Year 7 Science - Rationale

Students begin science in year 7 by revisiting the particles topic. Understanding particles is the basis of all science and students should be familiar with concepts of solids, liquids and gases. This is combined with the introduction of practical work where students have the opportunity to work in a science lab, separating mixtures. It is important that students are learning about tangible concepts that will build confidence during the transition period from KS2 to KS3.

From there, students are introduced to other fundamental topics. Energy is taught before Cells as all biological processes require energy and a basic understanding of energy helps students' development of learning and understanding.

Forces are also taught at KS2, so this is introduced in term 3 to reduce cognitive overload. The remaining topics in terms 3 and 4 aim to build on the learning that has already taken place. Chemical reactions involve the behaviour of particles and the impact of energy. Reproduction builds on the knowledge of cells and other biological processes.

Topics in terms 5 and 6 take advantage of the weather and during both Variation and Inheritance, and the Earth's Structure and Resources, there are opportunities for students to explore the scientific world outside the classroom.

At the beginning of the academic year, students are provided with a road map which shows the topics they will study across Year 7, and at the beginning of each new topic, they receive a more detailed breakdown of each lesson within a topic. This ensures students have an overview of their current learning and where it fits in the wider context of science

Extra–Curricular Opportunities

- All year - KS3 Science club runs once a week at lunchtime
- Term 2/3 - Dowty Propellers in school STEM workshop
- Term 6 - BIG Bang Festival at NEC Birmingham

	Autumn 1 Term 1	Autumn 2 Term 2	Spring 1 Term 3
Knowledge	**1. An introduction to science –** students work through an investigation to experience the different skills used by a scientist **2. Particles –** students learn about the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition. They are also introduced to atoms and molecules as particles. 3. **Separating Mixtures –** Students learn about the concept of a pure substance, mixtures, including dissolving, and diffusion in terms of the particle model. They carry out simple techniques for separating mixtures including filtration, evaporation, distillation and chromatography	1. **Energy –** Students learn how to complete calculations of fuel uses and costs in the domestic context, and how Energy is stored and transferred in different systems 2. **Cells, Muscles and Movement** – Students learn about different types of cells, and the structures found within them. They also investigate how gases diffuse into and out of cells, and how muscles and our skeleton allow us to move 3. **End of Autumn Terms Assessment –** covers Particles, Separating Mixtures, Energy and Cells, Muscles and Movement	**1. Forces –** Students learn about the different types of forces and investigate how they interact with different objects and how they can be measured. They also investigate how forces impact motion, and calculate speed and acceleration of different objects **2. Chemical Reactions (Acids and Alkalis)** – Students learn about chemical reactions as the rearrangement of atoms, and how they are represented using formulae and equations. Students also investigate neutralisation reactions, the pH scale, and how acids react with alkalis and metals
	Spring 2 **Term 4**	**Summer 1** **Term 5**	**Summer 2** **Term 6**
	1. Plant and Human Reproduction – Students learn how both plants and humans reproduce and this includes the structure of flowers and the male and female reproductive systems. In plant reproduction students also learn about pollination, seed and fruit formation and dispersal. In human reproduction, students learn about the menstrual cycle, fertilisation, gestation and birth, as well as the effect of maternal lifestyle on the foetus. 2. **Chemical Reactions (Reactions of Metals) -** Students recap term 3 learning about chemical reactions as the rearrangement of atoms, and how they are represented using formulae and equations. Students also investigate reactions with metals such as combustion, thermal decomposition, oxidation and displacement.	**1. Chemical Reactions (Reactions of Metals) (Continued)** **2. Variation and Inheritance –** Students learn about heredity including the transmission of genetic information from one generation to the next, the development of the DNA model, and the role of DNA, chromosomes and genes. Students will also learn about variation between species, between individuals within the same species and how they interact with the environment	**1. End of Year 7 Assessment –** Covers all topics taught in terms 1-5 **2. Earth's Structure and Resources –** Students learn about the composition and structure of the Earth. They also investigate the rock cycle and the formation of igneous, sedimentary, and metamorphic rocks.

Skills	Working scientifically and mathematically - across all three disciplines, students will be taught how to: ❖ Develop Scientific attitudes ❖ Develop Experimental skills through investigations ❖ Analyse and evaluate data and processes ❖ Take appropriate measurements
Assessment	❖ Low stakes quizzes ❖ Retrieval Practice activities ❖ Carousel Learning Quizzes ❖ End of topic, self-assessed assessments ❖ **End-of-term 2 Assessment** ❖ **End-of-year 7 assessment**

Year 8 Science - Rationale

As Students move into year 8, they begin the year by revisiting the practical skills they have developed in year 7, with a practical investigation that is determined by the class teacher. This covers, identifying variables, writing a method, designing a results table, displaying results in an appropriate graph, and evaluating the outcomes of the investigation. Students then move on to digestion, a topic that builds on KS2 knowledge, and knowledge gained in year 7 (Cells and Muscles). Students are then introduced to elements and the periodic table, which covers the fundamentals of chemistry. Term two revisits and builds on the topic of electricity, previously taught in KS2 and then introduces the concept of light. This is important for a later topic on photosynthesis.

