

CURRICULUM MAP (Long term plan)

SUBJECT :Science (Combined)

YEAR GROUP: 9

	Cycle 1 Autumn	Cycle 2 Spring	Cycle 3 Summer
Substantive knowledge – Essential knowledge & conceptual understanding of the National Curriculum	CB1 Cells & Microscopes CC1-2 States & Separation solutions CP1-2 Forces & Motion	CB2 Growth & Control CC3-4 Atomic Structure & Periodic table CP3 Energy	CB3 Genetics CC5-7 Bonding & Properties CP4-5 Waves & EM spectrum
Disciplinary knowledge - what skills are practised?	CB1 Make drawings of plant and animal cells using a light microscope and identify their parts. Estimate sizes using microscope fields of view. Estimate sizes using scale bars. Calculate total magnification using a formula. Interpret the SI prefixes milli-, micro-, nano and pico-. Change numbers to and from standard form. Calculate the rate of enzyme activity from experimental data. CC1-2 Use information to predict the states of a substance. Interpret a heating curve to identify a melting point. Calculate Rf values and use them to identify substances. make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements CP1-2 The use of conventions in scientific communication. Apply mathematical concepts and calculate results	CB2 Use percentile growth curves to interpret the growth in children. Understands 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. CC3-4 interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions, present reasoned explanations, including explaining data in relation to predictions and hypotheses, evaluate data, showing awareness of potential sources of random and systematic error. CP3 Interpret diagrams that represent energy transfers. Represent energy transfers using diagrams. Present observations and data using appropriate methods, including tables and graphs Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.	CB3 understands 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. CC5-7 interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions, present reasoned explanations, including explaining data in relation to predictions and hypotheses, evaluate data, showing awareness of potential sources of random and systematic error. CP4-5 interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions, present reasoned explanations, including explaining data in relation to predictions and hypotheses, evaluate data, showing awareness of potential sources of random and systematic error. The use of conventions in scientific communication. Apply mathematical concepts and calculate results
Key questions (What is the learning about?)	CB1 Can I compare & contrast animal & plant cells? Can I describe & explain how microscopes work?	CB2 Can I describe and explain mitosis? Can I explain how animals grow and how we measure this? Can I explain how plants grow? Can I	CB3 Can I describe the features of sexual and asexual reproduction? (Triple only) Can I compare & contrast mitosis and meiosis? Can I describe the

