Year 8 Science Curriculum Rationale

The year 8 science curriculum is designed to deepen students' scientific understanding and skills, building on their Year 7 foundation and preparing them for more advanced studies. It broadens their knowledge across biology, chemistry, and physics, enhancing their comprehension of complex concepts such as respiration, chemical reactions, and forces. Emphasising hands-on experiments and investigations, the curriculum develops practical scientific skills and analytical thinking. By introducing more detailed content and fostering curiosity through engaging topics, the curriculum ensures students are well-prepared for the transition to GCSE-level science. We follow the Ark Curriculum+ Science Mastery 5 year scheme.

At KS3 students learn 2 topics in parallel.

Unit	Core knowledge/skill development	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home learning and enrichment
Topic 1 8B Plants and reproduction	Students learn about the structures and functions of flowers, the processes of pollination and fertilisation, and the roles of seeds and fruit in plant reproduction. Students learn about different methods of seed dispersal and the conditions necessary for germination.	KS2: Students learn about the life cycle of plants and basic plant structures, including flowers and seeds. KS3: This links to the prior learning of cells and cell structures. The topic deepens this understanding by delving into the specific processes of pollination, fertilisation, and seed dispersal. This progression not only reinforces prior knowledge but also introduces more detailed explanations and explores the diverse strategies plants use for reproduction.	End of topic assessment	Literacy: Introduce and reinforce key terms related to plant reproduction (e.g., pollination, fertilization, ovary, anther). Numeracy: **Ratios and Proportions**: Calculate ratios and proportions in various contexts, such as the success rate of seed germination under different conditions. FBV: **Rule of Law**: Discuss laws and regulations related to environmental protection and conservation.	Intellectual confidence Connection finding Multi-step problem solving	Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks

Topic 1 8I Fluids	Students learn about the concept of density, the effects of pressure and temperature on fluid behaviour, and the principles of buoyancy and viscosity. Students learn about key properties such as surface tension and capillary action, and they explore practical applications of fluid mechanics in everyday life and engineering.	KS2: Students are introduced to properties of liquids and solids, such as volume and mass. KS3: In year 7 students describe the properties of the states of matter using the particle model. This knowledge is developed by studying fluids, including how they flow and interact under different conditions of pressure and temperature. This progression allows students to deepen their understanding of physical properties and principles.	End of topic assessment	Numeracy -Units and Conversions: Work on converting between different units of energy (e.g., joules, kilojoules, calories) and power (e.g., watts, kilowatts). PSHE - Personal Responsibility: Encourage students to think about their own energy use and ways to reduce their carbon footprint.		Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks
Topic 2 8C Breathing and respiration	Students learn about the structure and function of the respiratory system, the process of breathing (inhalation and exhalation), and the role of the lungs in gas exchange. Students learn about cellular respiration, exploring how cells produce energy through aerobic and anaerobic processes.	KS2: Students learn about the organs and systems of the human body, including the basics of how muscles work and the role of the heart in circulation. KS3: Links to prior learning in year 7 of cells, organ systems and the use of muscles. The topic builds on this by focusing on the specialised function of the respiratory system, explaining how oxygen is taken in and carbon dioxide is expelled, and how these processes support cellular functions and overall health.	End of topic assessment	Literacy - Scientific Vocabulary: Introduce and reinforce key terms related to breathing and respiration (e.g., alveoli, diaphragm, aerobic respiration, anaerobic respiration, oxygen, carbon dioxide). PSHE - Health Education: Discuss the importance of	Meta-cognition Precision	Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks

