Science

We intend to equip our young people with the knowledge needed to understand the world and technology around them. We aim to encourage a curiosity in the natural, physical and chemical world around them; and to foster critical thinking. We strive to provide our young people with a chance to broaden their horizons and provide multiple routes into STEM careers.

Year 11 Science

Term One

Content of study	*AQA GCSE Trilogy Combined Science/ AQA GCSE Physics – Unit P5 – Forces and Motion*	*AQA GCSE Trilogy Combined Science/ AQA GCSE Physics – Unit P6 – Waves*
What are the aims and objectives of this term?	Scalar quantities have magnitude only. Vector quantities have magnitude and an associated direction. The arrow notation for vectors. Force is a vector quantity and can be described as contact or non-contact. Examples of contact forces include friction, air resistance, tension and normal contact force. Examples of non-contact forces are gravitational force, electrostatic force and magnetic force. Weight is the force acting on an object due to gravity. The force of gravity close to the Earth is due to the gravitational field around the Earth. The weight of an object can be calculated using the equation: weight = mass x gravitational field strength $[W = m\,g]$ A number of forces acting on an object may be replaced by a single force that has the same effect as all the original forces acting together. This single force is called the resultant force. Use diagrams to describe qualitatively examples where several forces lead to a resultant force on an object. Use vector diagrams to illustrate: resolution of forces; equilibrium situations and determine the resultant of two forces including magnitude and direction. Use a free body diagram to show the magnitude and direction of the forces acting on an object A single force can be resolved into two components acting at right angles to each other. The two component forces together have the same effect as the single force.	Waves may be either transverse or longitudinal. In a transverse wave the oscillations are perpendicular to the direction of energy transfer. The ripples on a water surface are an example of a transverse wave. In a longitudinal wave the oscillations are parallel to the direction of energy transfer. Longitudinal waves show areas of compression and rarefaction. Sound waves travelling through air are longitudinal. Describe evidence that for both ripples on a water surface and sound waves in air, it is the wave and not the water or air that travels. Waves are described by their amplitude, wavelength, frequency and period. The amplitude of a wave is the maximum displacement of a point on a wave away from its undisturbed position. The wavelength of a wave is the distance from a point on one wave to the equivalent point on the adjacent wave. The frequency of a wave is the number of waves passing a point each second. $Period\ [T] = \frac{1}{f}$ period, *T*, in seconds, s frequency, *f*, in hertz, Hz The period of a wave is how long it takes for one wave to pass a point. The wave speed is the speed at which the energy is transferred (or the wave moves) through the medium. All waves obey the wave equation: $wave\ speed =$ $frequency\ x\ wavelength$ $[v = f\,\lambda]$ wave speed, *v*, in metres per second, m/s

	When a force causes an object to move through a distance, work is done on the object. The work done by a force on an object can be calculated using the equation: work done = force x distance (moved along the line of action of the force) $[W = F\,s]$ One joule of work is done when a force of one newton causes a displacement of one metre. 1 joule = 1 newton-metre Describe the energy transfer involved when work is done. Work done against the frictional forces acting on an object causes a rise in the temperature of the object. Explain why a change in the shape of a stationary object (by stretching, bending or compressing) can only happen when more than one force is applied.. Elastic deformation occurs when an object returns to its original shape and size after the forces are removed. An object that does not return to its original shape after the forces have been removed has been inelastically deformed. The extension of an elastic object, such as a spring, is directly proportional to the force applied, provided that the limit of proportionality is not exceeded. force = spring constant x extension $[F = k\,e]$ A force that stretches (or compresses) a spring does work and elastic potential energy is stored in the spring. Provided the spring does not go past the limit of proportionality the work done on the spring and the elastic potential energy stored are equal. The amount of elastic potential energy stored in a stretched spring can be calculated using the equation: $Elastic\ potential\ energy =$ $0.5\ x\ spring\ constant\ x$ $(extension)^2$ $[Ee = \frac{1}{2}\,k\,e^2]$ A force or a system of forces may cause an object to rotate. The turning effect of a force is called	frequency, *f*, in hertz, Hz wavelength, λ, in metres, m Describe methods to measure the speed of sound waves in air, and the speed of ripples on a water surface. Show that when sound waves travel from one medium to another the changes in velocity, frequency and wavelength are inter-related. (physics only). Waves can be reflected at the boundary between two different materials. Waves can be absorbed or transmitted at the boundary between two different materials. Sound waves can travel through solids causing vibrations in the solid. Within the ear, sound waves cause the ear drum and other parts to vibrate which causes the sensation of sound. The conversion of sound waves to vibrations of solids works over a limited frequency range. This restricts the limits of human hearing. Different types of wave can be used for the detection and exploration of structures/ objects that cannot be seen directly by the eye. • Ultrasound waves have a frequency higher than the upper limit of hearing for humans. Ultrasound waves are partially reflected when they meet a boundary between two different media. The time taken for the reflections to reach a detector can be used to determine how far away such a boundary is. This allows ultrasound waves to be used for both medical and industrial imaging. • Seismic waves are produced by earthquakes. P-waves are longitudinal, seismic waves. P-waves travel at different speeds through solids and liquids. S-waves are transverse, seismic waves. S-waves cannot travel through a liquid. P-waves and S-waves provide evidence for the structure and size of the earth's core. Echo sounding, using high frequency sound waves is used to detect objects in deep water and measure water depth Electromagnetic waves are transverse waves that transfer energy from the source of the waves to an absorber. Electromagnetic waves form a continuous spectrum and all types of electromagnetic wave

