

# SCIENCE CURRICULUM MAP

Year 7



Module 1

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Cells, Body systems and Reproduction	<ul style="list-style-type: none"><li>• Explain what each part of a microscope does and how it is used</li><li>• Explain the functions of the components of a cell by linking to life processes</li><li>• Explain the similarities and differences between plant &amp; animal cells</li><li>• Explain the process of diffusion</li><li>• Explain the process of diffusion &amp; which substances move into &amp; out of cells</li><li>• Explain what all living organisms are made of</li><li>• Describe examples of specialised animal &amp; plants cells, linking structure to function</li><li>• Explain what a unicellular organism is</li><li>• Describe the structure and function of an amoeba and a euglena</li><li>• Explain how the different tissues in an organ and the different organs in an organ system function together.</li><li>• Explain in detail the hierarchy of organisation in a multicellular organism.</li><li>• Explain how the adaptations of the parts of the gas exchange system help them perform their function</li><li>• Explain how the actions of the ribcage and diaphragm lead to inhaling and exhaling.</li><li>• Explain the similarities and differences between the bell jar and the breathing system.</li><li>• Explain in detail how to measure lung volumes</li><li>• Explain the relationship between the bones and joints in the skeleton.</li><li>• Explain the link between structure and functions in the skeletal system</li><li>• Explain how the parts of a joint allow it to function.</li><li>• Explain the relationship between the forces required to move different masses.</li><li>• Explain how the muscle groups interact with other tissues to cause movement.</li><li>• Explain why it is necessary to have both muscles in an antagonistic pair to cause movement</li><li>• Explain the difference between adolescence and puberty</li><li>• Explain the main changes that take place during puberty</li><li>• Explain how different parts of the male and female reproductive systems are adapted &amp; work together to achieve certain functions</li><li>• Compare the male and female gametes.</li></ul>	<ul style="list-style-type: none"><li>• Use a microscope to observe a prepared slide and state the magnification</li><li>• Use the equation <math>M = I/A</math> to work out magnification</li><li>• Be able to rearrange the equation <math>M = I/A</math> and find each variable</li><li>• Make and record observations and measurements using a range of methods for different investigations</li><li>• Interpret data given to explain the difference in the composition of inhaled and exhaled air</li><li>• Use a pressure model to explain the movement of gases including simple measurements of lung volume</li><li>• Present information (the menstrual cycle) in the form of a scaled timeline or pie chart.</li></ul>

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	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 2	Elements, Atoms and Compounds	<ul style="list-style-type: none"> <li>Evaluate particle models that explain why different materials have different properties</li> <li>Explain why different substances boil at different temperatures using particle diagrams and latent heat</li> <li>Use the particle model and latent heat to explain boiling.</li> <li>Explain what occurs during sublimation and condensation using particle models.</li> <li>Explain, using particle models, the differences between evaporation and boiling.</li> <li>Explain why there is a period of constant temperature during melting and freezing.</li> <li>Interpret melting point data to explain the particle movement of different substances at given temperatures.</li> <li>Use ideas about how fast particles are moving to explain the properties of a substance in its three states.</li> <li>Discuss the properties of a range of substances in their three states Use particle diagrams to explain how diffusion occurs and the factors that affect it.</li> <li>Use particle diagrams to explain how gas pressure is created. Explain, using particle diagrams, what happens to gas pressure as the temperature increases.</li> <li>Explain why certain elements are used for given roles, in terms of the properties of the elements.</li> <li>Link the behaviour of atoms within substances to why elements, but not lone atoms, exhibit properties.</li> <li>Calculate the percentage of a given element within a compound &amp; use data provided to calculate formula masses for compounds</li> <li>Use information given to draw conclusions about how the properties of atoms contribute to the properties of elements.</li> <li>Differentiate elements from compounds when given names and properties.</li> <li>Use particle diagrams to explain why a compound has different properties to the elements in it.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identifying and explain anomalies</li> <li>Critically evaluate designs of investigations.</li> </ul>
Module 3	Forces	<ul style="list-style-type: none"> <li>Explain the difference between contact and non-contact forces</li> <li>Explain which pairs of forces are acting on an object</li> <li>Explain how forces deform objects in a range of situations.</li> <li>Explain how solid surfaces provide a support force, using scientific terminology and bonding.</li> <li>Apply Hooke's Law to make quantitative predictions with unfamiliar materials.</li> <li>Explain the effect of drag forces and friction in terms of forces.</li> <li>Explain why drag forces and friction slow things down in terms of forces.</li> <li>Apply the effects of forces at a distance to different fields.</li> <li>Explain how the effect of gravity changes moving away from Earth.</li> <li>Explain the difference between balances and unbalances forces.</li> <li>Describe a range of situations that are in equilibrium</li> <li>Explain why the speed or direction of motion of objects can change using force arrows.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identifying and explain anomalies</li> <li>Critically evaluate designs of investigations.</li> </ul>