	<p>Can I use a light microscope to observe, draw and label a variety of cells?</p> <p>Can I apply structure to function in prokaryotic cells?</p> <p>Can I link specialised cells structure to their function?</p> <p>Can I link structure to function in different cells?</p> <p>Can I describe & explain how enzymes catalyse reactions?</p> <p>Can I Use the lock-and-key model to develop explanations for enzyme activity? Can I describe the effects of different factors on enzyme activity?</p> <p>Can I describe & explain how enzymes catalyse reactions?</p> <p>Can I Use the lock-and-key model to develop explanations for enzyme activity? Can I describe the effects of different factors on enzyme activity?</p> <p>Which tests are used to identify the main substances in food? (Triple only)</p> <p>Can I compare and contrast diffusion, osmosis and active transport?</p> <p>CC1-2 Can I describe how substances are arranged in different states and explain how they can transition between states?</p> <p>Can I distinguish between a pure substance & a mixture and link this to melting points? Can I distinguish between filtration & crystallisation?</p> <p>Can I describe and explain how chromatography separates substances?</p> <p>Can I explain how distillation can separate different substances?</p> <p>Can I explain how to purify drinking water?</p> <p>CP1-2 Can I explain the difference between a scalar and a vector quantity?</p> <p>Can I interpret a distance-time graph?</p> <p>Can I use the acceleration equation $a=v-u/t$</p> <p>HIGHER:</p>	<p>evaluate the risks & benefits of stem cells?</p> <p>Can I explain how the nervous system works? Can I explain how reflexes and synapses work? Can I describe & explain a reflex arc?</p> <p>Can I explain what some of the different parts of the brain and spinal cord do?</p> <p>Can I explain how brain function is investigated? How are spinal injuries and brain tumours treated?</p> <p>Can I explain how we can see and how we see in colour? (Triple only)</p> <p>CC3-4 Can I explain how the parts of atoms compare with each other? Can I calculate the numbers of protons, neutrons and electrons in atoms? Can I explain why the relative atomic masses for some elements are not whole numbers? Can I explain how Mendeleev arranged elements into a periodic table? Can I understand how elements are arranged in the modern periodic table?</p> <p>Can I work out and show the electronic configuration of an element?</p> <p>CP3 Explain, using examples, that energy is conserved. Give examples of energy being moved between different stores. Describe what happens to wasted energy in energy transfers. Explain some ways in which energy is transferred wastefully by mechanical processes. Explain some ways of reducing unwanted energy transfers in mechanical processes. Define what efficiency means. Recall and use the equation for calculating energy efficiency.</p> <p>Explain how efficiency can be increased.(H)</p> <p>Describe the ways in which energy can be transferred by heating. Describe ways of reducing unwanted energy transfers using thermal insulation. Explain how different ways of reducing energy transfer by heating work. Define the</p>	<p>structure of DNA? Can I describe how proteins are made in cells?</p> <p>Can I describe how mutations lead to a change in a protein? Can I describe Mendel's contribution to modern day genetics? (Triple only) Can I predict possible alleles using a genetic diagram?</p> <p>Can I describe how sex is determined in humans? Can I describe codominance and why men more than women suffer from X-linked diseases? Can I explain how mutations may or may not lead to variations?</p> <p>Can I distinguish between genetic and environmental variation?</p> <p>CC5-7 Can I explain how ionic bonds are formed? Can I describe the structure of ionic lattices? Can I understand the properties of ionic compounds? Can I explain how covalent bonds form? Can I describe the properties of simple molecular compounds? Can I describe the structure and properties of different forms of carbon? Can I describe & explain the properties of metals? Can I compare & contrast different bonding models?</p> <p>CP4-5 Can I compare & Contrast Longitudinal & Transverse waves?</p> <p>Can I use the wave equation to calculate wave speed? Can I explain some of the effects of refraction? Describe some effects of waves being transmitted and absorbed.</p> <p>Describe some effects of waves being reflected and refracted. (triple only)</p> <p>Can I link ear structure to hearing? (triple only)</p> <p>Can I define and explain the uses of Ultrasound? (triple only)</p> <p>Can I define and explain some uses of</p>
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	<p>$V^2 - U^2 = 2ax$ Can I interpret a velocity-time graph? Can I distinguish between mass and weight and use the formula correctly? Can I describe and explain newton's second law of motion? Can I describe and explain newton's third law of motion Can I define momentum and apply the equation correctly? Can I explain how different factors affect the stopping distance of a vehicle? Can I calculate the energy transfers when an object brakes? Can I describe the forces involved in collisions?</p>	<p>meaning of thermal conductivity. Describe the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling. Describe how different factors affect the gravitational potential energy stored in an object. Recall and use the equation for gravitational potential energy. Describe how different factors affect the kinetic energy stored in an object. Recall and use the equation for kinetic energy. List the non-renewable energy resources in use today. Describe the advantages and disadvantages of non-renewable energy resources. Compare the advantages and disadvantages of non-renewable energy resources. Explain how the use of non-renewable energy resources is changing. List the renewable energy resources in use today. Describe the source of energy for different renewable resources. Describe the ways in which the different energy resources are used. Explain why we cannot use only renewable resources. Explain how the use of renewable energy resources is changing.</p>	<p>infrasound? (triple only) Can I describe and explain the effects of EM waves? Can I identify and give uses of the waves in the EM spectrum? Can I describe some uses of the long EM waves? Can I describe some uses of the short EM waves? Can I explain some dangers of EM radiation?</p>
<p>Assessment</p>	<p>PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment</p>	<p>PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment</p>	<p>PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment</p>
<p>Literacy (L), Numeracy (N), Oracy (O) opportunities</p>	<p>Literacy & Communication skills distinguish between information and explanation text, use information and explanation texts to answer different types of questions Maths skills use appropriate units for area measurements, and calculate area for a variety of shapes, including rectangles and cuboids.</p>	<p>Literacy & Communication skills distinguish between information and explanation text, use information and explanation texts to answer different types of questions Maths skills use appropriate units for area measurements, and calculate area for a variety of shapes, including rectangles and cuboids. Maths skills interpreting more complex graphs, substituting into formulae.</p>	<p>Literacy & Communication skills distinguish between information and explanation text, use information and explanation texts to answer different types of questions Maths skills use appropriate units for area measurements, and calculate area for a variety of shapes, including rectangles and cuboids.</p>

	Maths skills interpreting more complex graphs, substituting into formulae.	Types of questions	Maths skills interpreting more complex graphs, substituting into formulae.
Cross Curricular Opportunities			
SMSC / Character/Careers/Cultural Capital (personal development)	SMSC -pair & group working, working safely in a science laboratory. Character Integrity : during practical work Resilience : using equations & data handling Confidence : participation during classroom discussions	SMSC -pair & group working, working safely in a science laboratory. Character Integrity : during practical work Resilience : using equations & data handling Confidence : participation during classroom discussions	SMSC -pair & group working, working safely in a science laboratory. Character Integrity : during practical work Resilience : using equations & data handling Confidence : participation during classroom discussions
Equality and Diversity	Diverse representation within text/ videos/website links shared. Display shows a variety of scientists of different genders and from different ethnicity	Diverse representation within text/ videos/website links shared. Display shows a variety of scientists of different genders and from different ethnicity	Diverse representation within text/ videos/website links shared. Display shows a variety of scientists of different genders and from different ethnicity
Super Curriculum (personal development)	Astronomy Club for enrichment possibly leading to GCSE	Astronomy Club for enrichment possibly leading to GCSE	Astronomy Club for enrichment possibly leading to GCSE