Term 2 ends with an assessment covering the topics of digestion, elements and the periodic table, electricity, and light. After Christmas, students build on year 7 knowledge and investigate how energy is involved in chemical reactions. Electricity is then revisited in relation to magnets and electromagnets. Term 4 returns to biology and the processes of photosynthesis, respiration and breathing. These topics continue to build on learning from year 7, particularly cells, energy, and chemical reactions.

Biology continues into term 5, where students think about healthy living, and then investigate evolution and interdependence. At the beginning of term 6, students complete an end-of-year assessment which covers all the topics covered in year 8, and then they finish with topics on sound and the universe

At the beginning of the academic year, students are provided with a road map which shows the topics they will study across Year 7, and at the beginning of each new topic, they receive a more detailed breakdown of each lesson within a topic. This ensures students have an overview of their current learning and where it fits in the wider context of science

Extra–Curricular Opportunities

- All year - KS3 Science club runs once a week at lunchtime
- Term 2 Gloucestershire Schools' Christmas Lectures, Dene Close School
- Term 2/3 - EDF in school STEM workshop
- Term 6 – Cheltenham Science Festival

	Autumn 1 Term 1	Autumn 2 Term 2	Spring 1 Term 3
Knowledge	**1. Practical Skills –** students work through an investigation to recap the different skills used by a scientist **2. Digestion –** students learn about the different nutrients that make up a healthy diet and what they are needed for. They also learn about the process of digestion, and the consequences of imbalances in the diet. Students will also investigate how the digestive system is adapted to its function and the role that enzymes play in breaking down our food **3a. Elements –** Students learn about a simple atomic model, and the difference between atoms, elements and compounds, along with their chemical symbols and formulae. They also investigate the idea of the conservation of mass, and the varying physical and chemical properties of different elements. **3b. The Periodic Table –** Students learn about the principles underpinning the Mendeleev periodic table, along with the properties of metals and non-metals. Students will also investigate the patterns in chemical reactions that can be predicted with reference to the periodic table, such as the reactivity of group 1 metals and the displacement of halides	1. **Electricity –** Students investigate the interaction of charged particles in static electricity and then learn about the different components found in electrical circuits. Students also investigate the concepts of potential difference, current, the flow of charge and resistance. 2. **Light** – Students learn about the similarities between light waves and waves in matter, as well as how light travels at different speeds in a vacuum when compared with travelling through matter. Students also learn about the structure of the eye and how lenses can be used to correct vision. Students then investigate how light can be reflected and refracted, and the impact of colour on light 3. **End of Autumn Terms Assessment –** covers digestion, elements and the periodic table, electricity and light	**1. Chemical Energy and Reactions –** Students recap prior learning on particles and chemical reactions from year 7 and apply this knowledge and understanding to how energy behaves in a reaction. Students also investigate energy transfers in exothermic and endothermic reactions and thermal decomposition. **2. Magnets and Electromagnets** – Students learn about magnetic poles, attraction and repulsion, as well as the magnetic effect of a current and an electromagnet. Students also investigate magnetic fields and the uses of electromagnets

	Spring 2 Term 4	Summer 1 Term 5	Summer 2 Term 6
	1. Photosynthesis – Students learn about the reactants and products in photosynthesis, and how almost all life on Earth is dependent on the photosynthetic ability of plants and algae. Students also investigate how leaves are adapted for photosynthesis, and how the rate of photosynthesis can be measured 2. **Breathing and Respiration -** Students learn about the structure of the gas exchange system and how it is adapted for its function. Students also investigate the processes of aerobic and anaerobic respiration and the differences between them.	**1. Healthy Living -** Students learn about the effects of recreational drugs, including smoking and alcohol, on behaviour, health, and life processes. **2. Evolution and Interdependence –** Students learn about the interdependence of animals in an ecosystem including food chains and food webs. They also investigate how organisms are affected by the environment, particularly the accumulation of toxic materials	**1. End of Year Assessment –** Covers all topics taught in terms 1-5 **2. Sound –** Students learn that sound needs a medium to travel through and that the frequencies of sound waves are measured in hertz. Students also use models to investigate wave behaviour and how the ear works **3. The Universe -** Students learn about the objects in the night sky and our Solar System, as well as the structure of the universe. They also investigate the motion of the sun, stars and moon, and why there are seasonal changes.

Skills	Working scientifically and mathematically - across all three disciplines, students will be taught how to: ❖ Develop Scientific attitudes ❖ Develop Experimental skills through investigations ❖ Analyse and evaluate data and processes ❖ Take appropriate measurements
Assessment	❖ Low stakes quizzes ❖ Retrieval Practice activities ❖ Carousel Learning Quizzes ❖ End of topic, self-assessed assessments ❖ **End-of-term 2 assessment** ❖ **End-of-year 8 assessment**