# SCIENCE CURRICULUM MAP

Year 7



Module 4

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Acids and Alkalis	<ul style="list-style-type: none"><li>• Compare the different particles found in acids and alkalis</li><li>• Explain what 'concentrated' and 'dilute' mean, in terms of the numbers of particles present</li><li>• Use a variety of indicators to measure acidity and alkalinity and explain how they work categorising them using pH values</li><li>• Interpret a graph of pH changes during a neutralisation reaction</li><li>• Explain why neutralisation reactions are useful in the context of specific examples</li><li>• Predict the formulae for products of reactions between acids and metals, or acids and bases</li><li>• Describe in detail what happens to particles in a chemical reaction &amp; explain the differences in physical and chemical changes</li><li>• Compare and contrast physical and chemical reactions</li><li>• Convert word equations into formula equations</li><li>• Construct a formula equation for a reaction without the use of word equations</li><li>• Construct formula equation for some combustion reactions</li><li>• Explain the benefits and disadvantages of some oxidation reactions</li><li>• Write formula equations for decomposition reactions</li><li>• Compare decomposition reactions with combustion reactions</li><li>• Apply the conservation of mass in unfamiliar situations, giving a reasoned explanation</li><li>• Predict and explain whether the mass within a reaction vessel will stay the same from word and formula equations</li><li>• Apply temperature changes to exothermic and endothermic changes in unfamiliar situations</li><li>• Begin considering endothermic and exothermic changes in terms of energy transfers to and from the surroundings.</li></ul>	<ul style="list-style-type: none"><li>• Form a hypothesis based on reasoned scientific knowledge/models</li><li>• Decide on observations &amp; measurements to be taken and degree of accuracy</li><li>• Write detailed conclusions; identifying and explain anomalies</li><li>• Critically evaluate designs of investigations.</li></ul>

# SCIENCE CURRICULUM MAP

Year 7



Module 5

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Light, Sound and Space	<ul style="list-style-type: none"><li>• Use the speed of light to describe distances between astronomical objects</li><li>• Describe the structure of the Universe in detail, in order of size and of distance away from the Earth.</li><li>• Explain how the properties and features of planets are linked to their place in the Solar System</li><li>• Compare features of different objects in the Solar System</li><li>• Predict the effect of the Earth's tilt on temperature and day-length</li><li>• Predict how seasons would be different if there was no tilt</li><li>• Predict phases of the Moon at a given time</li><li>• Explain how total eclipses are linked to phases of the Moon</li><li>• Explain why it is possible to see an eclipse on some of the planets in the Solar System but not others</li><li>• Compare the properties of waves and their features</li><li>• Explain how reflection of a wave occurs</li><li>• Explain one effect of superposition of waves</li><li>• Explain what is meant by supersonic travel</li><li>• Compare the time taken for sound and light to travel the same distance</li><li>• Compare and contrast waves of different loudness/frequency using a diagram</li><li>• Describe sound as the transfer of energy through vibrations and explain why sound cannot travel through a vacuum</li><li>• Explain how parts of the ear transfer vibrations</li><li>• Explain how animals hear the same sounds differently</li><li>• Explain how your hearing can be damaged</li><li>• Compare and contrast the ear and the microphone</li><li>• Explain how ultrasound can be analysed &amp; explain some uses of ultrasound</li><li>• Predict how light will interact with different materials</li><li>• Calculate the distance travelled by light in a light-year</li><li>• Draw a ray diagram showing how an image is formed in a plane mirror</li><li>• Apply the concept of specular reflection and diffuse scattering to models and other examples</li><li>• Predict the path of light using a model of light refraction</li><li>• Explain what happens when light travels through a lens</li><li>• Explain how the eye forms an image and compare a simple camera with the eye</li><li>• Explain why a prism forms a spectrum</li><li>• Explain the formation of secondary colours and predict how coloured objects will appear given different coloured lights and filters.</li></ul>	<ul style="list-style-type: none"><li>• Form a hypothesis based on reasoned scientific knowledge/models</li><li>• Decide on observations &amp; measurements to be taken and degree of accuracy</li><li>• Write detailed conclusions; identifying and explain anomalies</li><li>• Critically evaluate designs of investigations.</li></ul>

