

Year 11	Biology	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks
	Course topic	<b>Biology: Control- Homeostasis and response</b> <b>Biology: Inheritance, Variation, Evolution</b>		<b>Continued from previous term and QLA</b>	
	Powerful/Core Knowledge	<b>Biology: Control- Homeostasis and response</b> That cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems (nervous and hormonal) that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about a response. The structure of the nervous system explains how it can bring about fast responses called reflex actions. The hormonal system usually brings about much slower changes by glands secreting hormones that travel in the bloodstream to target organs. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. The role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility. Triple Science – how hormones control plants and how they can be used commercially to improve yield		Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level.	
	Including key people and stories	<b>Biology: Inheritance, Variation, Evolution</b>  How the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve.  An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic.  Scientists have now discovered how to take genes from one species and introduce them in to the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.		Intervention models and resources to be shared and reviewed annually.	
		Combined (p47-56) <a href="#">AQA Spec</a>			
		Triple Biology specification (p51-65) <a href="#">AQA Spec</a>			

Year 11	Chemistry	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks
	Course topic	Crude Oil and Fuels, Polymers (Triple only) Earth's atmosphere and resources			Continued from previous term and QLA
	Powerful/Core Knowledge  Including key people and stories	<p>Crude Oil and Fuels, Polymers (Triple only)</p> <p>Crude Oil</p> <p>The chemistry of carbon compounds is so important that it forms a separate branch of chemistry. A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds. This branch of chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are a major source of feedstock for the petrochemical industry. Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents.</p> <p>See Combined Spec:  <a href="https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF">https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF</a> (P104 – 107)</p> <p>See Triple Spec  <a href="https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF">https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF</a> (P61 – 70)</p> <p><b>Earth's atmosphere and resources:</b></p> <p>The use the Earth's natural resources to manufacture useful products. However, in order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised. The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.</p>			<p>Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level.</p> <p>Intervention models and resources to be shared and reviewed annually.</p>

Year 11	Physics	Autumn 1 – 7 weeks	Autumn 2 – 7 weeks	Spring 1 – 6 weeks	Spring 2 – 5/6 weeks
	Course topic	Waves, Electromagnetism, Space, Energy GCSE Concepts (triple only)		Continued from previous term and QLA	
	<b>Powerful/Core Knowledge</b>  <b>Including key people and stories</b>	<p><b>Waves</b>            Combined 6.6 p155-159  <a href="#">AQA Spec</a>            Triple 4.6 p59-67  <a href="#">AQA Spec</a></p> <p>Waves transfer energy and can be generalised into longitudinal and transverse, definitions are given by comparing the direction of the oscillations to overall energy propagation</p> <p>Know wave characteristics and be able to recall and use the wave equation.</p> <p>(Triple) describe reflection and refraction of waves, constructing ray diagrams and showing how images are formed using lenses</p> <p>(Triple) describe the way that the ear is able to convert wave disturbances between sound waves and solids</p> <p>(Triple) Waves can be used to investigate and detect objects that cannot be seen. Ultrasound uses reflective properties to identify boundaries between materials of different acoustic impedance. Seismic waves generated by earthquakes have been used to identify the Earth's structure and to provide evidence for a partially molten mantle and the molten inner core.</p> <p>Know that the electromagnetic spectrum is a family of transverse waves. It is divided into seven sections (RMIVUXG). Each part of the spectrum has uses and dangers.            (Triple) Total internal reflection may occur when light travels into a material that is optically more dense. TIR can be utilised in fibre optic cables.            (Triple) Colour perception depends on the wavelength of light. Objects appear to be different colours because they reflect particular wavelengths of light.            (Triple) Transparent objects allow light to pass through them, translucent objects internally scatter light, no light passes completely through an opaque object.</p>		<p>Question level analysis of mock exams used to design and deliver bespoke targeted intervention programme targeted to the need at academy, class and pupil level.</p> <p>Intervention models and resources to be shared and reviewed annually.</p>	



## **Electromagnetism**

Combined 6.7 p159-162

<https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF>

Triple 4.7 p67-72

<https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF>

The poles of a magnet are the places where the magnetic forces are strongest. When two magnets are brought close together they exert a force on each other. Two like poles repel each other. Two unlike poles attract each other. Attraction and repulsion between two magnetic poles are examples of non-contact force. A permanent magnet produces its own magnetic field. An induced magnet is a material that becomes a magnet when it is placed in a magnetic field. Induced magnetism always causes a force of attraction. When removed from the magnetic field an induced magnet loses most/all of its magnetism quickly.

Know that the region around a magnet where a force acts on another magnet or on a magnetic material (iron, steel, cobalt and nickel) is called the magnetic field. The force between a magnet and a magnetic material is always one of attraction.

Know how to create and vary the strength of an electromagnet

Know how the motor effect works and how to vary the speed of a motor and (Triple) how Loudspeakers and headphones use the motor effect to convert variations in current in electrical circuits to the pressure variations in sound waves.

(Triple) know how the generator effect is used in an alternator to generate ac and in a dynamo to generate dc. And how Microphones use the generator effect to convert the pressure variations in sound waves into variations in current in electrical circuits.

Know how a basic transformer works and how to calculate input and output voltages

## **Space**

Triple 4.7 p67-72

<https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF>

Our solar system consists of (in ascending size order): comets, dwarf planets, moons, eight planets, the Sun.

Our sun and its solar system is part of a galaxy called the Milky Way.

Nebula - a cloud of gas and dust which contracts due to the force of gravity.

Protostar - Friction between particles causes high temperature and pressure, nuclear fusion starts

Main Sequence Star - stable period of a star's life during which force due to radiation pressure outwards and gravity force inwards are balanced.

Red Giant - star expands and cools, elements up to iron made by fusion

White Dwarf and Planetary Nebula – layers drift into space and last fusion occurs until all hydrogen runs out

Black Dwarf - Fusion eventually stops and the star no longer gives out light.  
Red super giant - star expands and cools elements up to iron made by fusion  
Supernova - layers collapse in on dense core in an explosion in which elements more massive than iron are made. Elements are scattered throughout the universe.  
Neutron star - a very dense ball of neutrons.  
Black hole - object so dense that not even light can escape its gravity field.  
All circular motions are caused by a force towards the centre of an orbit. For satellites this is caused by gravity.  
Planets, moons and artificial satellites all orbit a larger mass. Planets orbit stars, moons orbit planets, artificial satellites are put into orbit by humans.  
Red shift - the light observed from an object moving away from us (receding) shows an increase in wavelength. The faster the relative speed between the observer and the object the greater the observed increase in wavelength.  
The Big Bang Theory – this model explains the red-shift data by suggesting that the Universe began from a small hot dense region and has been expanding ever since.

**Energy GCSE Concepts (triple only)**

The triple content covering radiation (particularly black body radiation) fits very well into the space topic completed at the end of year 11 (approx. 8 lessons)