Year 7 Long Term Plan

The spiral science curriculum gradually fleshes out the Key concepts and Big Ideas of Sciences, through regularly revisiting them in different substantive contexts. Integrated into the most appropriate substantive context is the disciplinary knowledge and related Big Ideas about Science.

The deliberate commonality across different substantive contexts of the Key Concepts, means students revisit each of them in almost every topic.
For the Big Ideas, these recur less often, usually (but not always) within their specific discipline (for example the Chemistry Big Idea of atoms is part of some Biology and Physics topics). However the curriculum has been designed such that any one big idea is revisited typically multiple times a year, in order to secure retention over time.

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8
P1 Energy	C1 The Particle Model	B1 Cells	P2 Speed	C2 Atoms, Elements and Compounds	B2 Skeletal and Muscular System	P3 Forces	C3 Pure and Impure substances
• Fuels • Energy stores and transfers • Power • Energy resources	• Simple particle model • Properties of different states • Changes of state • Gas pressure	• Microscopes • Cell structure • Animal and plant cells • Magnification • Unicellular organisms • Diffusion • Specialised cells	• Speed • Distance-time graphs • Relative motion	• The atomic model • Symbols and formulae • Elements and compounds	• The skeleton • Biomechanics • Principles of organisation	• Force diagrams • Naming forces • Stretching and squashing • Hooke's Law • Work done • Moments and machines • Balanced forces • Forces and motion	• Diffusion • Pure and impure • Separation
Key Concepts							
SA, SB, SC, SD Big ideas • CD • PB • DC, DD, DE	SA, SB, SC, SD Big ideas • CA, CB • DA, DD	SA, SB, SC, SD Big ideas • BA, BB • CA • DB, DC, DD	SB, SD Big ideas • PA, PB • DA, DB, DC	SA, SB, SD Big ideas • CA, CB • DD	SA, SB, SC, SD Big ideas • BA • PA • DA, DE	SB, SC, SD Big ideas • PA, PB, PC • DA, DB, DC, DE	SA, SB, SD Big ideas • CA, CB • DA, DD

Key concepts and Big ideas in Science

Science is a discipline that gives us a fulfilling understanding of the macroscopic world around us, by exploring its microscopic components, the relationships between things and the transfer of energy between them. It also reveals its own scientific methods as a way of observing the world around us to reliably generate evidence and test ideas, which brings confidence and clarity to an uncertain world.

Our overarching 'Key concepts' in science encapsulate these ideas of what science is, allowing students to see the common threads and interconnectedness in what they are studying across the scientific disciplines, and across ages / phases. They are:

SA. The macroscopic world around us is driven by its (sub)microscopic components that we can rarely see.
- As exemplified by the study of organisms and their cells, and materials and their particles.

SB. All things interact through complex relationships like cause and effect.
- As exemplified by the study of how humans are impacting global ecosystems, how substances interact to form new substances, and how motion is affected by forces and the fields between objects.

SC. Energy is the currency of the Universe; it passes between things and makes change possible.
- As exemplified by the study of ecosystems, biological and chemical reactions, and energy stores, transfers and resources.

SD. The scientific method reliably generates quantitative and qualitative evidence which we can use to develop and test theories and models.
- As exemplified by the study of apparatus and techniques, equations and data analysis, and the limitations of models and theories

Students are explicitly taught to recall the four key concepts of Science, and guided to reflect on them throughout their learning.

Beyond this, we identify the 'Big ideas' that recur within the substantive knowledge of discipline, drawn from "Principles and Big Ideas in Science" by Harlen et al., and Jasper Green's "Powerful ideas of science and How to Teach Them". They represent the most revolutionary but also most fundamental ideas of the subject, and some of the best that has been thought and said within science. To complement these, we have explicit 'Big ideas' about science, to give a similar consistency to our development of disciplinary knowledge.

By making these explicit, we can plan to deliberately and regularly revisit them throughout our spiral curriculum. They help teachers understand the learning journey of students, specifically what prior and future knowledge may be relevant to current learning. Students are made explicitly aware of revisiting these Big Ideas, but are not expected to recall them given that they are highly expert concepts that would only hold profound meaning to students at the end of their scientific studies.

Big ideas of Biology	Big ideas of Chemistry	Big ideas of Physics	Big ideas about Science (Disciplinary knowledge)
BA. The cell is the basic structural and functional unit of life from which complex organisms emerge. BB. Organisms reproduce by passing down their genetic information from one generation to the next. BC. Organisms compete with, or depend on, other organisms for a supply of materials and energy that cycle throughout ecosystems. BD. The variety of organisms, living and extinct, is the result of evolution by natural selection.	CA. Objects are made from materials, and materials are made from one or more substances built from atoms. CB. Substances are held together by electrostatic forces of attraction. CC. When substances react, atoms are rearranged and new substances form, but mass is always conserved. CD. Chemical reactions, both natural and manmade, shape the Earth, its resources, and the atmosphere, and in turn impact organisms throughout the biosphere.	PA. Changing the movement of an object requires a net force to be acting on it. PB. The total amount of energy in the Universe is always the same but can be transferred from one energy store to another during an event. PC. Objects can affect other objects at a distance, through waves transferring energy and the forces caused by fields. PD. The movement of charge forms electric current and causes magnetic fields. PE. The solar system is a very small part of one of millions of galaxies in the Universe.	DA. There are many scientific methods to analyse patterns, synthesise new substances, construct fair tests, create simulations and evaluate research. DB. All observations and measurements have an inherent uncertainty, often due to limitations in the accuracy and precision of the apparatus and techniques. DC. Mathematics is a tool to analyse measurements, and a language to express the laws of the universe. DD. Scientific explanations, theories, and models fit the facts known at a particular time, but are inherently limited and must change in light of new evidence. DE. Science can be applied to a variety of related fields, including technology and medicine, but often has ethical, social, economic, and political implications.