				maintaining a healthy respiratory system through exercise, avoiding pollutants, and not smoking.		
Topic 2 7F Acids and alkalis	Students learn about the characteristics of acids and alkalis, recognising common examples of each, and understanding their effects on indicators. Students also learn about pH scale and how to measure acidity or alkalinity of substances.	KS2: students learn about the states of matter and simple chemical reactions. In KS3: In year 7 students learnt about how atoms can join to make compounds and the signs and basic process of a chemical reaction. This topic furthers this by introducing the specific properties and reactions of acids and alkalis, including their effects on other substances and how they can be identified using indicators. chemistry	End of topic assessment	HSW: Improve measurement skills and the ability to use laboratory equipment accurately, such as pipettes and burettes.	Generalisation Intellectual confidence Critical thinking	Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks
Switch to Ark Curriculum + Science Mastery Course. The Exploring Science and Science Mastery courses were cross referenced to ensure all curriculum content was covered. This resulted in some topics being slightly shorter as the content will have already been covered.						
Topic 3 B2.1 Tissues and organs	Pupils will apply their knowledge of pressure from C1.1 to the breathing system. Pupils will discover how the actions of the musculoskeletal system bring about pressure changes that determine the movement of air in and out of the lungs. Pupils will then learn the important relationship between	KS3: Prior to this unit, pupils will have learnt about the levels of organisation that build to organ systems and studied the reproductive system in detail. Pupils should be able to identify where their lungs are and describe what happens when they breathe in and out. Pupils should be able to identify that humans and some other animals have skeletons and muscles for support, protection and movement. In KS2, pupils learn to identify and	End of topic assessment Pre-unit quiz	Literacy - Scientific Vocabulary: Introduce and reinforce key terms related to breathing and respiration (e.g., alveoli, diaphragm, aerobic respiration, anaerobic respiration, oxygen, carbon dioxide).	Intellectual confidence Connection finding	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	breathing and respiration, exploring how the lungs are adapted for efficient gas exchange before investigating how the composition of air changes as it passes in and out of the lungs. Pupils will use their new learning about the breathing system to explain the effect of asthma, smoking and exercise on breathing.	describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.		PSHE - Health Education: Discuss the importance of maintaining a healthy respiratory system through exercise, avoiding pollutants, and not smoking.		
Topic 3 C2.1 Acids and Alkali	Students learn about the characteristics of acids and alkalis, recognising common examples of each, and understanding their effects on indicators. Students also learn about pH scale and how to measure acidity or alkalinity of substances.	KS2: students learn about the states of matter and simple chemical reactions. In KS3: In year 7 students learnt about how atoms can join to make compounds and the signs and basic process of a chemical reaction. This topic furthers this by introducing the specific properties and reactions of acids and alkalis, including their effects on other substances and how they can be identified using indicators. chemistry	End of topic assessment Pre-unit quiz	Numeracy -Units and Conversions: Work on converting between different units of energy (e.g., joules, kilojoules, calories) and power (e.g., watts, kilowatts). PSHE - Personal Responsibility: Encourage students to think about their own energy use and ways to reduce their carbon footprint.	Connection finding Wider world application	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

