Year 7 Science Curriculum Rationale

In year 7, students will develop their scientific thinking and intellectual curiosity through theory and investigation. Their factual knowledge will cover a wide range of scientific topics, exploring the big ideas within the three main subject areas: Biology, Chemistry and Physics. Students will be introduced to the core principles for each discipline and will build upon their previous KS2 knowledge and experiences to develop their understanding of the world around them.

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/Enrichment
Introduction to science	Basic health and safety in the laboratory, core skills (methods, diagrams, names of equipment etc).	An introduction to working in a laboratory including how to use equipment safely and carry out basic experiments		HSW- Risk assessing a practical, correct use of scientific diagrams, safe working with Bunsen burners etc Literacy- correct names of scientific equipment	Automaticity Risk-taking	
Topic 1 7A - Cells, tissues, organs and systems	Students study the structure and function of animal and plant cells, key organelles, and how cells form tissues and organs. They learn about major human and plant organs and their systems, like the circulatory and digestive systems.	KS2: Students learn about the basic structure and function of some common plants and animals, and the human body, focusing on major organs and their roles. This knowledge is expanded to a cellular level, exploring the detailed structure of plant and animal cells, and	End of topic assessment	HSW- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety (using a light microscope and preparing	Connection finding Intellectual confidence Critical and logical thinking	Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks

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		how these cells form tissues and organs.		light microscope slides) Maths- use symbols for units.		
Topic 1 7G – Particles	Students learn about the particle model of matter, understanding the structure and behaviour of solids, liquids, and gases. They explore how particles are arranged and move in each state, and study concepts like air pressure and diffusion. studies in chemistry and physics.	KS2: Students learn the basic properties of solids, liquids, and gases. This understanding is expanded to include the particle model, explaining how particles are arranged and move differently in each state. Students explore air pressure in-depth, learning how particle collisions create pressure and how this affects behaviour in different states of matter.	End of unit assessment	HSW - understand that scientific hypotheses, methods and theories develop as earlier explanations are modified to take account of new evidence and ideas. Maths - converting between metres and nanometres	Intellectual playfulness Intellectual confidence Connection finding	Homework 1 – Be the teacher Homework 2 – Seneca quiz Homework 2 – Active Learn revision tasks
Switch to Ark Curriculum+ Science Mastery Course. Exploring Science and Science Mastery course were cross referenced to ensure all curriculum content was covered. This resulted in some Science Mastery topics being slightly shorter in length as the content may have already been covered.						
Topic 2 B1.2	This unit introduces pupils to their first specialised organ system, under the big	Prior to this unit, pupils have learnt about the structure of plant and animal cells as well	End of unit assessment	HSW- Make predictions using scientific	Concern for society Connection finding	Homework is set on Seneca. Cognito

Unit:	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home Learning/Enrichment
Reproduction	idea 'characteristics are inherited'. Pupils will learn that all organisms reproduce and be introduced to some of the ways that different organisms do this. Pupils will learn about the role of the reproductive system in the onset of puberty and have the opportunity to study some of the changes that take place. Pupils will study the menstrual cycle in enough detail to understand the different stages, before studying the process of reproduction in animals. Pupils will also develop an understanding of plant reproduction, learning how different plant structures are specialised to allow for pollination, fertilisation and germination.	as the levels of organisation that make up an organ system. Pupils have learnt about the structure and function of a range of specialised cells, including the sperm cell. Reproduction allows characteristics to be inherited, and this is a fundamental process that all living organisms carry out. From this unit pupils will go on to cover mitosis and meiosis in more detail, as well as the evolution of species through natural selection. They will also learn more about competition between species and how different species have adapted to suit their environment. Pupils will also delve into genetic inheritance in Year 9 units, so a fundamental understanding of the process of reproduction is crucial at this stage.		knowledge and understanding.	Imagination Big picture thinking	provides support for home learning.

Unit:	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home Learning/Enrichment
Topic 2 C1.1 Particles (4 lessons)	Pupils will learn how to explain the different properties of different substances using their knowledge of particle arrangement. Pupils will also use the particle model to represent expansion, melting, boiling, freezing and condensing. They will learn how to plot melting and boiling points onto number lines and use these to identify the different states of different substances at different temperatures. This unit also introduces pupils to the concepts of diffusion and pressure. Pupils will apply their knowledge of the properties of different substances to a range of scenarios involving diffusion and pressure. Pupils will also be introduced to the idea of density in this unit, including how to calculate it and	Prior to this unit, pupils will have some understanding of the states of matter from Key Stage 2. They should be able to compare and group materials together, according to whether they are solids, liquids or gases. They will have observed that some materials change state when they are heated or cooled and measured or researched the temperature at which this happens in degrees Celsius (°C). Many pupils will be able to identify the part played by evaporation and condensation in the water cycle and will be able to associate the rate of evaporation with temperature. Students have covered the bulk of these ideas in the 7G topic and are covering the melting, freezing, boiling and condensing as well as		Numeracy – calculating density Keyword glossary	Intellectual playfulness Intellectual confidence Connection finding	Homework is set on Seneca. Cognito provides support for home learning.