# SCIENCE CURRICULUM MAP

Year 8



Module 1

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Electricity, Magnetism and Energy	<ul style="list-style-type: none"><li>• Predict how charged objects will interact, explain, in terms of electrons, why something becomes charged &amp; can compare a gravitational field and an electric field</li><li>• Use a model to explain how current flows in a circuit &amp; can predict the current in different circuits</li><li>• Explain the difference between potential difference and current, explain why potential difference is measured in parallel &amp; can predict the effect of changing the rating of a battery or bulb in a circuit</li><li>• Explain the most suitable type of circuit for the domestic ring main &amp; can explain why current and potential difference vary in series and parallel circuits</li><li>• Explain the causes of resistance, explain what factors affect the resistance of a resistor &amp; can compare the effect of resistance in different materials</li><li>• Explain how magnets can be used &amp; can compare magnetic field lines and a magnetic field.</li><li>• Explain how a compass works</li><li>• Explain how an electromagnet works &amp; can predict the effect of changes on the strength of different electromagnets</li><li>• Apply knowledge about electromagnets to design a circuit &amp; can suggest ways to make a motor turn faster</li><li>• Calculate energy requirements for various situations, considering diet and exercise &amp; can suggest different foods needed in various situations, considering diet and exercise</li><li>• Account for energy dissipation during transfers &amp; can compare energy transfers to energy conservation</li><li>• Give an example to show that energy and temperature are different &amp; can explain, in terms of particles, how energy is transferred</li><li>• Give examples of equilibrium</li><li>• Explain in detail the processes involved during heat transfers &amp; can explain why certain materials are good insulators</li><li>• Explain how thermal equilibrium can be established &amp; can explain why some objects radiate more energy</li><li>• Compare the advantages and disadvantages of using renewable and non-renewable energy resources &amp; can explain how a range of resources generate electricity, drawing on scientific concepts</li><li>• Compare the power consumption of different activities &amp; can calculate and compare energy costs in different scenarios</li><li>• Compare work done in different scenarios and by different machines &amp; can explain how conservation of energy applies in one example</li></ul>	<ul style="list-style-type: none"><li>• How to work out resistance using <math>R = V/I</math></li><li>• Rearrange the resistance equation to find each variable</li><li>• Form a hypothesis from reasoned scientific knowledge and models</li><li>• Decide on observations and measurements to be taken and degree of accuracy</li><li>• Write detailed conclusions</li><li>• identify and explain anomalies.</li></ul>

