

**Year 7**

This year is designed to provide students with a bridge between the concepts that they have covered in primary school and those that they will go on to study in secondary. It is assumed that all students will enter with a slightly different starting point as they will be joining from a range of different primary schools that will have had different levels of expertise. Within this year, we hope to embed the learning habits and routines that will ensure that these students go on to be successful learners during their time at the school.

Each year is broken into the three disciplines., Biology, Chemistry and Physics.

**Secure Substantive Knowledge:**

- Within the Chemistry units, students will be introduced to the concept of particles and using models to explain how these behave. Students will also be introduced to the concept of physical and chemical changes and the periodic table which allows us to organise elements based on their structure and in turn their properties.
- In Spring, during the Physics unit, students will be introduced to the fundamentals of forces – that objects have an effect on each other. This is put into context through the effect of forces on motion, stretching of an object and in space. They will also be introduced to the concept that energy cannot be created or destroyed, simply transferred from one store to another. They are introduced to generating electricity and how humans utilise energy transfers to our advantage.
- Finally, within Biology, students will gain an understanding of how we classify organisms into categories based on their features and behaviour. They will also begin to discern between different types of organism based on their cellular structure and how these cells are organised to form complex organisms. They learn how to use a microscope and how we can use this to compare plant and animal cells. During Year 7, we also begin to look at reproduction and how characteristics are passed on via an organisms’ genetics and how this can lead to evolution of organisms over time.

**Secure Disciplinary Knowledge (inc. practical skills):**

- Students are introduced to the key experimental vocabulary during the first half term of this year. This is then built on through a series of short investigations where students follow simple methods, choosing appropriate equipment from a selection given. They are taught to draw simple graphs & describe simple relationships. They also begin to apply mathematical concepts such as substituting into a given equation, calculating means and rounding to two decimal places. They also begin to use simple unit conversions. Students also begin to look at historical figures in science and there is the option to have discussions around the lack of diversity within this community of scientists. Students also begin to look at the impact of science on our lives & how we as humans have had an impact on other organisms and habitats. The idea that science is constantly evolving will be introduced as students learn about the development of the periodic table and our understanding of fuels.

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7	<p><b>Topic: Particles (Chemistry)</b></p> <ol style="list-style-type: none"> <li>Routines and Expectations (optional)</li> <li>Variables</li> <li>Accuracy</li> <li>Equipment</li> <li>Following a method</li> <li>Drawing graphs</li> <li>Maths in Science</li> <li>States of matter (inc. density)</li> <li>Changes of state</li> <li>Melting and boiling points (Practical)</li> <li>Expansion and contractions (Demonstration)</li> <li>Brownian Motion and the particle model (Demonstration)</li> <li>Types of transport</li> <li>Atoms and elements</li> <li>Compounds and mixtures</li> <li>Symbols and formulae</li> <li>Atomic Structure</li> </ol>	<p><b>Topic: Types of reaction and the periodic table (Chemistry)</b></p> <ol style="list-style-type: none"> <li>Physical and Chemical reactions</li> <li>Pure substances and solubility</li> <li>Rates of dissolving (Practical)</li> <li>Filtration (Practical)</li> <li>Crystallisation (linking to evaporation) (Practical)</li> <li>Simple Distillation (Demonstration)</li> <li>Chromatography (Practical)</li> <li>Acids and Alkalis</li> <li>Indicators (Practical)</li> <li>Neutralisation (Practical)</li> <li>The periodic table – structure</li> <li>History of the periodic table</li> <li>Metals and non-metals</li> <li>Alloys (EXT)</li> <li>Ceramics, Polymers, Composite</li> </ol>	<p><b>Topic: Forces (Physics)</b></p> <ol style="list-style-type: none"> <li>Identifying forces – contact vs non-contact</li> <li>Balanced and unbalanced forces</li> <li>Resultant force</li> <li>Newton’s Laws (EXT)</li> <li>Friction- advantages and disadvantage</li> <li>Streamlining- everyday examples and linked to particles (EXT) (Practical)</li> <li>Speed calculations</li> <li>Distance- time graph</li> <li>Velocity-time graph</li> <li>Hooke’s Law- (Practical)</li> <li>Moments</li> <li>Gravity, weight and mass</li> <li>Solar system</li> <li>Day and night</li> <li>Seasons</li> <li>Galaxies and universe</li> <li>Light year</li> </ol>	<p><b>Topic: Energy (Physics)</b></p> <ol style="list-style-type: none"> <li>Energy Stores</li> <li>Energy transfers</li> <li>Useful and wasted energy</li> <li>Sankey diagrams (EXT)</li> <li>Efficiency calculations</li> <li>Energy in food</li> <li>Heating and thermal equilibrium</li> <li>Conduction, convection and radiation (Practical)</li> <li>Preventing heat loss- practical skills</li> <li>The National Grid</li> <li>Renewable and non-renewable</li> <li>Generating electricity from renewable and non-renewable sources</li> <li>Renewables- advantages and disadvantages</li> <li>Nuclear energy</li> <li>Calculations: power and energy costs</li> </ol>	<p><b>Topic: Interdependence and cells (Biology)</b></p> <ol style="list-style-type: none"> <li>Living things: MRS NERG</li> <li>5 Kingdoms and classes</li> <li>Classification and keys</li> <li>Food chains</li> <li>Food webs</li> <li>Pyramids of numbers</li> <li>Pyramids of biomass (EXT)</li> <li>Environment and habitats</li> <li>Competition</li> <li>Sampling techniques (EXT) (Practical)</li> <li>Microscopes</li> <li>Animal cells (Practical)</li> <li>Plant cells (Practical)</li> <li>Microscope calculations (EXT)</li> <li>Prokaryotic vs eukaryotic</li> <li>Specialised cells</li> <li>Stem cells</li> <li>Cells, tissues, organs, systems</li> </ol>	<p><b>Topic: Reproduction and Variation (Biology)</b></p> <ol style="list-style-type: none"> <li>Male and female reproductive organs in humans and plants</li> <li>Gametes – humans and plants</li> <li>Fertilisation in humans</li> <li>Pregnancy and gestation</li> <li>Effect of maternal lifestyle</li> <li>Menstrual cycle</li> <li>Pollination and seed dispersal</li> <li>Quantitative investigations of dispersal mechanisms</li> <li>Genetic and environmental variation</li> <li>Genetic cross diagrams (EXT)</li> <li>Genetic diseases and sexual determination (EXT)</li> <li>Variation</li> <li>Adaptation</li> <li>Natural Selection</li> <li>Selective Breeding</li> <li>Endangered species and extinction</li> <li>Biodiversity</li> <li>Extremophiles (EXT)</li> </ol>