Unit	Core knowledge/skill development:	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home Learning/Enrichment
	describing the relative densities of solids, liquids and gases using the particle model.	density to ensure they are aligned with the Science Mastery curriculum.				
Topic 2 P1.1 Contact Forces	In this unit pupils will learn about contact and non-contact forces and different examples of these as part of the big idea 'forces predict motion'. They will cover magnetism and gravity as examples of non-contact forces in this unit. Pupils will look at the fundamentals of Newton's First Law of Motion, determining whether forces are balanced or unbalanced based on the motion of the object, and explaining the possible effects of an unbalanced force. Pupils will learn how to represent forces using free body diagrams and how to interpret the size and direction of arrows, as well as calculate resultant force	Students should be able to identify the effects of air resistance, water resistance and friction that act between moving surfaces from their work in primary school. In KS2, they learn to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. They should know that some forces need contact between two objects, but magnetic forces can act at a distance.	End of unit assessment	Maths - the use of conventions when communicating science, the SI system Glossary of keywords	Agile Enquiring Generalisation Empathy	Homework is set on Seneca. Cognito provides support for home learning.

Unit	Core knowledge/skill development:	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home Learning/Enrichment
	when forces are acting in the same direction and in opposite directions. They will then learn about interaction pairs, covering the fundamentals of Newton's Third Law of Motion. Pupils will apply their understanding to springs and investigate deformation as a possible effect of an unbalanced force. They will practice measuring the extension of a spring as well as measuring the force applied using a Newton meter. Pupils will also look at resistive forces and the effect these have on the motion of an object. They will learn about drag forces (air resistance and water resistance) as well as friction and be able to explain when each occurs. They will go on to investigate how the type of surface affects the friction					

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	experienced by an object, as well as the effect of lubrication.					
Topic 3 P1.2 Space	In this unit, pupils learn about gravity as a non-contact force and its relationship with distance. They explore weight as the effect of gravity on mass and how gravitational field strength affects both. The unit covers gravity's role in orbits, natural and artificial satellites, and the solar system's structure, including eclipses and the differences between solar and lunar eclipses. Pupils also study the Earth's rotation and tilt, understanding how these cause day and night, seasons, and variations in day length and temperature.	KS2 provides pupils with an understanding of the solar system, the spherical nature of the Sun, Earth, and Moon, and the length of days and years. They also learn that the Sun is a star at the center of our solar system with eight planets and explore how ideas about the solar system have evolved. Building on P1.1, pupils review forces, including gravity as a non-contact force, and develop their understanding of gravity's relationship with distance. They differentiate between mass and weight, practice calculations using gravitational field strength, and explore how gravity keeps objects in orbit.	End of unit assessment	HSW- understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review Maths - an understanding of number, size and scale and the quantitative relationship between units. Using estimations and explaining	Big picture thinking Meta cognition Connection finding	Homework is set on Seneca. Cognito provides support for home learning.

Unit:	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home Learning/Enrichment
		The unit expands on the solar system, using models to explain phenomena, and covers natural and artificial satellites. Pupils study the Earth's tilt and its effect on seasons, as well as how Earth and Moon movements cause eclipses.		when they should be used.		
Topic 3 C1.2 Atoms, Elements and compounds	In this unit, pupils build a conceptual understanding of matter under the theme 'Structure Determines Properties.' They learn that a substance's properties are linked to the type and arrangement of its particles. Pupils are introduced to key terms like atoms, elements, compounds, and molecules. They explore the periodic table, studying metals, non-metals, and their properties. The unit also covers chemical reactions, hazard symbols, and safe handling	Before this unit, in C1.1, pupils learned about solids, liquids, gases, and changes of state, becoming confident in drawing and interpreting particle diagrams. They also gained KS2 knowledge of metals and non-metals, linking properties to functions and uses. This unit introduces fundamental chemistry concepts, starting with atoms and elements, providing the language and understanding to access later topics. Pupils explore	End of unit assessment	HSW - present observations and data using appropriate methods, including tables and graphs understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.	Intellectual confidence Precision skills Generalisation skills	Homework is set on Seneca. Cognito provides support for home learning.