	the moment of the force. The size of the moment is defined by the equation: $$moment\ of\ a\ force\ =$$ $$force\ x\ distance$$ $$[M\ =\ F\ d]$$ If an object is balanced, the total clockwise moment about a pivot equals the total anticlockwise moment about that pivot. Explain how a simple lever and a simple gear system can both be used to transmit the rotational effects of forces. A fluid can be either a liquid or a gas. The pressure at the surface of a fluid can be calculated using the equation: pressure = force (normal to a surface)/ area (of that surface) $$[p\ =\ \frac{F}{A}]$$ Explain why, in a liquid, pressure at a point increases with the height of the column of liquid above that point and with the density of the liquid. The pressure due to a column of liquid can be calculated using the equation: pressure = height of the column x density of the liquid x gravitational field strength $$[p\ =\ h\ \rho\ g\ ]$$ A partially (or totally) submerged object experiences a greater pressure on the bottom surface than on the top surface. This creates a resultant force upwards. This force is called the upthrust. An object floats when its weight is equal to the upthrust. An object less dense than the surrounding liquid displaces a volume of liquid equal to its own weight. So the less dense object will float. An object sinks when its weight is greater than the upthrust. An object denser than the surrounding liquid is unable to displace a volume of liquid equal to its own weight. The denser object sinks. The atmosphere is a thin layer of air round the Earth. The atmosphere gets less dense with increasing altitude.	travel at the same velocity through a vacuum (space) or air. The waves that form the electromagnetic spectrum are grouped in terms of their wavelength and their frequency. Going from long to short wavelength (or from low to high frequency) the groups are: - radio, microwave, infra-red, visible light (red to violet), ultra-violet, X-rays and gamma-rays. Our eyes detect visible light and so only detect a limited range of electromagnetic waves. Construct ray diagrams to illustrate the refraction of a wave. Different wavelengths of electromagnetic waves are reflected, refracted, absorbed or transmitted differently by different substances and types of surface. HT only. Some effects, for example refraction, are due to the difference in velocity of the waves in different substances. Refraction does not happen when a wave enters a medium at 90° to the surface. HT only. Use wave front diagrams to explain refraction in terms of the change of speed that happens when a wave travels from one medium to a different medium. HT only Changes in atoms and the nuclei of atoms can result in electromagnetic waves being generated or absorbed over a wide frequency range. Gamma rays originate from changes in the nucleus of an atom. Radio waves can be produced by oscillations in electrical circuits. HT only. When radio waves are absorbed they may create an alternating current with the same frequency as the radio wave itself, so radio waves can also produce oscillations in an electrical circuit. HT only. Ultra-violet waves, X-rays and gamma rays can have hazardous effects on human body tissue. The effects depend on the type of radiation and the size of the dose. Radiation dose (in Sieverts) is a measure of the damage caused by the radiation in the body. Ultra-violet waves can cause skin to age prematurely and increase the risk of skin cancer. X-rays and gamma rays are ionising radiation that can cause mutation of genes and cancer.