# SCIENCE CURRICULUM MAP

Year 8



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 2	Electricity, Magnetism and Energy	<ul style="list-style-type: none"> <li>Classify properties of metalloids into metallic and non-metallic properties &amp; can predict the properties of an element, given its position on the Periodic Table</li> <li>Explain how the position of an element can be used to suggest properties of elements &amp; can apply patterns shown within groups or periods to unknown elements</li> <li>Describe patterns in the properties of Group 1 elements using data given &amp; can compare predictions with evidence, and from reactions involving Group 1 elements</li> <li>Explain any predictions made about the Group 7 elements</li> <li>Write word equations to represent displacement reactions</li> <li>Link information about Group 0 elements to their properties &amp; can compare the trends in Group 0 with those of Group 1 and Group 7 elements</li> <li>Use formula equations to show what happens when metals react in different acids.</li> <li>Use word and formula equations to explain the test for hydrogen gas.</li> <li>Explain the reactivity of metals according to how they react with oxygen.</li> <li>Construct balanced equations that include state symbols.</li> <li>Can link a metal's reaction with its place in the reactivity series.</li> <li>Explain predictions made about a metal's reactivity.</li> <li>Explain why displacement reactions are predicted to occur or not occur.</li> <li>Use particle models and diagrams to represent displacement reactions</li> <li>Explain why metals can be extracted using carbon, using the idea of displacement.</li> <li>Convert amounts of metals within ores from masses to percentages, or vice versa.</li> <li>Distinguish between chemical and physical properties of ceramics.</li> <li>Justify why possible ceramics are identified from data about material properties</li> <li>Explain properties of different polymers.</li> <li>Compare properties of different polymers.</li> <li>Explain composite properties &amp; suggest advantages and disadvantages of composite properties.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/ models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identify and explain anomalies</li> <li>Critically evaluate designs of investigations. Identify patterns in melting and boiling points from data given. be able to predict properties of an element</li> <li>Be able to draw bar charts about patterns in groups and periods, as well as density data</li> <li>Make observations based on chemical reactions and reactivity.</li> </ul>
Module 3	Health and Lifestyle	<ul style="list-style-type: none"> <li>Explain what makes a food a healthy option &amp; can explain how each nutrient contributes to a healthy, balanced diet</li> <li>Explain why testing food for starch, lipids, sugar, and protein is important &amp; can explain the meaning of positive or negative results in terms of the food tests</li> <li>Explain how an unhealthy diet causes health issues &amp; can explain that different people require different amounts of energy, using energy calculations and data to support my explanations</li> <li>Explain why food needs to be digested &amp; can explain how each part of the digestive system works in sequence, including adaptations of the small intestine for its function</li> <li>Explain how enzymes affect the rate of digestion</li> <li>Explain how some bacteria improve health</li> <li>Explain why people take different medicinal and recreational drugs &amp; can explain how recreational drugs can have a negative effect on people's lifestyles</li> <li>Explain in detail how alcohol affects health and behaviour, detailing its effect on life processes &amp; can explain the importance of providing information about drinking to the general public, not just pregnant women</li> <li>Explain how smoking causes disease &amp; can explain which chemicals in tobacco smoke affect the development of a fetus.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/ models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identify and explain anomalies</li> <li>Critically evaluate designs of investigations.</li> </ul>

# SCIENCE CURRICULUM MAP

Year 8



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 4	Separating techniques	<ul style="list-style-type: none"> <li>Use particle models to represent mixtures &amp; use particle models to represent mixtures</li> <li>Explain the relationship between solutes, solvents, and solutions &amp; can draw particle diagrams to represent solutions and pure substances</li> <li>Explain why temperature affects the amount of solute dissolved in a solution &amp; can explain what a solubility graph shows</li> <li>Use particle diagrams to illustrate how filtering works &amp; can explain whether or not filtering can be used in given situations</li> <li>Compare evaporation and distillation &amp; can discuss whether evaporation or distillation would be suitable for separating a mixture</li> <li>Explain how chromatography can be used in different scenarios &amp; can consider how chromatography can be used to monitor the progress of reactions.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/ models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identifying and explain anomalies</li> <li>Critically evaluate designs of investigations.</li> </ul>
Module 5	Adaptations and Ecosystems	<ul style="list-style-type: none"> <li>Explain the effect of competition on the individual or the population</li> <li>Explain how adaptations help an organism survive in their environment</li> <li>Explain how organisms are adapted to seasonal changes</li> <li>Explain how competition or long-term environmental change can lead to evolutionary adaptation or extinction</li> <li>Explain how variation gives rise to different species</li> <li>Explain that some variation is affected by both environmental and inherited factors.</li> <li>Explain the causes of continuous and discontinuous variation &amp; represent this variation within a species using the appropriate type of graph</li> <li>Explain how characteristics are inherited through and coded for by genes.</li> <li>Explain the contribution of each team of scientists to the development of the model of DNA</li> <li>Explain how natural selection leads to evolution</li> <li>Explain how scientists know that organisms have changed over time &amp; explain some factors that may have led to extinction</li> <li>Explain the different types of gene bank.</li> <li>Explain the importance of photosynthesis in the food chain &amp; can explain how the plant obtains the reactants for photosynthesis</li> <li>Explain how the structures of the leaf make it well adapted for photosynthesis &amp; can explain the role of chloroplasts in photosynthesis</li> <li>Explain deficiency symptoms in plants &amp; can explain how proteins are made for plant growth</li> <li>Explain how some chemosynthetic organisms form symbiotic relationships &amp; can compare similarities and difference between photosynthesis and chemosynthesis.</li> <li>Explain how the reactants for respiration get into the cells &amp; can explain the process of aerobic respiration</li> <li>Explain the uses of the products from anaerobic respiration &amp; can explain the differences between the two types of respiration</li> <li>Explain the link between food chains and energy &amp; can explain why a food web gives a more accurate representation of feeding relationships than a food chain</li> <li>Explain the interdependence of organisms &amp; can explain why toxic materials have greater effect on top predators in a food chain.</li> <li>Explain why different organisms are needed in an ecosystem &amp; can explain why different organisms within the same ecosystem have different niches.</li> </ul>	<ul style="list-style-type: none"> <li>Form a hypothesis based on reasoned scientific knowledge/ models</li> <li>Decide on observations &amp; measurements to be taken and degree of accuracy</li> <li>Write detailed conclusions; identifying and explain anomalies</li> <li>Critically evaluate designs of investigations.</li> </ul>

