

**Year 9 Curriculum Intent**

Our science curriculum intends to train excellent scientists. This means that they will be able to:

1. Select and use appropriate equipment
2. Formulate an aim and hypothesis
3. Risk assess
4. Follow and write a method
5. To identify and change the independent variable
6. To identify and measure the dependent variable
7. To identify the control variables and ensure that they are constant
8. Draw tables and identify anomalies
9. Calculate mean values\*
10. Draw line graphs with appropriate lines of best fit and analyse the data\*
11. Understand how to ensure accurate and precise data
12. Write a conclusion from a set of data
13. Evaluate the validity of an experiment
14. Recall knowledge, understand the concepts, apply the concepts and link the concepts.
15. Equations: identify, substitute, and re-arrange subjects.\*
16. Identify the correct units and convert them.\*
17. Utilise standard form\*
18. Understand significant figures\*
19. Resolve vectors\*

*\*Cross – curricular links with Mathematics.*

The curriculum teaches the fundamental ideas which are the building blocks of scientific understanding, and we sequence these in the best order so that students can see how these fundamental ideas link together.

**Term 1**

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| **Topic** | **Key ideas** | **Why they are learning it and in what order.** | **What students often get wrong** |
| **C1a****Atomic Structure** | **KO** | These key ideas are the fundamental building blocks to all chemistry topics and links to many fundamental principles of Biology and Physics.Builds on from particle theory in year 7. | They think that:There must be “something” between atoms.Atoms are flat circles and that we can actually see atoms.Particles are all the same size.Air has no massElectrons orbit the nucleus like planets orbit the sun. Electrons and protons are the only fundamental particles. The current model of the atom is the right model.Atoms can be seen under the microscope.They cannot explain why atoms are neutral. |
| **P1a****Energy** | **KO** | Everything in science is based on energy and how it is transferred so It is the fundamental building blocks to many topics.Builds on from Energy stores in year 7. | They think that:Energy can be created and lost.Energy transforms from one type completely into another type.An object at rest has no energy.They can struggle with:Re-arranging equations.Unit conversions. |
| **B1a****Cell Biology** | **KO** | Cells are the basic building block of living organisms.Understanding this is essential to later concepts in Biology.Builds on from Cells in year 7. | They think that:Only animal cells have cell membranes.All cells have a nucleus.Cells are flat.All animal cells are the same. There are only two types of cell (animal and plant).Cells are the same size and are too small to see.Animal cells respire and plant cells photosynthesise.Respiration is the same as breathing.Clear round structures under the microscope are cells. |

**Term 2**

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| **Topic** | **Key ideas** | **Why they are learning it and in what order.** | **What students often get wrong** |
| **C1b****Periodic table** | **KO** | Links to all chemical reactions when understanding the behaviour of atoms so a fundamental building block to many later topics.Students cannot apply the principles of the periodic table until the structure of the atom is understood so this builds on from C1a and the Periodic table taught in year 7. | Students often mix up periods and groups in terms of atomic structure.They often mix up mass number and atomic number.They incorrectly identify the position of period 1.Students think that:Elements were invented when building the periodic table and not discovered.Water exists in all three states but other elements do not.That all elements become more reactive as you move down a group. |
| **P1b****Energy** | **KO** | This builds on P1a and Energy stores in year 7. Energy stores are now understood so they can be applied to energy transfer.This links to many aspects of everyday life. For example, methods of generating electricity and impacts on the atmosphere. This will later be used in P3 when they need to be able to explain internal energy in particle models of matter. | Students can think:That nuclear power is renewable.That only Carbon dioxide relates to global warming.That if a method is cheaper to install then they are cheaper to use overall.Energy is lost to the atmosphere!Things use up energy.Energy is not conserved because we are running out of it.Energy is only associated with movement.Energy is a fuel. |
| **B1b****Cell Biology** | **KO** | This links to Variation, Inheritance and Evolution and Particle Matter in Year 8 and also builds upon B1a. It is important to understand how living organisms grow, and repair and in the understanding of the role of stem cells in therapeutic cloning.The understanding of transport methods into and out of cells allows students to later understand life processes such as digestion.These ideas are built upon further in B2 for digestion, Lung function and transpiration and B4 for photosynthesis and respiration in Year 9. | Students can think that:Genetic material halves before a cell division rather than replicating.Cell division only happens in animals not plants.Stem cells are only found in animal cells.Stem cells with the same genetic material as the patient cannot be rejected.In active transport substances move from a high to low concentration.Students do not understand that surface area to volume is a ratio. They think that a large organism has a large surface area to volume ratio. |