	Air molecules colliding with a surface create atmospheric pressure. The number of air molecules above a surface decreases as the height of the surface above ground level increases. So atmospheric pressure decreases with an increase in height. Distance is how far an object moves. It is a scalar quantity. Displacement includes both the distance an object moves, measured in a straight line from the start point to the finish point and the direction of that straight line. Displacement is a vector quantity. Express a displacement in terms of magnitude and direction. Speed is a scalar quantity. The speed of a moving object is rarely constant. When people walk, run or travel in a car their speed is constantly changing. The speed that a person can walk, run or cycle depends on many factors including; age, terrain, fitness and distance travelled. Typical values may be taken as: walking ~1.5 m/s running ~3 m/s cycling ~6 m/s For an object moving at constant speed the distance travelled in a specific time can be calculated using the equation: $$distance\ travelled\ =$$ $$speed\ x\ time$$ $$[s\ =\ v\ t]$$ The velocity of an object is its speed in a given direction. Velocity is a vector quantity. When an object moves in a circle the direction of the object is continually changing. This means that an object moving in a circle at constant speed has a continually changing velocity. If an object moves along a straight line, how far it is from a certain point can be represented by a distance–time graph. The speed of an object can be calculated from the gradient of its distance–time graph. If an object is accelerating, its speed at any particular time can be determined by drawing a tangent and measuring the gradient of the distance–time graph at that time. HT only	Electromagnetic waves have many practical applications. For example: • radio waves – television and radio • microwaves – satellite communications, cooking food • infrared – electrical heaters, cooking food, infra-red cameras • visible light – fibre optic communications • ultraviolet – energy efficient lamps, sun tanning • X-rays – medical imaging and treatments. Explain why each type of electromagnetic wave is suitable for the practical application. HT only. A lens forms an image by refracting light. In a convex lens, parallel rays of light are brought to a focus at the principal focus. The distance from the lens to the principal focus is called the focal length. Ray diagrams are used to show the formation of images by convex and concave lenses. The image produced by a convex lens can be either real or virtual. The image produced by a concave lens is always virtual. The magnification produced by a lens can be calculated using the equation: $$magnification = \frac{image\ height}{object\ height}$$ Magnification is a ratio and so has no units. Image height and object height should both be measured in either mm or cm. Each colour within the visible light spectrum has its own narrow band of wavelength and frequency. The colour of an object is related to the reflection, absorption and transmission of different wavelengths of light by the object. Reflection from a smooth surface in a single direction is called specular reflection. Reflection from a rough surface causes scattering this is called diffuse reflection. The colour of an opaque object is determined by which wavelengths of light are more strongly reflected. Wavelengths not reflected are absorbed. If all wavelengths are reflected equally the object appears white. If all wavelengths are absorbed the objects appears black. Objects that transmit light are either transparent or translucent.

	The average acceleration of an object can be calculated using the equation: acceleration = change in velocity / time taken $[a = \frac{\Delta v}{t}]$ An object that slows down is decelerating. The acceleration of an object can be calculated from the gradient of a velocity – time graph. The distance travelled by an object can be calculated from the area under a velocity – time graph. HT only. The following equation applies to uniform acceleration: (final velocity)^2 – (initial velocity)^2 = 2 x acceleration x distance $v^2 - u^2 = 2\,a\,s$ Near the Earth's surface any object falling freely under gravity has an acceleration of about 9.8 m/s^2. An object falling through a fluid initially accelerates due to the force of gravity. Eventually the resultant force will be zero and the object will move at its terminal velocity. Students should investigate factor/factors that affect the terminal velocity of a falling object. Draw a velocity – time graph to show how the speed of a skydiver changes throughout the jump. (physics only) Analyse the velocity-time graph for a skydiver and explain what is happening at each stage of the jump. (physics only) Newton's First Law: If the resultant force acting on an object is zero and: • the object is stationary – the object will remain stationary • the object is moving – the object will continue to move at the same speed and in the same direction. So the object continues to move at the same velocity. So, when a vehicle travels at a steady speed the resistive forces balance the driving force. The tendency of objects to continue in their state of rest or of uniform motion is called inertia. HT only. Newton's Second Law:	All objects, no matter what temperature, emit and absorb infra-red radiation. The hotter an object is the more infra-red radiation it radiates in a given time. A perfect black body is an object that absorbs the entire radiation incident on it. The object does not reflect or transmit any radiation. Since a good absorber is also a good emitter a perfect black body would be the best possible emitter. All objects emit radiation. The intensity and wavelength distribution of any emission depends on the temperature of the object. When the temperature is increased the intensity of every wavelength of radiation emitted increases but the intensity of the shorter wavelengths increases more rapidly making the object appear more white. An object at constant temperature is absorbing radiation at the same rate as it is emitting radiation. The temperature of an object increases when the object absorbs radiation faster than it emits radiation. HT only. The temperature of the Earth depends on many factors including; the rates of absorption and emission of radiation, reflection of radiation into space. HT only.