# SCIENCE CURRICULUM MAP

Year 8



Module 6

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
The Earth	<ul style="list-style-type: none"><li>• Compare the different layers of the Earth in terms of their properties</li><li>• Describe the composition of the atmosphere in terms of abundance of components</li><li>• Explain two properties of sedimentary rocks by linking them to the rock structure and formation</li><li>• Give a detailed explanation of the sedimentary rock cycle</li><li>• Discuss examples of rocks that illustrate the different methods of formation of igneous and metamorphic rocks</li><li>• Link properties of igneous and metamorphic rocks to their methods of formation</li><li>• Give a detailed description and explanation of a rock's journey through the rock cycle</li><li>• Explain changes in the levels of carbon dioxide using stages of the carbon cycle</li><li>• Use equations to explain processes that exchange carbon dioxide to and from the atmosphere</li><li>• Use a model to explain why global warming happens &amp; discuss in detail the impacts of global warming, identifying primary and secondary problems</li><li>• Compare how other materials are recycled with recycling of aluminium</li><li>• Use data to discuss the relative benefits and drawbacks of recycling materials.</li></ul>	<ul style="list-style-type: none"><li>• Form a hypothesis based on reasoned scientific knowledge/models</li><li>• Decide on observations &amp; measurements to be taken and degree of accuracy</li><li>• Write detailed conclusions; identifying and explain anomalies</li><li>• Critically evaluate designs of investigations.</li></ul>



# SCIENCE CURRICULUM MAP

Year 9



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 1	Unit 9A Biology	<ul style="list-style-type: none"> <li>Identify plant and animal cells as Eukaryotic cells and bacteria cells as prokaryotic cells</li> <li>Explain how the subcellular structures of cells are related to their functions</li> <li>Compare and contrast the three types of cells (animal, plant, bacteria), why cells are specialised for a specific function, the link between structure and function of various specialised cells (sperm, egg, muscle, ciliated epithelial, nerve), the sequence of the organisation in a multicellular organism, how the structure of different types of cell relate to their function in a tissue, an organ or organ system, understanding of the scale and the size of a cell</li> <li>Understand how microscopy techniques have developed over time</li> <li>The differences between light and electron microscopes</li> </ul>	<ul style="list-style-type: none"> <li>Carry out order of magnitude calculations</li> <li>Use the magnification equation</li> <li>Use a light microscope to observe, draw and label an onion cell</li> <li>Write a method including an equipment list</li> <li>Identify risks associated with the practical</li> <li>Present the results of the practical</li> </ul>
Module 1	Unit 9A Chemistry	<ul style="list-style-type: none"> <li>Arrangement, movement and the relative energy of particles in each of the three states of matter</li> <li>Be able to identify the 6 interconversions and the change in arrangement, movement and energy of particles during these interconversions</li> <li>Predict the physical state of a substance, the different temperatures at which changes of state occur, know the limitations of the particle theory, what a compound is, what a mixture is, the difference between a pure and impure substance</li> <li>Describe the states of matter in a heating curve, know whether a substance is pure or impure, know how big an atom is be able to describe the structure of an atom</li> <li>What is an isotope and be able to give examples</li> <li>Know chemical formulae for common elements and compounds</li> </ul>	<ul style="list-style-type: none"> <li>Use graphs to identify melting points of pure substances and mixtures</li> <li>Calculate the number of protons, neutrons and electrons in an atom</li> <li>Represent the electronic structure of the first twenty elements</li> <li>Calculate the number of protons, neutrons and electrons in an isotope</li> <li>Calculate relative atomic mass of an element</li> <li>Calculate how many atoms are in a compound</li> <li>Write word and symbol equations, Write formula and balanced chemical equations</li> </ul>
Module 1	Unit 9A Physics	<ul style="list-style-type: none"> <li>The differences in density between the different states of matter</li> <li>Be able to define density as density = mass/ volume</li> <li>Investigate the densities of solids and liquids, Make predictions based on scientific knowledge, the pressure of a gas, the effect of changing the temperature of a gas on the velocity of its particles and hence on the pressure, how liquid pressure changes with depth, why some things float and some things sink</li> <li>Apply ideas of pressure to different situations.</li> </ul>	<ul style="list-style-type: none"> <li>Calculate pressure, Define density as density = mass/ volume</li> <li>Be able to rearrange equation to find each variable, B/C assessment - Make predictions based on scientific knowledge of densities, complete the practical and collect results - recap density equation in order to correctly draw the table of results</li> <li>Know how to write up a practical investigation</li> </ul>

