

Long Term Plan: Year 9 2024-2025

“Science is simply the word we use to describe a method of organising our curiosity.”

The programme for KS3 (years 7-9) sees a single* teacher following the curriculum roadmap for each class. All teachers teach the same unit to aid sequencing and consistency with teaching and learning.

*There are few classes which are split between staff - but again, the same unit is delivered by both staff.

There are two data collection points for all KS3 students, which will then be analysed with a subsequent KS3 Standardisation Meeting.

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
1	Cells	<p>Prokaryotic compared to eukaryotic cells</p> <p>Microscopy</p> <p>Cell specialisation and differentiation</p> <p>Diffusion – the process of diffusion, examples of where it happens</p> <p>Factors affecting the rate of diffusion</p> <p>Exchange surfaces – how our bodies are adapted for efficient diffusion</p>	<p>Practical Skills:</p> <ul style="list-style-type: none"> Using light microscopes correctly Investigate the effect of temperature on the rate of diffusion Investigate the effect of concentration on the rate of diffusion Investigate the effect of surface on the rate of diffusion Investigate the effect of concentration on the rate of osmosis <p>Scientific Skills:</p>	<p>That all animal cells look like the model animal cell often used to teach this topic, teaching must be careful that students understand that most animal cells are specialised</p> <p>That people grow as their cells get bigger as opposed to replication of cells</p> <p>Diffusion and osmosis are the same thing.</p> <p>Active transport only occurs when</p>	<p>KS3 students to study the basic structure from animal plant and bacterial cells, including the function of most organelles, cell specialisation.</p> <p>Students carried out some basic work with microscopy</p> <p>S3 students looked at diffusion and factors which affect the rate of.</p>	<p>The cell as the fundamental unit of life is studied in both GCSE Biology, Applied human biology and A-level biology</p> <p>This content leads to: 4.4 - Energy in living organisms</p> <p>4.2: Organisation</p> <p>4.3 – Infection & response</p>	<p>Students to compare stem cells extracted from bone marrow and from embryos, looking at which kind of cells these can differentiate into and considering why</p> <p>Cross subject links to Chemistry</p> <p>High Prior attainers can attempt to draw the osmosis</p>

		<p>Osmosis – the process of osmosis, examples of where it happens</p> <p>Active transport - the process of active transport , examples of where it happens</p>	<ul style="list-style-type: none"> • Drawing and labelling scientific diagrams • Changing the subject of, and substituting into, simple equations with three terms • Record data in tables • Present data in graphs 	something has to move upwards		<p>4.7 – Ecology</p> <p>4.6 – Inheritance, variation and evolution</p> <p>4.5 - Reflex arc and neurotransmitter movement</p>	graph without scaffolding
SMSC & British Values	The ethics surrounding the use of stem cells in medical research and in the treatment of certain diseases such as dementia British values in science						
Cultural Capital	Students explore the ethical issues surrounding use stem cells, including why different people may hold different views on their use						
Career Link	As cells are fundamental to biology this unit opens doors to careers in any biological medical or ecological field https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Two	Separatin g Mixtures	Melting and boiling points of a substance depend on the nature of its particles and the forces between particles, How to predict the states of substance at different temperatures given appropriate data,	<p>Practical Skills:</p> <ul style="list-style-type: none"> • Describe a practical procedure for a specified purpose. • Carry out practical procedures safely. • Recording observations • Use of appropriate apparatus to make and record a range of 	<p>Some students will have an ‘everyday’ understanding of ‘pure’ water as opposed to chemically pure water</p> <p>All liquids have the same boiling point</p> <p>The ink is sucked up the paper.</p>	This is a golden thread that runs through all disciplines in science. Yr7 particles, Yr8 separation techniques, Yr 7 cells (diffusion), Yr8 motion and		