	The acceleration of an object is proportional to the resultant force acting on the object, and inversely proportional to the mass of the object. As an equation: $$resultant\ force\ =$$ $$mass\ x\ acceleration$$ $$[F\ =\ m\ a\ ]$$ The tendency of objects to continue in their state of rest or of uniform motion is called inertia. Inertial mass is a measure of how difficult it is to change the velocity of an object. Inertial mass is defined by the ratio of force over acceleration. For everyday road transport; estimate the speed, accelerations and forces involved in large accelerations. Newton's Third Law: Whenever two objects interact, the forces they exert on each other are equal and opposite. The stopping distance of a vehicle is the sum of the distance the vehicle travels during the driver's reaction time (thinking distance) and the distance it travels under the braking force (braking distance). For a given braking force the greater the speed of the vehicle, the greater the stopping distance. Reaction times vary from person to person. Typical values range from 0.2s to 0.9s. Knowledge and understanding of methods used to measure human reaction times. Knowledge of how a driver's reaction time can be affected by tiredness, drugs and alcohol. Distractions may also affect a driver's ability to react. The braking distance of a vehicle can be affected by adverse road and weather conditions and poor condition of the vehicle. Estimate how the distance for a vehicle to make an emergency stop varies over a range of speeds typical for that vehicle. Interpret graphs relating speed to stopping distance for a range of vehicles. When a force is applied to the brakes of a vehicle, work done by the friction force between	

	the brakes and the wheel reduces the kinetic energy of the vehicle and the temperature of the brakes increases. The greater the speed of a vehicle the greater the braking force needed to stop the vehicle in a certain distance. The greater the braking force the greater the deceleration of the vehicle. Large decelerations may lead to brakes overheating and/or loss of control. Estimate the forces involved in the deceleration of road vehicles. HT only. Momentum is a property of moving objects and is defined by the equation: $momentum = mass\ x\ velocity$ $[\ p = m\ v\ ]$ In a closed system, the total momentum before an event is equal to the total momentum after the event. This is called conservation of momentum. When a force acts on an object that is moving, or able to move, a change in momentum occurs. The equations $F = m\ x\ a$ and $a = \frac{v-u}{t}$ lead to the equation $F = \frac{m\ \Delta\ v}{\Delta t}$ Students should be able to explain safety features such as air bags, seat belts, gymnasium crash mats, cycle helmets and cushioned surfaces for playgrounds with reference to the concept of rate of change of momentum.	
What previous knowledge is required?	Speed is measured in m/s Distance in meters or Km, and how to convert between the two Forces make things speed up or slow down in a certain direction The difference between weight and mass Forces are measure in Newtons (N)	Speed is measured in m/s Distance in meters or Km, and how to convert between the two Energy cannot be created or destroyed Sound moves at different speeds through different substances Light only moves in straight lines. The visible spectrum as ROYGBIV
How will this term's content help with future learning?	Links to revision of previous units, a part within A level Physics, very few future learning opportunities outside of A level Physics.	Links to revision of previous units, a part within A level Physics, very few future learning opportunities outside of A level Physics.