Topic 4 P2.1 Movement and pressure	"This unit begins with a more scientific introduction to the definition of speed and how it is calculated using distance and time. Pupils will be able to calculate the missing quantities using the equation, as well as the average speed of an object during a journey. Pupils then move on to relative motion, which is also something they may be able to relate to their own experience, but at this point move from describing relative motion qualitatively to quantitatively. Pupils are also introduced to acceleration at this point as the rate of change of speed. Following on from this, pupils cover the drawing and interpretation of distance-time graphs and the features and values that can be calculated from them. The unit then moves on to pressure, its applications and how it is calculated, again asking	Students should have good grasp of the different contact and non-contact forces and should be able to identify these where they occur. Prior to this unit, in year 7, pupils should have encountered contact and non-contact forces, along with calculation of resultant forces. They will be able to describe friction and how this can be reduced. Pupils will have learned about density and calculating density using mass and volume.	End of topic assessment Pre-unit quiz	Numeracy: Average speed equations and graph analysis Literacy: key word glossary	Meta-cognition Precision Multi-step problem solving	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	pupils to use three-term equations. "					
Topic 4 B2.2 Respiration and Photosynthesis	Pupils will start this unit looking at respiration, learning the significance of the reaction to all living organisms. Pupils will be expected to apply their knowledge of the breathing system from B2.1 to give a simple description of how oxygen is obtained by respiring cells. Therefore, a good prior understanding of this is essential. Pupils will then look at anaerobic respiration in animals and fermentation in yeast. Pupils will develop their skills in comparison when looking at the different types of respiration. Pupils will then study photosynthesis and apply their understanding of plant adaptations to this process. Pupils will finish the unit linking their learning together, identifying the relationship between respiration and photosynthesis, and	"In KS2, pupils learn to identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. They explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant and investigate the way in which water is transported within plants. Pupils will recognise that some of the physiological changes that occur in their own bodies during exercise and may have an idea about why these changes occur. Prior to this unit in B2.1, pupils will have learnt how the respiratory system allows for the exchange of gases between the atmosphere and blood. In Y7 pupils will have learnt that the life processes of organisms include respiration and that mitochondria are the site of the release of energy for the cell. In Y7 pupils will know the term photosynthesis when learning about the function of chloroplasts in plant cells. In Y7 pupils will have learnt that diffusion is the movement of particles from a high concentration to a low	End of topic assessment Pre-unit quiz	Literacy: key word glossary	Intellectual confidence Connection finding Multi-step problem solving	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	applying it to biomes as systems which recycle resources.	concentration and factors that affect the rate of diffusion."				
Topic 5 C2.2 Changing substances	Pupils will start this unit looking at respiration, learning the significance of the reaction to all living organisms. Pupils will be expected to apply their knowledge of the breathing system from B2.1 to give a simple description of how oxygen is obtained by respiring cells. Therefore, a good prior understanding of this is essential. Pupils will then look at anaerobic respiration in animals and fermentation in yeast. Pupils will develop their skills in comparison when looking at the different types of respiration. Pupils will then study photosynthesis and apply their understanding of plant adaptations to this process. Pupils will finish the unit linking their learning together, identifying the relationship between respiration and photosynthesis, and	KS2: Students learn about basic elements and their characteristics KS3: In year 7 students can categorise metals and non-metals based on their scientific properties. This topic builds on that prior learning and introduces the systematic organisation of elements in the periodic table, highlighting patterns in their properties and reactivity.	End of topic assessment Pre-unit quiz	Literacy: Key word glossary	Critical thinking Intellectual confidence	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	applying it to biomes as systems which recycle resources.					
Topic 5 P2.2 Magnetism	The unit begins with an introduction to the types of magnetic material and the rules for attraction and repulsion. From here pupils move on to learning about magnetic fields, including how to draw these accurately. Pupils then move on to comparing electromagnets and permanent magnets, before investigating the factors that affect the strength of an electromagnet themselves. Finally, they apply their knowledge of magnetic fields to the Earth's magnetic field where they learn the difference between a magnetic and geographic pole. "	Pupils should remember learning contact and non-contact forces and be able to identify examples of each. They will also understand the general properties of metals from KS2, and some pupils may be able to identify magnetic materials. Pupils will also have a basic understanding of how to set up a simple circuit, which they will need when building an electromagnet.	End of topic assessment Pre-unit quiz	Literacy: keyword glossary	Abstraction skills Meta cognition skills	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

Topic 6 B2.3 Life diversity	Pupils will begin this unit learning about variation. They will consider how variation is affected by both the environment and heredity, how DNA controls inherited characteristics, and how variation can be either continuous or discontinuous. Pupils will have the opportunity to investigate variation amongst their peers. Pupils will then learn about artificial selection as a way of controlling variation, before studying natural selection. Pupils will finish this unit learning about how natural selection gives rise to evolution. Pupils will learn how species that do not evolve can become extinct if their environment becomes unfavourable, look at some examples of extinction events from history and consider how humans are affecting extinction rates today.	KS2, students learn about how sounds are made by vibrations and how they travel through the air to the ear. KS3: links to the year 7 particles and energy. In this topic knowledge is deepened by exploring the detailed properties of sound waves, such as frequency, amplitude, and wavelength, and how these affect pitch and volume.	End of topic assessment Pre-unit quiz	FBV - Rule of Law: Discuss laws and regulations related to noise pollution and hearing protection in the workplace and public spaces.	Intellectual confidence Connection finding	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