		<p>The limitations of the particle model</p> <p>Define a pure substance</p> <p>Explain how melting and boiling point data can be used to identify pure substances</p> <p>Define formulation</p> <p>Explain how formulations are made and give examples</p> <p>Identify formulations given appropriate information.</p> <p>Describe, explain and give examples of the specified process of separation,</p> <p>Suggest suitable separation and purification techniques for mixtures when given appropriate information</p> <p>Investigate how paper chromatography can be used to separate coloured substances,</p> <p>Explain how paper chromatography separates mixtures Interpret chromatograms and determine Rf</p>	<p>measurements accurately.</p> <ul style="list-style-type: none"> • Safe use of a range of equipment to purify and/or separate chemical mixtures. • Safe use of a range of equipment to separate chemical mixtures. e..g paper chromatography <p>Scientific Skills:</p> <ul style="list-style-type: none"> • Interpret chromatograms and determine Rf values from chromatograms • Students should be able to identify formulations given appropriate information. 	<p>Water is the only solvent/things only dissolve in water. The ink is sucked up the paper.</p> <p>Water is the only solvent/things only dissolve in water. The ink is sucked up the paper.</p>	<p>pressure are just a few examples</p>		
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		Describe the tests and positive result for hydrogen, oxygen, carbon dioxide and chlorine					
SMSC & British Values	British values in science The contribution of British scientists to scientific understanding.						
Cultural Capital	The historical importance of the various figures that have contributed to the development of understanding of the atom.						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Three	Energy Stores	<p>Define energy and systems,</p> <p>Explain the law of the conservation of energy,</p> <p>Identify energy stores.</p> <p>Describe energy transfers between stores. Describe what is meant by 'work done',</p> <p>Calculate work done</p>	<p>Practical Skills:</p> <ul style="list-style-type: none"> Investigate the transfer of energy from a gravitational potential energy store to a kinetic energy store Investigating specific heat capacity <p>Scientific Skills:</p> <ul style="list-style-type: none"> Students should be able to convert between newton-metres and joules, Use a variety of models such as representational, spatial, 	Energy like food or a fuel, gets used up. students see energy as an 'intangible fluid' that flows from one place or object to another during a process (IOP), stores of energy are not changed into something else. They are moved or transferred to a different store.	<p>Year 7 power and energy</p> <p>Year 7 Energy in the home</p> <p>Year 7 conduction</p> <p>Year 7 energy and energy stores</p> <p>Year 7 work done and energy changes on deformation</p>	<p>Y9 - Power and energy</p> <p>Y9 - Energy in living organisms</p> <p>Y9 - Atoms and radiation</p> <p>Y10 - 6.2 Electricity</p> <p>Y11 - 6.6 Waves</p>	<p>Students could be asked to consider more complex energy transfers involving more than two stores.</p> <p>Changing the subject of energy equations to calculate theoretical maximum speed</p>

		<p>State the factors that affect GPE</p> <p>Recall and apply the GPE equation</p> <p>State the factors that affect Kinetic Energy</p> <p>Recall and apply the Kinetic energy equation</p> <p>State the factors that affect Kinetic Energy</p> <p>Recall and apply the Kinetic energy equation</p> <p>Describe elastic energy</p>	<p>descriptive, computational and mathematical to solve problems,.</p> <ul style="list-style-type: none"> Recall and apply an equation. Apply to unfamiliar contexts Apply the equation for elastic potential energy Students should be able to give examples that illustrate the definition of power eg comparing two electric motors that both lift the same weight through the same height but one does it faster than the other. 	<p>tudents confuse ideas of energy with ideas of force, work or power</p> <p>All metals conduct heat equally as well</p> <p>Power is the same as force or work.</p>			
SMSC & British Values	<p>British values in science</p> <p>The impact of non-sustainable resources and the everyday changes that can be made to promote the use of more sustainable resources</p>	<p>State the equation and calculate elastic energy stored</p> <p>Describe with examples how net energy in a system doesn't change</p> <p>Describe how dissipation can result in energy being stored in less useful ways.</p> <p>Identify useful and wasted energy</p> <p>Recall the equation for and calculate efficiency,</p> <p>Describe ways to increase efficiency</p> <p>Define power,</p>					