	May assist with maths and using vector diagrams	
Links to Specification	• *YouTube – primrose kitten – https://www.youtube.com/watch?v=Rz4XBSKNGXg* • *CGP Revision Guides (various)* • *YouTube – cognito https://www.youtube.com/watch?v=WCPTKRaScgE*	• *YouTube – primrose kitten – https://www.youtube.com/watch?v=9JPNVJ_LC3E* • *CGP Revision Guides (various)* • *YouTube – cognito* https://www.youtube.com/watch?v=aCu4VRKMstA
Resources	*6.5* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Biology – 4.5* *https://filestore.aqa.org.uk/resources/biology/specifications/AQA-8461-SP-2016.PDF*	*6.6* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Biology – 4.6* *https://filestore.aqa.org.uk/resources/biology/specifications/AQA-8461-SP-2016.PDF*
Assessments	*Pupils are assessed through an end of unit exam paper, it is 40 minutes in length. Students should use their CGP revision guides or BBC Bitesize:* *combined - https://www.bbc.co.uk/bitesize/examspecs/z8r997h* *Triple – https://www.bbc.co.uk/bitesize/examspecs/z8xtmnb*	*Pupils are assessed through an end of unit exam paper, it is 40 minutes in length. Students should use their CGP revision guides or BBC Bitesize:* *combined - https://www.bbc.co.uk/bitesize/examspecs/z8r997h* *Triple – https://www.bbc.co.uk/bitesize/examspecs/z8xtmnb*
Term Two		
Content of study	*AQA GCSE Trilogy Combined Science/ AQA GCSE Biology – Unit B5 –Homeostasis and Response*	*AQA GCSE Trilogy Combined Science – Unit B6 – Inheritance, Variation and Evolution*
What are the aims and objectives of this term?	Explain what homeostasis is and why it is important. Describe examples of conditions that need to be controlled. Describe the roles of the nervous system and the endocrine system in homeostasis. Describe the main components of a control system and their functions.	*Define sexual and Asexual reproduction* *Explain how meiosis halves the number of chromosomes in gametes* *Describe the structure of DNA and define "genome"* *Explain key terms associated with inheritance* *Be able to use a punnet square to predict possible offspring phenotypes, using simple ratios and percentages to report the possible outcomes.*

	Explain the importance of being able to respond to environmental changes and coordinate behaviour. Explain how the nervous system is adapted for its functions. Describe the functions of the main structures in the nervous system. Explain the role of chemicals at synapses. Describe and use different methods to measure reaction time. Required practical Make a plan to investigate a factor on human reaction time. Carry out a controlled investigation, present and analyse the results. Explain the importance of reflex actions and give examples. Describe the differences between voluntary and reflex actions. Describe the stages of a reflex action.	*Understand how Polydactyly and Cystic Fibrosis are inherited* *Recall variants of genes arise from mutations, most of which have no effect on phenotype* *Describe evolution as a change in the inherited characteristics of a population over time through a process of natural selection forming a new species.* *Explain the impact of selective breeding of food plants and domesticated animals.* *Describe the process of genetic engineering plants and bacteria.* *Describe the evidence for evolution.* *Describe how fossils are formed and describe factors which may contribute to the extinction of a species.* *Explain how resistant strains of bacteria such as MRSA develop, linking this to evolution and mutation.* *Describe Linnaeus' system of classification and use the binomial naming system.* *Triple only – Explain in outline cloning using tissue cultures, cuttings, embryo transplants and adult cell cloning.*
What previous knowledge is required?	*Body temperature is 37C* *We sweat to cool down, shiver to warm up* *We use glucose as an energy source for respiration, a process needed for all living things.* *Water is lost through urine, sweat and breath.* *Hormones are used in the body to send "instructions".*	*Sperm and egg are how mammals reproduce* *Half your genes come from mum and half from dad* *Most of this unit is brand new info, very little prior knowledge applicable.*
How will this term's content help with future learning?	*A level Biology picks up from B5 to look at the function of a kidney and the nephron and the cycle of glucose management in close detail in mammalian bodies.*	*A level Biology unit 7 has a very large inheritance component to it, drawing upon this units knowledge. Further study post 16 in molecular biology or ecology.*
Links to Specification	• *YouTube – primrose kitten – https://www.youtube.com/watch?v=xOfqw7MbU8k* • *CGP Revision Guides (various)* • *YouTube - Amoeba Sisters https://www.youtube.com/watch?v=Iz0Q9nTZCw4*	• *YouTube – primrose kitten – https://www.youtube.com/watch?v=npl10a6p8jQ* • *CGP Revision Guides (various)* • *YouTube - Amoeba Sisters https://www.youtube.com/watch?v=fcGDUcGjcyk&list=PLwL0Myd7Dk1FVxYPO_bVbk8oOD5EZ2o5W*