Unit	Core knowledge/skill development:	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home Learning/Enrichment
	practices to minimize health risks	the periodic table, comparing metals and non-metals, and learn about compounds formed by chemically combining elements. They begin to represent substances with symbols, names, and particle diagrams. Understanding atoms, elements, and compounds is foundational for future chemistry topics like bonding, periodic patterns, and quantitative chemistry, as well as biology and physics concepts. Pupils will also learn to write and interpret balanced symbol equations, linking bonding and structure to properties—key skills for GCSE and beyond.				
Topic 4 B1.3 Interde	This unit introduces pupils to the concept of interdependence, under the	From KS2, pupils are familiar with plants, animals, and terms like predator, prey,	End of unit assessment	HSW - present observations and data using	Connection finding Intellectual confidence	Homework is set on Seneca. Cognito

Unit:	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home Learning/Enrichment
pendence	big idea 'Organisms are Interdependent'. Pupils will be introduced to key ecological terminology and the structure of ecosystems. Pupils will learn how we can investigate different ecosystems using sampling methods and learn when and how each sampling method can be used. Pupils will learn about feeding relationships and develop an understanding of how organisms within a food chain or food web are interdependent. They will also learn about competition between organisms, and how biotic and abiotic factors affect where organisms can live and how they can co-exist.	habitat, and environment. In B1.2, they learn the importance of reproduction and pollination for plant reproduction, which ties into the concept of interdependence. In this unit, pupils learn about ecosystem organization, sampling techniques, and how organisms depend on each other and their environment for survival. They also explore competition between organisms. This unit introduces key concepts of interdependence, environmental impact, and feeding relationships, which will be revisited in later years. Pupils will begin developing sampling skills, which will be expanded in Year 9 and at A-level to study ecosystems and monitor human impact.		appropriate methods, including tables and graphs interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions. Literacy- Interdependence	Critical and logical thinking Collaborating Problem solving	provides support for home learning.

Unit:	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home Learning/Enrichment
Topic 4 P1.3 Energy transfers	This unit introduces pupils to the concept of energy under the big idea 'energy is conserved'. Pupils are introduced to the language of energy; the different energy stores and being able to refer to changes in terms of emptying and filling stores and transfers. Pupils will apply this language to a wide range of observations both in the classroom and their everyday experiences. New in this unit is the idea that energy is quantifiable and measurable. Pupils will be introduced to the law of conservation of energy, and the calculation of efficiency in simple energy transfers. They will learn about the difference between heat, temperature and thermal energy and also how we can measure these. Finally, pupils will investigate	From KS2, pupils recognize common electrical appliances, understand food as an energy source, identify mass units, and describe simple food chains. They also know conductors and insulators, associate metals with good conduction, and measure temperature in °C with a thermometer. This unit introduces energy, measured in Joules, and addresses misconceptions. Pupils learn about energy storage, carriers, and efficiency. They explore energy transfer, including "wasted" energy as heat, and study thermal energy and temperature, linking these to energy stores and carriers.	End of unit assessment	HSW/Maths - using ratios to compare experimental results. Calculate efficiency Literacy – Keyword glossary. HSW - Energy specific 'language'	Intellectual playfulness Intellectual confidence Connection finding	Homework is set on Seneca. Cognito provides support for home learning.

Unit	Core knowledge/skill development:	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home Learning/Enrichment
	thermal insulators and conductors.					
Topic 5 C1.3 Mixtures	This unit, under the big idea of 'Structure Determines Properties,' teaches that the properties of substances, particularly mixtures, are linked to particle arrangement and type. It begins by defining mixtures and solutions, then focuses on separation techniques, starting with decanting and evaporation and advancing to chromatography. Pupils will learn to select the most suitable technique and equipment for specific scenarios, gaining practical skills in separating mixtures and solutions.	This unit begins by defining and describing mixtures and solutions. This forms the foundation for the rest of the unit, which focuses on the separation of mixtures and solutions. The separation techniques increase in complexity, starting with decanting and evaporation, and concluding with chromatography which also has a quantitative element to it. As students progress through this sequence of lessons, they will be required more and more to choose the best and most appropriate technique to separate a variety of mixtures. This will require students to draw on their learning from previous lessons to a greater degree.	End of unit assessment	HSW - use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety. Literacy - Use conventions and symbols when communicating science. Keyword glossary	Precision Multi-step problem solving Connection finding	Homework is set on Seneca. Cognito provides support for home learning.

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Topic 5 P1.4 Electric circuits	Pupils will explore the fundamentals of electric circuits, using models like comparing current and voltage to water flow in a heating system. They will study series and parallel circuits, the requirements for a complete circuit, and conditions for current flow. They will define current as the rate of charge flow, using the equation I=Q/t and investigate current in circuits by connecting ammeters and comparing findings to established rules. Pupils will also examine voltage in series and parallel circuits, using voltmeters and observing bulb brightness to understand voltage distribution	From KS2, pupils should understand electrical conductors and insulators, their effects on circuits, and be familiar with simple series circuits and basic components like switches, batteries, and lightbulbs. They may have encountered current but this is not guaranteed. This unit begins with an overview of electricity, then focuses on circuits as energy pathways. Pupils learn about current, its relationship with charge and time, and represent circuits using diagrams and symbols. They measure current in series and parallel circuits, observe the behaviour of current, and later learn about voltage and its measurement, avoiding potential confusion with potential difference.	End of unit assessment	HSW Make predictions using scientific knowledge and understanding. Literacy – Keyword glossary	Precision Multi-step problem solving Connection finding	Homework is set on Seneca. Cognito provides support for home learning.