Cultural Capital	The ubiquity of energy means that problems can be framed in a variety of familiar and unfamiliar contexts	Recall, rearrange and apply the power equation					
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Four	Cell Division	<p>Describe DNA structure and function</p> <p>Explain what a genome is</p> <p>Explain the benefits of studying the genome.</p> <p>State what is meant by cell division</p> <p>Explain why cells need to divide</p> <p>Describe the cell cycle</p> <p>Describe differentiation</p>	<p>Practical Skills:</p> <p>Scientific Skills:</p> <ul style="list-style-type: none"> Use models and analogies to understand the structure of DNA. Use models and analogies to develop explanations of how cells divide. Appreciate the power and limitations of science and consider 	<p>DNA is alive; DNA is only found in blood, or only in specific cell types (e.g. in the reproductive system); some non-living things (e.g. cars) have DNA, and some living organisms (e.g. plants and bacteria) do not; genes and DNA are different entities, and specifically that genes are responsible for family resemblance while DNA makes you unique and identifiable</p>	<p>Revisiting concepts from cells in year 7 and adaptation and inheritance from Year 8. Pupils will be familiar with the role of the nucleus, DNA and chromosomes</p> <p>Pupils will know that chromosomes are found in the nucleus. They may know that</p>	<p>Y9 - Energy in living organisms</p> <p>Y10 - Infection and Response</p> <p>Y10 - Reflex arc and neurotransmitter movement</p>	<p>Cross subject links to Chemistry</p>

		<p>Explain how differentiation differs in plants and animals</p> <p>State what a stem cell is</p> <p>Describe the use of stem cells</p> <p>Evaluate the use of stem cells</p>	<p>any ethical issues which may arise.</p> <ul style="list-style-type: none"> • Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. • Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments. 	<p>(e.g. if it is discovered at a crime scene); genes and characteristics/traits are the same thing (e.g. 'blue eyes' is a gene); genes are 'particles' that carry a characteristics/trait; the terms 'gene', 'chromosome', 'DNA' and 'genetic information' are synonyms. Research conducted by Riemeier and Gropengießer (2008) identified aspects of learning about growth and cell division that students can find difficult, including: lack of understanding that the multiplication of cells (and therefore growth) occurs through cell division; failure to think about what happens to the size of cells before, during and after division; and a lack of clarity about what would happen to genetic material during cell division (including the misunderstanding that it would be shared, rather than copied, which would lead to a decrease in the number of chromosomes). When cell division is introduced students do</p>	<p>humans have 23 pairs</p> <p>Pupils will know that not all cells are the same and that they specialise. Pupils will be familiar with some specialised cells.</p> <p>Pupils will have been taught what an embryo is in during the Year 7 reproduction topic</p>		
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				not appreciate that cell enlargement must occur and the genome must be copied if the cells resulting from division are to be copies of the original cell. Some students did not believe that cell division (mitotic) occurred in plants because plants were not like animals.			
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SMSC & British Values	British values in science Students may discuss medical issues with certain diseases and how that impacts the efficiency of transport systems						
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Cultural Capital	Students explore issues with the digestive or respiratory system and how these affect the efficiency of transport systems in animals.						
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Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Five	Atomic Structure	Recap what the words atom, element, compound and mixture mean, Use the names and symbols of the first 20	Practical Skills: <ul style="list-style-type: none"> Investigating group 1 metals Potential to use models to explore the atom Scientific Skills:	(Briggs and Holding, 1986) which showed that many students do not adequately understand particle diagrams including the significance of the circles touching (atoms	Year 7 Atoms, elements and compounds. - chemical formulae, Year 8 chemical reactions	Y9 - The periodic table Y9 - Atoms and radiation Y9 - Energy changes	Considering why the results of the Gold Foil Experiment lead to the development of the nuclear