Resources	*4.5* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Biology – 4.5* *https://filestore.aqa.org.uk/resources/biology/specifications/AQA-8461-SP-2016.PDF*	*4.6* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Biology – 4.6* *https://filestore.aqa.org.uk/resources/biology/specifications/AQA-8461-SP-2016.PDF*
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Term Three		
Content of study	*AQA GCSE Trilogy Combined Science – Unit C6 – Rate and extent of chemical change*	*AQA GCSE Trilogy Combined Science/ AQA GCSE Chemistry – Unit C9 – chemistry of the atmosphere*
What are the aims and objectives of this term?	*To calculate the rate of reaction from both raw data and from the gradient of a graph.* *Identify the factors that affect the rates of chemical reactions.* *Explain how these factors effect the rate of chemical reactions using collision theory.* *Use the idea of activation energy to explain how catalysts affect rates of reaction.* *Understand some reactions are reversable.* *Describe how changing conditions of a reversable reaction effects the direction the reaction moves in.* *HT only – Use Le Chatlier's principle to predict the outcomes of changing conditions of a reaction in equilibrium.* *HT only – Describe the effect on changing concentrations, temperature and pressure of reactants or products of a reaction at equilibrium.*	For 200 million years, the proportions of different gases in the atmosphere have been much the same as they are today: • about four-fifths (approximately 80%) nitrogen • about one-fifth (approximately 20%) oxygen small proportions of various other gases, including carbon dioxide, water vapour and noble gases. Theories about what was in the Earth's early atmosphere, and how the atmosphere was formed, have changed and developed over time. Evidence for the early atmosphere is limited because of the time scale of 4.6 billion years. Describe the main changes in the atmosphere over time and some of the likely causes of these changes. Describe and explain the formation of deposits of limestone, coal, crude oil and natural gas. Describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter. Recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane.

		Evaluate the quality of evidence in a report about global climate change given appropriate information. Describe uncertainties in the evidence base. Recognise the importance of peer review of results and of communicating results to a wide range of audiences. Describe briefly four potential effects of global climate change Discuss the scale, risk and environmental implications of global climate change. Describe actions to reduce emissions of carbon dioxide and methane. Give reasons why actions may be limited. Describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. Describe and explain the problems caused by increased amounts of these pollutants in the air.
What previous knowledge is required?	*How to write a chemical reaction equation using words and symbols.* *How to balance a chemical equation.* *Endothermic reactions absorb energy from the surroundings.* *Exothermic reactions release energy into the surroundings.* *Concentration of a reactant refers to the particle density of reactant within a solution or mixture.*	Knowledge of C7 alkanes and alkenes, C9 pollution. Understanding of recycling vs landfill and that resources are finite. Understanding that climate change is a global current issue.
How will this term's content help with future learning?	- *If continuing on to any Science Level 3 course (A level or BTEC) a working knowledge of factors the affect the rate of chemical change and relating that to energy profiles is crucial.*	- Links to revision of previous units, a part within A level Chemistry, very few future learning opportunities outside of A level Chemistry.
Links to Specification	• *YouTube – primrose kitten – https://www.youtube.com/watch?v=7i90fiz9SmY* • *CGP Revision Guides (various)* • *BBC Bitesize – https://www.bbc.co.uk/bitesize/topics/zwdqqhv*	• *YouTube – primrose kitten –* • *CGP Revision Guides (various)* • *YouTube*

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Resources	*5.6* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Chemistry – 4.6* *https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF*	*5.9* *https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF* *Triple Science Chemistry – 4.9* *https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF*
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Term Four

Content of study	*AQA GCSE Trilogy Combined Science/ AQA GCSE Physics – Unit P7 – Magnetism and Electromagnetism*	*AQA GCSE Trilogy Combined Science/ AQA GCSE Chemistry – Unit C10 –*
What are the aims and objectives of this term?	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. The region around a magnet where a force acts on another magnet or on a magnetic material	State examples of natural products that are supplemented or replaced by agricultural and synthetic products. Distinguish between finite and renewable resources given appropriate information. Extract and interpret information about resources from charts, graphs and tables. Use orders of magnitude to evaluate the significance of data. Distinguish between potable water and pure water. Describe the differences in treatment of ground water and salty water.

