

KS3 Science curriculum mapping of topics

<b>Year 7 Topic</b>	<b>Overview of topic</b>	<b>Curriculum links to key concepts</b>	<b>Overview of key literacy, numeracy, and practical skills</b>
<b>Introduction to Science</b>	<b>Pupils will learn basics practical skill to support the curriculum including measuring, use of Bunsen burners, microscopes, and graph plotting.</b>	<b>NA</b>	<b>Basic practical skills Graph plotting Observing</b>
<b>Cells</b>	<b>Pupils will learn the fundamentals of living organisms, their structures and movement of substances.</b>	<b>Cells Evolution</b>	<b>Extended writing Making a slide and using microscopes Magnification calculations</b>
<b>Particles and solutions</b>	<b>Pupils will learn the kinetic theory of matter and separating techniques.</b>	<b>Particles Energy</b>	<b>Observing Concluding Calculating Rf values</b>
<b>Types of Forces</b>	<b>Pupils will learn the different types of forces and the foundations of making objects move.</b>	<b>Energy Forces</b>	<b>Measuring Hooke's Law practical Graph plotting Concluding</b>
<b>Human and Plant Reproduction</b>	<b>Pupils will learn key aspects of human and plant reproduction.</b>	<b>Cells Evolution</b>	<b>Dissection of a flowering plant</b>
<b>Principles of Chemistry</b>	<b>Pupils will learn the basics of chemical reactions (including combustion), focusing on acids and alkalis.</b>	<b>Particles Energy</b>	<b>Practical involving the use of different chemicals and indicators Bunsen burners Observing Concluding</b>
<b>Ecology</b>	<b>Pupils will study the interdependence of organisms and techniques to study the environment.</b>	<b>Cells Evolution</b>	<b>Measuring using quadrats Numeracy Graph plotting</b>



Year 8 Topic	Overview of topic	Curriculum links to key concepts	Overview of key literacy, numeracy, and practical skills
Digestion and respiration	Pupils will learn the structure and function of the digestive system, importance of a balanced diet, the structure and function of the breathing system and relate these to the process of respiration.	Cells Particles Energy Evolution	Food testing practical Observing Concluding
Earth and atmosphere	Pupils will learn about the rock cycle, the atmosphere and fossil fuels; and link these to pollution and climate change.	Particles Energy Evolution	Observing Concluding Evaluating Research Debating
Light and sound	Pupils will learn the properties of light and relate these to the eye and the camera. Pupils will learn the properties of sound and relate these to the ear and microphones. Pupils will learn about observed waves.	Particles Energy	Observing Measuring angles
Photosynthesis	Pupils will learn about the structures of plants and the process by which plants make their own food. Pupils will also study the factors that limit the rate of photosynthesis.	Cells Evolution Particles Energy	Observing Concluding
E, M C and Periodicity	Pupils will learn the differences between elements, mixtures and compounds and look at trends in the Periodic table. Building on year 7 they will start to understand what is happening in a chemical reaction on an atomic level.	Particles Energy	Observing
Magnets and <i>Space</i>	Pupils will learn the properties of magnets and electromagnets and their uses. Pupils will learn about the Earth in the Solar system.	Forces Energy	Observing magnetic fields Plotting graphs Extended writing Research Debate
<i>Microbes</i>	Pupils will learn about microbes and disease.	Cells Evolution	Observing Research Debate



<b>Year 9 Topic</b>	<b>Overview of topic</b>	<b>Curriculum links to key concepts</b>	<b>Overview of key literacy, numeracy, and practical skills</b>
<b>Inheritance, health, and muscles</b>	<b>Pupils learn about evolution by natural selection, selective breeding, and extinction. Pupils learn factors affecting health and fitness, and the function of the skeletal system.</b>	<b>Cells Evolution Energy</b>	<b>Graph plotting Research Debate</b>
<b>Periodicity and chemical reactions</b>	<b>Pupils will learn atomic structure and link this to the reactivity and position of element in Periodic table. Pupils will learn about the different types of chemical reactions and factors affecting the rate of reactions.</b>	<b>Energy Particles</b>	<b>Observing Measuring temperature change of reactions Graph plotting</b>
<b>Electricity and static</b>	<b>Pupils will study the fundamentals of static and current electricity. Pupils will learn how to measure the current and voltage in different types of circuits and real this to resistance.</b>	<b>Energy Particles</b>	<b>Ohm's equation Observing Building series and parallel circuits</b>
<b>Energy transfer</b>	<b>Pupils will learn about the processes of conduction, convection, and radiation</b>	<b>Energy Particles</b>	<b>Observing Concluding</b>
<b>Energy and fuels</b>		<b>Energy Particles</b>	
<b>Motion and pressure</b>	<b>Pupils will about the factors affecting the movement of objects. Pupils will learn about pressure in different environments.</b>	<b>Energy Particles Forces</b>	<b>Measuring using data loggers Speed and pressure equations Calculations Graph plotting</b>
<b>Investigation work</b>	<b>Pupils will carry out a series of investigations</b>		<b>Observing Analysing Graph plotting Concluding Evaluating</b>



## Teaching of the KS3 curriculum

The KS3 science curriculum is taught on a three-topic rotational basis. The rationale for this is to ensure the availability of equipment and currently, because of COVID, time to clean the equipment between different groups, following the guidance from CLEAPPS.