		<p>elements in the periodic table,</p> <p>Interpret chemical formulae</p> <p>Describe how the mass of products compares to the mass of reactants in a chemical reaction Represent reactions as equations.</p> <p>State the state symbols</p> <p>Describe the structure of an atom,</p> <p>Calculate the numbers of protons, neutrons and electrons in an atom, given its atomic number and mass number.</p> <p>State what an isotope of an element is,</p> <p>Calculate relative atomic mass</p> <p>State the number of electrons in an atom and how they are arranged,</p> <p>Represent electronic structures using diagrams and numbers,</p> <p>Explore the electronic structure of the first 20 elements</p> <p>Describe early ideas of the atom</p>	<ul style="list-style-type: none"> ● Using data to make predictions. ● The use of timelines ● Extended writing ● Reading for comprehension 	<p>joined) or not touching (atoms not joined). Particles misrepresented and undifferentiated in concepts involving elements, compounds, mixtures, solutions, and substances.</p> <p>Absence of conservation of particles during a chemical change. Failure to perceive that individual substances and properties correspond to a certain type of particle formation of a new substance with new properties is seen as simply happening, rather than as a result of particle rearrangement.</p> <p>That science does not change - ideas and hypothesis may change due to new evidence</p>	<p>A simple (Dalton) atomic model from Yr 7</p>	<p>Y10 - 5.3 Quantitative Chemistry</p> <p>Y10 - 5.4 Chemical changes</p> <p>Y10 - Rates of reaction</p> <p>Y11 - Chemical analysis</p>	<p>model of the atom.</p>
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		<p>Explain why the new evidence from the scattering experiment led to a change in the atomic model,</p> <p>Explain the difference between the plum pudding model and the nuclear model of the atom</p>					
SMSC & British Values	<p>British values in science</p> <p>The contribution of Scientists to scientific understanding.</p>						
Cultural Capital	<p>The historical importance of the various figures that have contributed to the development of the periodic table</p>						
Career Link	<p>https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1, https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf, https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</p> <p>More information here.</p>						
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Six	Energy	<p>The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material. Students do not need to know the definition of thermal conductivity.</p>	<p>Practical Skills:</p> <ul style="list-style-type: none"> Demo/ modelling gravitational, kinetic and elastic potential energy <p>Scientific Skills:</p>	<p>Students often frame renewable and non-renewable in terms of “able to be used again” rather than in terms of the finite or infinite pool of resources.</p>	<p>This unit builds directly from year seven study of energy stores and pathways.</p>	<p>Y9 - Energy in living organisms</p> <p>Y9 - Atoms and radiation</p> <p>Y10 - 6.2 Electricity</p>	<p>Students could be asked to use data on efficiency and cost to evaluate appliances</p>

		<p>Students should be able to explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation. Students should be able to describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls.</p> <p>The main energy resources available for use on Earth include: fossil fuels (coal, oil and gas), nuclear fuel, biofuel, wind, hydroelectricity, geothermal, the tides, the Sun and water waves.</p> <p>A renewable energy resource is one that is being (or can be) replenished as it is used.</p> <p>The uses of energy resources include: transport, electricity generation and heating. distinguish between energy resources that are renewable and energy resources that are non-renewable</p>	<ul style="list-style-type: none"> ● Changing the subject of simple equations with three terms. ● Evaluation of an equation involving multiplication, division, squares and square roots ● Record accurate results in an appropriate format ● Present and interpret data in tabular and graphical form. 			<p>Y11 - 6.6 Waves</p>	
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SMSC & British Values	British values in science Cost of living crisis - students to relate information of appliances to understanding how these link to cost
Cultural Capital	Cost of living crisis - students to relate information of appliances to understanding how these link to cost
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .

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Seven	Organisati on & Digestion	Describe the levels of organisation in the body, understand the size and scale of these levels Describe the pathway through the digestive system Explain how the small intestine is adapted for its function State the key nutrients we need and describe how to test for them Describe what each nutrient is made up from and how to test for it.	Practical Skills: <ul style="list-style-type: none"> ● Modelling the digestive system ● carry out experiments appropriately having due regard for the correct manipulation of apparatus, and health and safety considerations. ● Use scientific theories and explanations and hypothesis on how pH affects amylase activity. ● Make and record observations and measurements of time. 	Organs can only belong to one organ system. Some pupils may be confused between the respiratory system and respiration - thinking that respiration is breathing Eating is the same as digestion https://educationendowmentfoundation.org.uk/public/files/EEF_BEST_infographic_-_Digestion.pdf Pupils struggle to make the connection between liver,	In Year 7 pupils are first introduced to the levels of organisation. This is an opportunity to revisit and consolidate The organs and the function of the digestive system are studied in Year 8. Diffusion and surface area are revisited.	4.3 Health & Disease 4.5 Homeostasis	