	(iron, steel, cobalt, and nickel) is called the magnetic field. The force between a magnet and a magnetic material is always one of attraction. The strength of the magnetic field depends on the distance from the magnet. The field is strongest at the poles of the magnet. The direction of the magnetic field at any point is given by the direction of the force that would act on another North Pole placed at that point. The direction of a magnetic field line is from the North (seeking) Pole of a magnet to the South (seeking) Pole of the magnet. A magnetic compass contains a small bar magnet. The Earth has a magnetic field. The compass needle points in the direction of the Earth's magnetic field. When a current flows through a conducting wire a magnetic field is produced around the wire. The shape of the magnetic field can be seen as a series of concentric circles in a plane, perpendicular to the wire. The direction of these field lines depends on the direction of the current. The strength of the magnetic field depends on the current through the wire and the distance from the wire. Shaping a wire to form a solenoid increases the strength of the magnetic field created by a current through the wire. The magnetic field inside a solenoid is strong and uniform. The magnetic field around a solenoid has a similar shape to that of a bar magnet. Adding an iron core increases the magnetic field strength of a solenoid. An electromagnet is a solenoid with an iron core. Interpret diagrams of electromagnetic devices in order to explain how they work. Examples may include relays, electric bells and loudspeakers. (physics only). When a conductor carrying a current is placed in a magnetic field the magnet producing the field and the conductor exert a force on each other. This is called the motor effect. (HT only) The direction of the force on the conductor is reversed if either the direction of the current or the direction of the magnetic field is reversed. (HT only)	Give reasons for the steps used to produce potable water. Comment on the relative ease of obtaining potable water from waste, ground and salt water. Evaluate alternative biological methods of metal extraction, given appropriate information. Carry out simple comparative LCAs for shopping bags made from plastic and paper Evaluate ways of reducing the use of limited resources, given appropriate information Describe experiments and interpret results to show that both air and water are necessary for rusting. Explain sacrificial protection in terms of relative reactivity. Recall a use of each of the alloys specified Interpret and evaluate the composition and uses of alloys other than those specified, given appropriate information. Explain how low density and high density poly(ethene) are both produced from ethene. Explain the difference between thermosoftening and thermosetting polymers in terms of their structures. Compare quantitatively the physical properties of glass and clay ceramics, polymers, composites and metals. Explain how the properties of materials are related to their uses and select appropriate materials. Recall a source for the nitrogen and a source for the hydrogen used in the Haber process. (HT only) Interpret graphs of reaction conditions versus rate. (HT only) Apply the principles of dynamic equilibrium to the Haber process. (HT only) Explain the trade-off between rate of production and position of equilibrium. (HT only) Explain how the commercially used conditions for the Haber process are related to the availability and cost of raw materials and energy supplies, control of equilibrium position and rate.	

	The direction of the force on the conductor can be identified using Fleming's left-hand rule. (HT only) The size of the force on the conductor depends on: • the magnetic flux density • the current in the conductor the length of conductor in the magnetic field (HT only) For a conductor at right angles to a magnetic field and carrying a current: $$force = magnetic\ flux\ density\ x\ current\ x\ length$$ $$[F = B I l]$$ A coil of wire carrying a current in a magnetic field tends to rotate. This is the basis of an electric motor. The force on a conductor in a magnetic field causes the rotation of the coil in an electric motor.(HT only) Loudspeakers and headphones use the motor effect to convert variations in current in electrical circuits to sound waves.(HT only) If an electrical conductor moves relative to a magnetic field or if there is a change in the magnetic field around a conductor, a potential difference is induced across the ends of the conductor. If the conductor is part of a complete circuit, a current is induced in the conductor. This is called the generator effect or electromagnetic induction. (HT only) The size of the induced potential difference (and so induced current) can be increased by: • increasing the speed of movement • increasing the strength of the magnetic field using more turns on the solenoid. An induced current generates a magnetic field that opposes the original change, either the movement of the conductor or the change in magnetic field. (HT only) If the direction of motion of the conductor or the polarity of the magnetic field is reversed, the direction of the induced potential difference and any induced current is reversed.(HT only)	Recall the names of the salts produced when phosphate rock is treated with nitric acid, sulfuric acid and phosphoric acid Compare the industrial production of fertilisers with laboratory preparations of the same compounds, given appropriate information.	