# SCIENCE CURRICULUM MAP

Year 9



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 2	Unit 9B Biology	<ul style="list-style-type: none"> <li>State what health is</li> <li>Describe the difference between communicable and non-communicable diseases</li> <li>Explain how stress, diet and life situations can affect health, and the presence of one disease can lead to a higher susceptibility to another disease</li> <li>Explain the effect of lifestyle factors on the incidence of non-communicable diseases</li> <li>State examples of non-communicable diseases</li> <li>Use data to understand the diseases in relation to the risk factors</li> <li>Describe what is cardiovascular disease</li> <li>Describe the causes of cardiovascular disease</li> <li>Recall treatments for cardiovascular disease and evaluate the advantages and disadvantages</li> <li>Describe what is a pathogen</li> <li>Explain how diseases are spread in animals and plants</li> <li>Explain how the spread of diseases can be reduced or prevented</li> <li>Identify examples of communicable diseases</li> <li>Explain how the spread of diseases can be reduced and prevented</li> </ul>	<ul style="list-style-type: none"> <li>Maths skills: Use scatter diagrams to identify a correlation between two variables in terms of risk factors</li> <li>Example: Include graph data to show correlation between life situations and health e.g. correlation between income and health. Discuss that there could be many causes for this correlation and that it is not straightforward</li> <li>Students need to be able look at graphical data to understand correlation and cause - if there is a correlation between a particular factor and an outcome, it does not mean that the factor necessarily causes the outcome</li> <li>Understand the principles of sampling, including epidemiological data and in terms of risk factors</li> <li>Translate disease incidence information between graphical and numerical forms</li> <li>Interpret and extract information from frequency tables and diagrams, bar charts and histograms in terms of risk factors</li> </ul>
	Unit 9B Chemistry	<ul style="list-style-type: none"> <li>Describe how Mendeleev used the table to predict the existence and properties of unknown elements</li> <li>Explain how Mendeleev arranged the elements in the periodic table</li> <li>Describe the arrangement of the periodic table</li> <li>Define an Ion</li> <li>Calculate the number of protons, neutrons and electrons in an ion</li> <li>Work out the charges on ions</li> <li>(HT only) write balanced half equations</li> <li>Explain the use of the ending -ide and -ate in the names of compounds</li> <li>Deduce the formula of ionic compounds</li> <li>Describe the limitations of representing ionic compounds using different models</li> <li>Recall that metallic bonding occurs in metallic elements and alloys</li> <li>Explain metallic bonding</li> </ul>	<ul style="list-style-type: none"> <li>Students need to be able to work out the charge on the ions of metals and non-metals from the group number of the element and should be able to draw the electronic configuration and write the electronic configuration of an ion</li> <li>Students need to be able to calculate the number of protons, neutrons and electrons in simple ions given the atomic and mass number</li> <li>Students need to be able to write balanced half equations</li> <li>Students need to be able to name different ionic compounds</li> <li>Students should be able to recognise that a compound is ionic from a diagram and work out the ionic formula of the ionic compound"</li> </ul>
Module 2	Unit 9B Physics	<ul style="list-style-type: none"> <li>Explain the difference between scalar and vector quantities</li> <li>Recall examples of scalar and vector quantities</li> <li>Explain displacement</li> <li>Recall and use the equation for speed</li> <li>Recall some typical speeds</li> <li>Describe how you would determine the speed of an object in a laboratory</li> <li>Draw distance/ time graphs</li> <li>Analyse distance/ time graphs</li> <li>Recall and use the equation for acceleration</li> <li>Define decelerating</li> <li>Describe contact and non-contact forces</li> <li>Use diagrams to represent interactions between forces</li> <li>Define resultant forces</li> <li>Define weight</li> <li>Describe the difference between mass and weight</li> <li>Recall and use the equation for weight</li> </ul>	<ul style="list-style-type: none"> <li>Use the speed equation simply, then rearrange it, then convert units using it simply and build up to using it in exam questions</li> <li>Students need to be aware of how the equipment can be used to determine the speed of objects using light gates. This is more accurate than using a stopwatch.</li> <li>Students need to be able to calculate the speed using a gradient e.g. change in distance/ change in time</li> <li>Students need to be able to draw a distance-time graph from measurements and data</li> <li>Students need to be able to use the <math>W = mg</math> equation</li> </ul>