		<p>Use qualitative reagents to test for a range of carbohydrates lipids and proteins</p> <p>Use the lock and key theory to explain enzyme action</p> <p>Identify the enzyme needed and products of digestion of each nutrient</p> <p>Investigate the effect of pH on enzyme action (RP)</p> <p>Explain The effect of pH on enzyme action</p> <p>Explain The effect of Temperature on enzyme action</p> <p>Explain the roles of hydrochloric acid and bile in making digestion more efficient</p> <p>Recall how the small intestine is adapted to exchange materials</p>	<p>Scientific Skills:</p> <ul style="list-style-type: none"> • Students should be able to use other models to explain enzyme action. • present a graph of amylase activity against pH • translate numeric data into graphical form 	<p>gallbladder and the rest of the digestive system</p>	<p>Some of the food tests are undertaken in Year 8</p> <p>Pupils have been introduced to digestive enzymes and their role in year 8</p>		
<p>SMSC & British Values</p>	<p>British values in science</p>						
<p>Cultural Capital</p>	<p>Use of wash powder and baby food within the industry</p>						

Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Eight	Periodic table	<p>Describe how the periodic table was developed over time,</p> <p>Explain why Mendeleev's periodic table was accepted</p> <p>Describe how atomic structure is linked to the periodic table,</p> <p>Predict possible reactions and probable reactivity of elements from their positions in the periodic table</p> <p>Describe the physical and chemical properties of group 1 metals,</p> <p>Explain the properties of group 1 elements,</p> <p>Predict the properties of group 1 elements</p>	<p>Practical Skills:</p> <ul style="list-style-type: none"> • Demo – Group 1 metals in water <p>Scientific Skills:</p> <ul style="list-style-type: none"> • Know observations/ scientific knowledge of methods that scientists use to answer questions. • Classification of elements due to experimentation . • Carrying out predictions • Interpret data to describe patterns and properties 	<p>Students often mix up the names and data of the scientists responsible for each discovery of the periodic table</p> <p>Elements were 'invented'; they all have symbols with the same letters as their English names; elements and atoms are different substances; atoms are like cells and of a similar size</p>	<p>Year 7 the periodic table, atoms and electron configuration from Year 9</p> <p>Year 7 the periodic table, builds on and adds to explanations from Year 8 group 1 metals, atoms and electron configuration from Year 9</p> <p>Year 7 the periodic table, builds on and adds to explanations from Year 8 group 1 metals, atoms and electron</p>	<p>Y9 - The periodic table</p> <p>Y9 - Atoms and radiation</p> <p>Y9 - Energy changes</p> <p>Y10 - 5.3 Quantitative Chemistry</p> <p>Y10 - 5.4 Chemical changes</p> <p>Y10 - Rates of reaction</p> <p>Y11 - Chemical analysis</p>	<p>Considering the results of each investigation and how it lead to the development of the periodic table</p>

		Describe the properties and trends of group 7 elements, Explain the properties and trends of elements in group 7, Describe displacement reactions Describe the trends in group 0, Explain the properties of the group 0 elements			configuration from Year 9 Year 7 the periodic table, builds on and adds to explanations from Year 8 group 1 metals, atoms and electron configuration from Year 9		
SMSC & British Values	British values in science The impact of radiation and how we can stay safe while using it. The ethics of nuclear power						
Cultural Capital	The use of radioactivity and nuclear power globally; including the approach of the UK and other nations Links to current energy crisis						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Nine	Transport in Animals	Describe the components of blood	Practical Skills: <ul style="list-style-type: none"> Possible heart dissection 	Pupils struggle with the idea of what blood is made up of. That	Year 7 structure and function of our body - gas		