	The generator effect is used in an alternator to generate a.c. and in a dynamo to generate d.c. (HT only) Microphones use the generator effect to convert the pressure variations in sound waves into variations in current in electrical circuits.(HT only) A basic transformer consists of a primary coil and a secondary coil wound on an iron core. Iron is used as it is easily magnetised. (HT only) An alternating current in the primary coil of a transformer produces a changing magnetic field in the iron core and hence in the secondary coil. This induces an alternating potential difference across the ends of the secondary coil. If the secondary coil is part of a complete circuit an induced current will flow in the secondary coil.(HT only) The ratio of the potential differences across the primary and secondary coils of a transformer V_p and V_s depends on the ratio of the number of turns on each coil n_p and n_s: $\frac{V_p}{V_s} = \frac{n_p}{n_s}$ (HT only) If transformers were 100% efficient, the electrical power output would equal the electrical power input: $V_s \; x \; I_s \; = \; V_p \; x \; I_p$ Where $V_s \; x \; I_s$ is the power output (secondary coil) and $V_p \; x \; I_p$ is the power input (primary coil). power input and output, in watts, W Power is transmitted at high potential differences along the National Grid. (HT only)		
What previous knowledge is required?	Magnetism is a non contact force North attracts South and vice versa Magnets have North and South poles Like poles repel	Knowledge of C7 alkanes and alkenes, C9 pollution. Understanding of recycling vs landfill and that resources are finite.	
How will this term's content help with future learning?	Links to revision of previous units, a part within A level Physics, very few future learning opportunities outside of A level Physics.	Links to revision of previous units, a part within A level Chemistry, very few future learning opportunities outside of A level Chemistry.	

Links to Specification		• YouTube – primrose kitten – https://www.youtube.com/watch?v=KyVf2bVLl08 • CGP Revision Guides (various) • YouTube https://www.youtube.com/watch?v=dUsv-k0Xvac	
Resources	• YouTube – primrose kitten – https://www.youtube.com/watch?v=mnigg3MGslY • CGP Revision Guides (various) • YouTube – cognito https://www.youtube.com/watch?v=79_SF5AZtzo • YouTube – primrose kitten – https://www.youtube.com/watch?v=KyVf2bVLl08 • CGP Revision Guides (various) • YouTube https://www.youtube.com/watch?v=dUsv-k0Xvac Triple – https://www.bbc.co.uk/bitesize/examspecs/z8xtmnb	**5.10** **https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF** **Triple Science Chemistry – 4.10** **https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF**	
Assessments	Pupils are assessed through an end of unit exam paper, it is 40 minutes in l Pupils are assessed through an end of unit exam paper, it is 40 minutes in length. Students should use their CGP revision guides or BBC Bitesize: Students are also set regular homework and have the access to EDUCAKE online homework provision. combined - https://www.bbc.co.uk/bitesize/examspecs/z8r997h Triple –	Pupils are assessed through an end of unit exam paper, it is 40 minutes in l Pupils are assessed through an end of unit exam paper, it is 40 minutes in length. Students should use their CGP revision guides or BBC Bitesize: Students are also set regular homework and have the access to EDUCAKE online homework provision. combined - https://www.bbc.co.uk/bitesize/examspecs/z8r997h Triple –	

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Term Five			
Content of study	Revision and practice exam technique		
What are the aims and objectives of this term?			
What previous knowledge is required?			
How will this term's content help with future learning?			
Links to Specification			
Resources			
Assessments			
Term Six			
Content of study	Formal examinations		
What are the aims and objectives of this term?			
What previous knowledge is required?			
How will this term's content help with future learning?			
Links to Specification			
Resources			
Assessments			