# SCIENCE CURRICULUM MAP

Year 9



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 3	Unit 9C Biology	<ul style="list-style-type: none"><li>Identify the leaf, stem and roots as plant organs</li><li>State the equation for photosynthesis</li><li>Explain how the structures of the xylem, phloem and root hair cells are adapted to their function</li><li>Identify different plant tissues</li><li>Explain how the plant tissues are adapted to their functions</li><li>Observe and draw a transverse section of a leaf</li><li>Describe how sucrose is transported around the plant by translocation</li><li>Explain how water and mineral ions are transported through the plant by transpiration</li><li>Explain the effect of environmental factors on the rate of water uptake by a plant</li><li>Describe the similarities and differences between xylem and phloem</li><li>Explain how water and sucrose are transported through the plant</li><li>Explain how the cells, tissues and organs of the plant work together</li><li>Explain how the transport systems of the plant work together</li><li>Understand how plants are adapted to their environment</li><li>Identify the sensory receptors</li><li>Describe the structure and function of sensory, motor and relay neurones</li><li>Explain the structure and function of the nervous system</li><li>Explain the structure and function of a reflex arc</li><li>Understand why reflex actions are important</li><li>Investigate human reaction times</li></ul>	<ul style="list-style-type: none"><li>Investigate the distribution of stomata and guard cells</li><li>Measure the rate of transpiration by the uptake of water</li><li>Demonstrate an understanding of rate calculations for transpiration</li><li>Investigate human reaction times.</li></ul>
Module 3	Unit 9C Chemistry	<ul style="list-style-type: none"><li>Recall that covalent bonding results in the formation of molecules</li><li>Explain how the reactions of elements are related to the arrangement of electrons and their atomic number</li><li>Explain how a covalent bond is formed</li><li>Describe the limitations of the different models used to represent covalent bonding</li><li>Recall the properties of Alkali metals</li><li>Describe the reactions of the alkali metals</li><li>Describe and explain the pattern of reactivity of the alkali metals</li><li>Recall the colours and physical states of the group 7 elements</li><li>Describe the pattern in the physical properties of the halogens</li><li>Describe the reactions of the halogens</li><li>Describe the relative reactivity of the halogens as shown by their displacement reactions</li><li>Describe the chemical test for chlorine</li><li>Compare the reactivity of groups 1 and 7</li><li>Compare how the electron configuration affects the groups reactivity</li><li>Describe the pattern in the physical properties of the noble gases</li><li>Explain why the noble gases are chemically inert</li><li>Link the properties of the noble gases to their uses</li></ul>	<ul style="list-style-type: none"><li>Use the pattern of reactivity to predict the outcomes of reactions of other halogens</li><li>Interpret models to identify molecular formula and structural formula of a molecule.</li></ul>