		<p>and explain their functions</p> <p>Recognise different types of blood cells in a photograph or diagram and explain how they are adapted to their function</p> <p>Explain how the structure of blood vessels relates to their function</p> <p>Describe double circulation</p> <p>Describe the structure of the heart</p> <p>Describe coronary heart disease and its treatment</p> <p>Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant</p> <p>Identify the structures of the respiratory system</p> <p>Explain how the lungs are adapted for gaseous exchange</p>	<p>Scientific Skills:</p> <ul style="list-style-type: none"> • Observing and drawing blood cells seen under a microscope. Evaluate risks related to use of blood products. • Use models to explain the adaptations of blood vessels • Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment. • Use models to explain the adaptations of the alveoli 	<p>plasma is the liquid part of the blood. That we have blue blood. That blood clotting is always harmful - associated with blood clots that could cause deep vein thrombosis as an example</p> <p>The blood pressure in the capillaries is lower than that in the arteries and veins because the narrow capillaries offer great resistance to blood flow.</p> <p>https://educationendowmentfoundation.org.uk/public/files/Publications/Science/What_colour_is_deoxygenated_blood.pdf The heart is found on the left hand side of the chest, The heart pumps air around the body,</p> <p>Respiration takes place in the lungs</p>	<p>exchange. In Year 6 pupils covered the following objectives: identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Pupils have also previously studied transport across membranes and factors affecting it.</p>		
<p>SMSC & British Values</p>							

Cultural Capital			
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .		



Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Ten	Earth's Atmosphere	<p>State the gases and proportions of each in the atmosphere,</p> <p>Explain how the Early atmosphere has changed</p> <p>Describe the greenhouse effect,</p> <p>Recall human activities that increase the amounts of each of the greenhouse gases,</p> <p>Evaluate the quality of evidence given information and recognise the importance of peer review of results</p>	<p>Practical Skills:</p> <p>Scientific Skills:</p> <ul style="list-style-type: none"> • Use of timelines • Extended Writing • Reading for comprehension • Evaluating the accuracy of data • Using data to make predictions about the outcome of experiments • Interpreting data presented in tabular or graphical form 	<p>Many students believe that oxygen is the most plentiful gas in the atmosphere, rather than Nitrogen.</p> <p>Many students overestimate the concentration of carbon dioxide in the atmosphere</p> <p>Many students confuse global warming with climate change</p>	<p>Year 8 the earth and atmosphere</p> <p>Year 8 climate change</p>	<p>At A-Level, students will study the impact of CFCs and the mechanism by which they have contributed to loss of ozone.</p>	<p>Students may be asked to compare interventions based on compromise between their environmental and economic impacts.</p>

		Describe the cause of climate change, Describe the implications of climate change, Describe actions to reduce greenhouse gas emissions and give reasons why actions may be limited Describe the production and effects of atmospheric pollutants					
SMSC & British Values	British values in science Working safely in a lab and respecting each other's workspace						
Cultural Capital	The ubiquity of forces means that problems can be framed in a variety of familiar and unfamiliar contexts						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Eleven	Particle Model and Matter	Explain the term density in relation to particles,	Practical Skills: <ul style="list-style-type: none"> plan experiments or devise procedures 	Weight and density are the same thing. Density changes in	Year 7 Particles in states of matter, energy		

		<p>Describe the factors that affect density,</p> <p>Recall and use the density equation</p> <p>Describe a method to determine the density of a regular shaped object,</p> <p>Describe a method to determine the density of an irregular shaped object,</p> <p>Suggest ways to improve the accuracy of the methods described</p> <p>Explain what is meant by internal energy,</p> <p>Explain how heating a system changes the energy stored in it.,</p> <p>Explain the difference between heat and temperature</p> <p>Describe the factors that affect the temperature increase of a system,</p>	<ul style="list-style-type: none"> ● test hypotheses, ● apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. ● carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. ● Focus on accuracy of using a measuring cylinder <p>Scientific Skills:</p> <ul style="list-style-type: none"> ● make and record observations and measurements using a range of apparatus and methods. ● evaluate methods and suggest possible improvements and further investigations. ● recognise/draw simple diagrams to model the difference between solids, liquids and gases. 	<p>proportion to the amount of a substance.</p>	<p>stores and transfers, changes of state</p> <p>Year 7 pressure in gases,</p> <p>Year 7 particle theory and energy stores and transfers</p>		
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		<p>Define specific heat capacity,</p> <p>Recall and use the equation for specific heat capacity</p> <p>Explain why a change of state is a physical change not a chemical change,</p> <p>Define latent heat,</p>					
SMSC & British Values	<p>British values in science</p> <p>Working safely in a lab and respecting each other's workspace</p>	<p>Investigate temperature changes during state changes in stearic acid.</p> <p>Explain how temperature changes the pressure exerted by a gas</p>					
Cultural Capital	<p>The ubiquity of forces means that problems can be framed in a variety of familiar and unfamiliar contexts</p>						

Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .					

