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**Year 10 Curriculum Intent**

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

1. Recall knowledge, understand the concepts, apply the concepts and link the concepts.
2. Select and use appropriate equipment.
3. Formulate an aim and hypothesis.
4. Risk assess.
5. Follow and write a method.
6. To identify and change the independent variable.
7. To identify and measure the dependent variable.
8. To identify the control variables and ensure that they are constant.
9. Draw tables and identify anomalies.
10. Calculate mean values\*.
11. Draw line graphs with appropriate lines of best fit and analyse the data\*.
12. Understand how to ensure accurate and precise data.
13. Write a conclusion from a set of data.
14. Evaluate the validity of an experiment.
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** |
| **B7**  **Ecology** | **KO** | The appreciation that energy flows through an ecosystem and recycling of materials is fundamental to understanding our role in maintaining global biodiversity and the impact our actions can have on our environment.  Builds on from Interdependence in year 8 and links to C9 chemistry of the atmosphere. | They incorrectly think that:  Energy flows from the organism that is feeding rather than the other way round.  Materials are constantly replaced not recycled.  Greenhouse effect and global warming are the same process. |
| **C6**  **Rate and extent of chemical change** | **KO** | Factors that can affect the speed of a chemical reaction are important as industry uses these ideas to ensure the successful creation of chemical products.  Builds on Particle Model in year 7, Chemical Reactions in year 8. Links to C4 Chemical Changes and C5 Energy Changes –energy level diagrams. | They incorrectly think that:  Big lumps of a substance have a large surface area to volume ratio.  Catalysts cause more product to be made.  Equilibrium can be achieved in an open system.  Students often find drawing and interpreting rate graphs difficult. |
| **P5**  **Forces**  **Carries on into Term 2** | **KO** | Being able to understand how forces work on machines and structures and how to calculate them plays a vital role in making global advances.  Builds on year 7 Forces /Speed topic, year 8 Work done.  Links to P1 energy transfer and elastic potential energy. | They incorrectly think that:    Gravity is a force found only on Earth.  Mass and weight are the same quantity.  Speed and velocity are the same quantity.  The lines on distance –time graphs and velocity-time graphs have same meaning.  The units of acceleration are m/s.  Terminal velocity is only achieved once during a parachute jump  Stopping distance is the time taken for the car to stop once the brake is applied.  Thinking distance is the time taken to apply the brake.  There is often confusion over contact and non-contact forces.  Often confusion over what a resultant force is and how to draw free body diagrams.  Often difficulties with recalling and applying and recalling the force equations.  Often difficulties with converting units of quantities.  Often difficulties in interpreting distance-time graphs and velocity-time graphs. |

**Term 2**

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| **Topic** | **Key ideas** | **Why they are learning it and in what order.** | **What students often get wrong** |
| **P5**  **Forces –see above** | **KO** |  |  |
| **B5**  **Homeostasis and Response** | **KO** | Cells and Organs can only function within narrow physical and chemical limits.  It is important that students know how the nervous and the hormone systems work to regulate vital functions like blood sugar levels. Students need to appreciate the role of hormones in the menstrual cycle and methods of contraception.  Builds on year 7 Cells topic. Links to B1 cell structure and differentiation.  Working together –PSHE unit. | Students are often unable to define what homeostasis is.  Often have difficulties in sequencing the events in a reflex arc.  Difficulties in describing the correct location of glands and their function.  Difficulties in sequencing how the blood sugar levels are regulated.  Confusion over the differences between type 1 and type 2 diabetes.  Difficulties in explaining how the menstrual cycle is regulated.  Difficulties in identifying how different methods of contraception work. |
| **C7**  **Organic Chemistry** | **KO** | Knowledge of the chemistry of carbon is vital to understanding how our world functions as all the living organisms are carbon based (organic life forms).  Chemists are able to modify organic molecules to produce a huge range of useful materials.  Builds on ideas from year 8 energy resources and separating mixtures.  Linked to C1 –separating mixtures, C2 –structure and bonding of carbon. | Students often incorrectly think:  Crude oil is a pure substance.  Alkanes and alkenes are identical.  Big hydrocarbons are produced at the top of the fractional distillation column.  Complete and incomplete combustion produce the same products.  Students often have difficulties in balancing symbol equations for combustion.  Difficulties in describing the process of cracking. |