Topic 6 C2.3 Earth systems	This unit starts with the three different types of rock, their properties and how they are formed, before linking them all together in the rock cycle. Pupils will then go on to learn about another cycle; the water cycle, and the different processes within this. They will then link the water cycle with living things to help understand why water is so important. These cycles will then lead on to pollution, introducing part of the carbon cycle with combustion of fossil fuels. This introduction to pollution will be built upon in B3.2, C3.3 and a number of other later units.	KS2, students begin to group rocks based on their basic characteristics and learn about the identification of fossils embedded within sedimentary rocks. KS3, this knowledge is built upon with the study of the formation processes of rocks—igneous, sedimentary, and metamorphic—through understanding geological events like volcanic activity, sediment deposition, and metamorphism.	End of topic assessment Pre-unit quiz	Literacy: keyword glossary	Connection finding Abstraction	Homework 1 – Be the teacher Homework 2 – Seneca quiz
Topic 7 P2.3 Resistance	Following the recap lesson, pupils are introduced to resistance as a qualitative concept, describing the relationship between current and resistance. Then pupils will look at the	This unit brings together previous learning from electrical circuits, focusing on the relationships. In later unit's pupils will look at applications of electricity in real life, such as mains electricity and different energy resources. They will also revisit	End of topic assessment Pre-unit quiz	Numeracy - Measurement: Measure and record physical properties of conductive material, such as current, potential	Connection finding Meta cognition	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	relationships between current, voltage and resistance and use Ohm's Law to look at resistance quantitatively. Pupils will then go on to measure resistance of a wire, linking back to previous learning of how to measure current and voltage, before calculating resistance of different lengths of wire and explaining this relationship. Finally, pupils will cover resistance in series and parallel circuits, linking back to their knowledge of current and voltage in series and parallel circuits.	circuits in more detail in P4.2, including current, resistance and potential difference and calculating these from different circuit diagrams. They will also build on their understanding of current and voltage to learn about power, energy transferred and charge, including equations P=IV and E=VQ.		difference and resistance. Ohm's law equation and calculation		
Topic 7 B2.4 Nutrition	Pupils begin this unit revisiting prior knowledge from primary school, particularly around a balanced diet and the importance of different nutrients. Then they move on to how to test for some of these different nutrients, before looking at the digestive system and how	Prior to this unit, pupils will have learnt about several organ systems and should now be confident to recognise an organ system as a group of organs working together to carry out a specific function. Pupils will have learnt about the digestive system in KS2 and are likely to recognise the names of different nutrients contained in food. Pupils have learnt about soluble substances and diffusion and will apply	End of topic assessment Pre-unit quiz	**HSW/Maths - experimental results, measurements Qualitative data analysis**	Abstraction Meta cognition skills	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

	these nutrients are broken down and used by the body. They then start to look at the function of enzymes in the digestive system, and practice investigating enzyme action. Finally, they consolidate their knowledge of nutrition by looking at nutrition in plants, linking back to photosynthesis and how to test for starch.	this learning to the role of the small intestine in digestion.				
Topic 8 P2.4 Light	Students study the properties of light such as reflection, dispersion, and how light interacts with different materials and surfaces. Students learn about optical devices like lenses and mirrors, and how they are used in everyday applications such as cameras and telescopes.	Pupils will have a basic understanding of how light travels and different sources of light. They should also be able to explain that the process of reflection involves a change in direction of light (and some may be able to explain that light is reflected at the same angle as it hits an object. They may also be able to explain that shadows are formed because light travels in straight lines. Pupils may also be able to explain different types of surfaces that are good at reflecting light and other surfaces that are poor reflectors. Pupils may also know the basic structure of the eye and how humans see light, although not in	End of topic assessment Pre-unit quiz	Numeracy - Data Analysis: Collect and analyse data from experiments on light, such as measuring angles of reflection and refraction, or analysing the spectrum of light through a prism.	Problem solving Abstraction Critical thinking	Homework 1 – Be the teacher Homework 2 – Seneca quiz Cognito provides support for home learning

		detail. All pupils should be able to state the colours of the rainbow. Energy can be shifted between stores through by different pathways, including by radiation. "				