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Twelve	Organisation & Their environments	<p>Use food chains to model feeding relationships</p> <p>Explain why all food chains begin with green plants or algae</p> <p>Use a food web diagram to predict and explain effects that a change in the size of a population could have on other populations</p> <p>Define key terms: population, community, ecosystem.</p> <p>Identify levels of organisation within an ecosystem.</p> <p>Describe ways in which species can depend on other species for survival.</p>	<p>Practical Skills:</p> <ul style="list-style-type: none"> Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative. Use a range of apparatus to measure abiotic factors e.g. data loggers <p>Scientific Skills:</p> <ul style="list-style-type: none"> Use of food chains and webs to model feeding relationships extract and interpret information from charts, graphs and tables relating to the effect of biotic factors on organisms within a community. Using models to show the relationship between predator/prey 	<p>Food chains and webs show what eats what rather than a transfer of biomass. The words and pictures in a food chain represent individual organisms, rather than populations of organisms. A change in the size of a population will only affect another population if they are related as predator-prey. BEST food chains and food webs https://assets.ctfassets.net/pc40tpn1u6ef/3emtXyC7Z2FgtPxKnxk3Ota165f6eab98c416a399221cdc6525f46/BEST_BOE_1_1_Preview_Food_chains_and_food_webs.pdf</p> <p>A 'community' can only be formed by people living together. Population and</p>	<p>Pupils have studied what an ecosystem is in Year 8</p> <p>Pupils will be aware of the term adaptation and will have studied many cellular adaptations e.g. specialised cells. In Year 6 and 8 pupils will have covered how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p> <p>In Year 8 pupils will have begun to look at competition e.g. for food as well as</p>	<p>Ecology forms an entire unit of study at Biology A-Level, where students will study all of the concepts looked at here in greater depth.</p>	<p>Consider why and how energy is lost along a food chain</p> <p>Evaluate sampling techniques and suggest why a given technique may be used</p> <p>Suggest ways to improve food security</p>

		<p>Explain, with examples how the removal of a species can affect a community.</p> <p>Explain what is meant by a stable community.</p> <p>Define the terms biotic and abiotic factors.</p> <p>Give examples of biotic and abiotic factors.</p> <p>Explain how biotic and abiotic factors affect communities.</p> <p>Suggest factors that plants and animals compete for</p> <p>Explain why animals and plants need to compete for these factors</p> <p>Explain with examples what is meant by adaptation</p> <p>Explain what structural, functional and behavioural adaptations are.</p> <p>Give examples of extremophiles and the conditions they survive in.</p> <p>Describe methods that we can use to sample organisms for abundance.</p>		<p>community are interchangeable terms.</p> <p>Humans are separate from ecosystems. Interdependence is limited to feeding relationships. BEST:https://assets.ctfassets.net/pc40tpn1u6ef/58QrcKgPRmVQ1jlv/eqzwo8/16a1df01a11696c24e6ef09f6e6a6494/BEST_BOE_1_2_Preview_Interdependence_within_ecosystems.pdf</p> <p>Organisms can choose to adapt</p>	<p>how competition can lead to natural selection and evolution</p> <p>Pupils will have an awareness of factors that affect organisms from Year 8, however they will not have used the terms abiotic and biotic</p> <p>Predator/prey relationships described in Year 8 interdependence</p> <p>Revisiting feeding relationships from KS2 and Year 8</p>		
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		<p>Carry out sampling to determine the abundance of an organism</p> <p>Describe methods that we can use to sample organisms for distribution.</p> <p>Carry out sampling to determine the distribution of an organism using a transect</p>					
SMSC & British Values	<p>British values in science</p> <p>Humans as a wider part of the ecosystem and our place and role in protecting the environment; including the consequences if we fail to do so.</p>						
Cultural Capital	<p>Study of different ecosystems, climates and habitats both in the UK And worldwide</p>						
Career Link	<p>https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1, https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf, https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html</p> <p>More information here.</p> <p>Conservationist Farmer Food Scientist Careers with the environment agency or DEFRA (Department for Environment, Food & Rural Affairs)</p>						