Below is the sequencing of the topics based on the group your child is in. The table also gives an indication of the teaching time spent on each unit.

In the science curriculum, there are key concepts that appear in different units over the course of both Key Stage 3 and 4. Below are some examples of the curriculum choices we have made, based on these concepts, and why the units have been placed in the order we have chosen.

### Example 1:

Year 7 starts with the topics Particles and Solutions, in which we introduce the concept of diffusion. We have placed this unit here as an understanding of particle behaviour is fundamental to all three sciences, and that movement in and out of cells requires an understanding of diffusion, which is taught in the topic of Cells. The idea is developed in the year 8 topic of Respiration and will be visited in a range of topics at Key Stage 4.

### Example 2:

In year 8 we introduce the Bohr model of the atom. This is an important part of the vertical concept, 'reactions rearrange particles', which begins in Year 7 with Principles of Chemistry. The Bohr model is revisited in year 9, in Periodicity and chemical reactions, in Key Stage 4 chemistry, as well as Atomic structure in physics, and is prerequisite knowledge for the next chemistry topic, Bonding, which is in turn foundation to many remaining chemistry units.

### Example 3:

'Forces' is a fundamental idea in physics and is also explored at length in year 10 when Newton's laws of motion are introduced formally for the first time. The fundamentals to this concept are first introduced in year 7 Forces, built upon in Motion and Pressure in year 9, before simple Newtonian mechanics are explored in depth in Forces and Motion in year 10.

### Example 4:

In biology, the idea that 'species show variation' is central to understanding how organisms have evolved. This idea is introduced in Year 7 in the topic of Reproduction and Ecological Relationships and with Darwinian natural selection introduced in the year 9 topic Inheritance. The genetic underpinning of variation is developed further, alongside evolution and speciation in Key Stage 4.

## Key stage 4

### GCSE Science Teaching and Learning Approach at Broughton

The Edexcel specification is an assessment framework and does not specify the order of teaching. Teachers follow the Pearson Edexcel scheme of work. This means in order to create a coherent narrative; some statements are taught in a different order to the specification. Overarching principles are covered in earlier course components. These ideas are later re-introduced, reinforced and extended to match the specification, allowing pupils to revisit material on a regular basis and therefore build their knowledge and skills. Each unit is split into differing numbers of topics. Topics do not always need the same teaching time.

For Triple Science, when topics are taught is dependent on whether the time allocated to each of the separate subjects of Biology, Chemistry and Physics, is Year 10 (2 hours) followed by Year 11 (3 hours) or Year 10 (3 hours) followed by Year 11 (2 hours).

<b>Biology</b>
Topic 1- Key concepts in biology
Topic 2- Cells and control
Topic 3- Genetics
Topic 4- Natural selection and genetic modification
Topic 5- Health, disease and the development of medicines
Topic 7- Animal coordination, control and homeostasis
Topic 6- Plant structures and their functions
Topic 8- Exchange and transport in animals
Topic 9- Ecosystems and material cycles

<b>Chemistry</b>
Topic 1 - Atomic structure and the periodic table
Topic 2 – Bonding
Topic 3 - States of matter and mixtures and methods of separating and purifying substances
Topic 4 – Calculations
Topic 5 – Acids
Topic 6 - Electrolytic processes
Topic 7 - Obtaining and using metals, reversible reactions and equilibria
Topic 8 - Transition metals, alloys and corrosion
Topic 9 - Reversible reactions and dynamic equilibria
<i>*Topic 10 - Quantitative analysis</i>
<i>*Topic 11 - Chemical cells and fuel cells</i>
Topic 12 - Group 1, 7 and 0 of the Periodic table
Topic 13 -Rates of reaction
Topic 14 - Heat energy changes in chemical reactions
Topic 15 - Fuels, Earth and atmospheric science
<i>*Topic 16 - Qualitative analysis: test for ion</i>

*\*Topic 17 – Hydrocarbons, Polymers, Alcohols and carboxylic acids*

*\*Topic 18 - Bulk and surface properties of matter including nanoparticles*

## Physics

Topic 1 - Key concepts of Physics

Topic 2 - Motion and Forces

Topic 3 - Conservation of Energy

Topic 4 – Waves

Topic 5 - Light and the electromagnetic spectrum

Topic 6 – Radioactivity

*\*Topic 7 - Astronomy*

Topic 8 - Energy: Forces doing work

Topic 9 - Forces and their effects

Topic 10 - Electricity and circuits

Topic 11 - Static electricity

Topic 12 - Magnetism and the motor effect

Topic 13 - Electromagnetic induction

Topic 14 - Particle model

Topic 15 – Forces and matter

*\*These topics are only taught to Triple pupils.*