# SCIENCE CURRICULUM MAP

Year 9



Module 3

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Unit 9C Physics	<ul style="list-style-type: none"><li>• Identify the energy stores and transfers</li><li>• Analyse the changes involved in the way energy is stored</li><li>• Explain what is meant by conservation of energy</li><li>• Recall and use the equations for efficiency</li><li>• Describe ways to increase the efficiency of an intended energy transfer</li><li>• Explain ways of reducing unwanted energy transfers</li><li>• Describe the main energy sources available</li><li>• Distinguish between non-renewable and renewable energy sources</li><li>• Compare the different energy resources</li><li>• Explain patterns and trends in the use of energy resources</li><li>• Consider the environmental issues that surround the different energy resources</li><li>• Discuss the environmental, political, social, ethical and economic considerations of using different energy resources</li><li>• Define work done</li><li>• Recall and use the equation for work done</li><li>• Define power using examples</li></ul>	<ul style="list-style-type: none"><li>• Draw and interpret diagrams to represent energy transfers</li><li>• Use diagrams to explain the conservation of energy</li><li>• Use the equations for efficiency</li><li>• Use the equation for work done</li><li>• Recall and use the equation for power.</li></ul>

# SCIENCE CURRICULUM MAP

Year 9



	Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Module 4	Unit 9D Biology	<ul style="list-style-type: none"><li>Describe the physical and chemical barriers</li><li>Describe the role of white blood cells</li><li>Explain the role of the immune system</li><li>Explain what a vaccination is</li><li>Explain the use of antibiotics and other medicines</li><li>Explain why antibiotics can only be used to treat bacterial infections</li><li>Describe the process of developing new medicines</li><li>Explain the stages of making a medicine</li><li>Apply knowledge of the immune response</li><li>Describe the different levels of organisation within an ecosystem</li><li>Understand feeding relationships within an ecosystem</li><li>Define key terms for this topic</li><li>Define abiotic and biotic factors</li><li>Explain how a change in abiotic and biotic factors affect communities</li><li>Explain how organisms are adapted to live in their natural environments</li><li>Describe how the survival of some organisms are dependent on other species</li><li>Describe a quadrat and how it is used</li><li>Describe a belt transect and how it is used</li><li>Explain why we sample ecosystems</li></ul>	<ul style="list-style-type: none"><li>Measure the abundance and distribution of a species on the school field</li><li>Display your results in an appropriate table</li><li>Calculate the mean, mode and median for your data</li><li>Display your results in a graph</li><li>Analyse your results</li><li>Analyse and interpret data in relation to abiotic and biotic factors</li></ul>
Module 4	Unit 9D Chemistry	<ul style="list-style-type: none"><li>Describe the composition of the Earth's early atmosphere</li><li>Recall the gases that are released by volcanic activity</li><li>Explain the role of condensation forming oceans</li><li>Describe the composition of today's atmosphere</li><li>Explain how the levels of carbon dioxide altered</li><li>Explain the formation of limestone, coal, crude oil and natural gas</li><li>Describe the test for hydrogen</li><li>Describe the test for oxygen</li><li>Describe the test for carbon dioxide</li><li>Describe the test for chlorine</li></ul>	<ul style="list-style-type: none"><li>The test for hydrogen gas</li><li>The test for oxygen gas</li><li>The test for carbon dioxide gas.</li></ul>

# SCIENCE CURRICULUM MAP

Year 9



Module 4

Topic	Core declarative knowledge: what should students know?	Core procedural knowledge: what should students be able to do?
Unit 9D Physics	<ul style="list-style-type: none"><li>Recall Newton's first law</li><li>Explain what happens to the motion of an object when the forces are balanced / when there is a resultant force</li><li>(HT) Describe inertia</li><li>Explain terminal velocity</li><li>Recall Newton's second law</li><li>Recall and apply the equation for resultant force</li><li>(HT) Explain inertial mass</li><li>Recall Newton's third law</li><li>Apply Newton's third law to examples of equilibrium situations</li><li>Explain the motion in a circle</li><li>Explain what is required for motion in a circle to occur</li><li>Describe how forces cause objects to change shape</li><li>Describe the difference between elastic and inelastic distortion</li><li>Recall and use the equation for linear elastic distortion</li><li>Understand how a spring works</li></ul>	<ul style="list-style-type: none"><li>Investigate the relationship between force, mass and acceleration by varying the masses added to trolleys</li><li>Use the equation that links initial and final velocity with distance travelled</li><li>Estimate the magnitudes of everyday accelerations</li><li>Draw velocity-time graphs from measurements</li><li>Analyse velocity-time graphs</li><li>Use the equation for linear elastic distortion</li><li>Use the equation to calculate the work done in stretching a spring</li><li>Calculate relevant values of stored energy and energy transfers</li><li>Investigate the relationship between force, extension and work done extending a spring</li></ul>