and the acceleration. The results lead to an idea of Newton's second law of motion and its application. The students then compare the concepts of mass and weight, linking the idea of a gravitational field before looking at the forces acting on an object as it falls through a fluid and the resulting terminal velocity. The forces acting during stopping a car are analysed; identifying two phases of the motion - thinking and braking distance, and the effects of a wide range of factors on both of these distances. Students will then calculate the size of the accelerations experienced during braking. Finally, all of the students will investigate the effect of forces on the stretching of a range of materials identifying both linear and non-linear relationships between the force and extension.	
Term 1	Organic Chemistry	In this unit, students are taught about hydrocarbons and are introduced to the alkanes. They should be able to identify alkanes from their formulae, and be able to name and draw the displayed formula of the first four alkanes. Students have also learnt about some of the reactions of hydrocarbons, including combustion (both complete and incomplete) and cracking. All students should be able to write balanced symbol equations for the complete combustion of hydrocarbons and to describe the conditions of cracking. All students should	This links to the unit on structure and bonding and using resources (Year 10 term 1 and Year 9 Term 3 respectively). It deals with the importance of hydrocarbons industrially, how they are separated using fractional distillation (previously taught in atomic structure Year 9 term 1) and then how they are cracked to form alkanes and alkenes.

		be able to describe the test for alkenes (a product of cracking). Students will have also learned about crude oil as a source of hydrocarbons and the fractional distillation of crude oil. They should be able to describe how the size of the hydrocarbon molecule affects its properties, including viscosity, boiling point, and flammability.	
Term 2	Chemical Analysis	In this unit, students will be taught about various techniques for analyzing substances. All students should understand the difference between a pure substance, a mixture, and a formulation, and what is meant by purity. Students should also have built upon their understanding of chromatography experiments and be able to analyse a chromatogram, both qualitatively and quantitatively using *R*f values. Students should also be able to describe the different experimental tests for gases, including both the procedure and positive result.	In this final unit we use laboratory tests to identify key substances such as hydrogen, oxygen and carbon dioxide gases. We also analyse chromatograms using R_f values (linking to Year 9 term 2) and explain the differences between pure substances and formulations used industrially.
Term 2	Homeostasis	In this unit students will study the principles of homeostasis, and be able to give some examples and outline the control system involved. They will be able to recall details of the human nervous system and its structure and function. They will be able to describe a reflex arc, with detail of synaptic transmission. Next students will study the principles of hormonal control and the endocrine system. They will be able to identify the main parts of the endocrine system and recall the hormones they produce. They will be able to recall how blood-glucose concentration is controlled, including the role of insulin, with some	This is concerned with the way in which organisms respond internally to deal with changes externally. We look at specialised nerve cells (Year 9 term 1) and the way in which both nervous and hormonal control systems are used to good effect in the body. We focus on the role of insulin to balance blood glucose levels after digestion (Year 10 term 1) and the diseases caused by the body getting it wrong (Year 10 term 2). Finally we develop an understanding of the importance

		students able to explain the role of glucagon, and clearly distinguish between glucose, glycogen, and glucagon. All students will be aware of the causes and treatments of both type 1 and type 2 diabetes. All students will study hormones in human reproduction. They will be able to recall the action of hormones in bringing about puberty. They should be aware of the role of oestrogen in the menstrual cycle in females, and of testosterone in males. Students should understand how hormones are used in the control of fertility as applied to contraception, and to infertility treatments.	of hormones in fertility and how we can control it.
Term 2	Magnetism	Students begin this chapter by reinforcing their knowledge of magnetism by looking at the magnetic fields around permanent magnets and the concept of induced magnetism in some materials. The students will use techniques to plot a magnetic field and the shape of the Earth's field. Students move on to examine the magnetic field produced by a current and investigate the factors that affect the direction and strength of this field. They compare the field shape of a solenoid to that produced by a simple bar magnet. Some students will describe how a current carrying wire placed in a magnetic field will experience the motor effect before going on to explain how this effect can be used to create an electric motor. The force produced on the motor is linked mathematically to the magnetic flux density of the magnetic field.	This unit builds on the work covered in the electricity unit (Year 10 term 2) and links it to the magnetism work covered in Year 8 term 2. We look at how magnetic fields are formed around solenoids and how these can be used to produce forces. We examine the use of Fleming's Left hand rule to predict the movement of wires and examine its use to predict the motor effect in motors and generators.

Term 2	Inheritance	All students should be able to outline asexual and sexual reproduction, and should be aware of the importance of meiosis, fertilisation, and variation in sexual reproduction. They will be aware of the genetic code and genomes, including how the data produced by genome research can be used. Students will be able to recall the detailed structure of DNA and understand how the genetic code is used to assemble amino acids into proteins. All students will be able to use genetic terms and set out a genetic cross with the use of a Punnett square. They will be able to predict ratios of different phenotypes, and apply this to sex determination and family trees. Students will describe the inheritance of genetic disorders as applied to polydactyly and cystic fibrosis. They should be aware of developments in genetic engineering with the aim of curing genetic disorders. Finally, students should be able to discuss screening for genetic disorders and the implications of using this technology. All students will be able to discuss the causes of variation in terms of genetic, environmental, or a combination of both. They should link environmental variation with the effect of alcohol on a fetus. In studying evolution by natural selection, students should be taught the role of mutation in variation, understand the theory of evolution by survival of the fittest and natural selection, and be able to give examples. Students will study the process of selective breeding. They should understand this as an example of artificial selection, and be aware of its limitations. In	This deals with reproduction, cell division and the way in which our genetics determine our characteristics (originally started in Year 8 term 3 then continued in Year 9 term 1). We deal with the work of Mendel in determining how genetics determine our health and the different hereditary diseases we can get. We then move to look at the role of natural selection, selective breeding and genetic engineering in ensuring the future development of food animals and crops. Finally we look at the evidence for evolution, Darwin's theory (Year 8 term 3) and the rise of antibiotic resistant bacteria (Year 10 term 2), and the classification of organisms using the Linnaean and Domain systems.

		studying genetic engineering, all students should understand what is meant by the term, and be able to give examples of its use and consider the potential benefits and problems. Students should be aware of the evidence for evolution, including the fossil record and reasons for extinction. They will be able to describe antibiotic resistant bacteria and their fast evolution, in particular the problem of MRSA. Finally, all students will be taught how living organisms are classified. They should explain the natural system designed by Linnaeus, and be able to give the rules of the binomial system of naming living things. They should be familiar with the three-domain system developed in the light of recent technological advances.	