Year 7 Curriculum Sequencing Grid				
Subject: Physics	**Sequence of Units taught in one year**			
Unit	Unit 1 Forces	Unit 2 Circuits	Unit 3 Energy	Unit 4 Electromagnets
Key Retainable Substantive Knowledge	- Introduction to Forces. - Balanced and Unbalanced Forces. - Movement - Zero and Non-zero Forces. - Gravity. - Terminal Velocity. - Speed. - Acceleration. - Stopping Distances. - Distance-time Graphs.	- Circuit Symbols. - Potential Difference. - Current. - Series Circuits. - Parallel Circuits. - Resistance. - Electrical Safety - Fuses Plugs	- Energy Resources - Non-renewable and renewable. - Energy and Power. - Energy Conservation. - Food and Fuels. - Types of Energy and Energy Transfers. - Efficiency.	- Magnets & Magnetic Fields. - Electromagnets. - Using Electromagnets.
Key Retainable Disciplinary Knowledge	**Predict**: Students will be able to **predict** the movement of an object by analysing the forces upon it, for simple scenarios. **Analyse:** Students will be able to use a velocity-time graph to chart the motion of a sky-diver of the course of the skydive. **Calculate**: They will be able to **calculate** the speed of an object and acceleration for simple scenarios from given information, **Describe:** They'll be able to **describe** the motion of an object graphically, and translate a given distance-time graph into a description of the object's motion	**Practical skills:** Students will be confident in using a selection of components and power supplies to construct simple series and parallel circuits. They will also be able to collect results by reading ammeters and voltmeters. **Analyse:** Patterns in data collected **Maths:** Understanding number scales and relative sizes when ranking items in order. Using correct units. **Calculate:** resistance using the equation. **Graph Skills:** Plot a graph of the results I V.	**Evaluate:** Gain an appreciation of where electricity comes from and be able to evaluate the resources from which it is generated. **Maths:** Learn the relationships between energy power and time, practise key maths skills in basic algebra and equation use **Practical skills:** Students to investigate food as fuels by using food labels/packages to gain an appreciation of how much energy is stored in the different types of food that we eat, and how much energy is typically required by different people	Practical Investigate: **which** materials are magnetic, how magnets interact with those materials and each other **Drawing:** Magnetic Field line diagrams for permanent magnets in various_orientations **Practical skills:** Gain confidence in building electromagnetic circuits and conducting scientific practical's from equipment that they have made **Enquire:** predict and test the effect of changes to an electromagnet **Analyse:** present observations in an appropriate table and

		Calculate HA: Re-arrange the equation V=IR **Evaluate:** The correct fuse to use for a practical application in the home.	**Enquire:** make and record observations **Analyse:** draw conclusions from your observations **Communicate:** use scientific vocabulary to explain your observations. **Describe:** how many common appliances work and what energy transfers are happening within **Evaluate**: common household devices and understand that energy efficient devices are better economically and environmentally	interpret observations to draw conclusions. **Understand:** Gain an appreciation for some of the technologies that require magnetism to work, links to STEM and careers
Key Tier Three Vocabulary	acceleration, air resistance, average, speed, balanced (forces), contact force, distance–time graph, driving force, equilibrium, field, friction, gravitational field strength, gravity/gravitational force, interaction pair kilogram, mass, metres per second, newton, newton Meter, non-contact force, pull, push, relative motion, resistive force resultant force, speed, unbalanced (forces), weight. **Physics:** The use of renewable and non-renewable energy sources. STEM Opportunities and guest speakers. Practical techniques, health and safety, development of fine motor	ammeter, amps, atoms, attract, battery, cell, charged up, current electrical conductor, electrical insulator, electric charge, electric field electron, electrostatic force, lightning, negatively charged, neutral, ohms, parallel, positively charged, potential difference, rating, repel, resistance, series, voltage, voltmeter, volts	chemical energy, store dissipation (dissipated), elastic energy store, energy energy resource, fossil fuel, gravitational potential energy store, joule, kilojoule kilowatt, kilowatt hour, kinetic energy store, law of conservation of energy non-renewable, power, renewable, thermal energy store, watt	circuit breaker, core (electromagnet), electric bell, electromagnet loudspeaker, magnet, magnetic field, magnetic field lines, magnetic force magnetic poles, magnetise, permanent magnet, solenoid

	and dexterity skils Communication of Science ideas and concepts (all sciences			
Opportunities for reading	Textbooks, revision guides, news articles etc as relevant (put reading tasks in)	Textbooks, revision guides, news articles etc as relevant	Textbooks, revision guides, news articles etc as relevant	Textbooks, revision guides, news articles etc as relevant
Authentic Connections – Cross Curricular Links				
Key Assessments				

Year 8 Curriculum Sequencing Grid			
Subject: Physics	**Sequence of Units Taught in One Year**		
Unit	**Unit 5: Waves**	**Unit 6: Forces**	**Unit 7: Energy**
Key Retainable Substantive Knowledge	Modelling waves The ear and hearing Frequency, pitch and amplitude Sound waves and speed Refraction Light Reflection The eye and vision Colour and filters Radiation and energy	Friction and drag Air and Water Resistance Squashing and stretching Turning forces Pressure in gases Pressure in liquids Density	Work, energy, and machines Energy and temperature Energy transfer: Conduction Energy transfer: Convection Energy transfer: Radiation Energy transfer: Insulation
Key Retainable Disciplinary Knowledge	**Practical Competencies** **Enquire:** use appropriate methods during laboratory work, paying attention to health and safety. **Enquire:** make and record observations and data in tables. **Analyse:** interpret observations and data **Communicate:** show an awareness of objectivity and the effect on accuracy, precision, and validity of observations. **Mathematical competencies:** Using the speed equation and rearranging it. Converting Units Able to measure angles using a protractor. Graph interpretation.	**Practical Competencies** **Enquire:** make a prediction you will test **Enquire:** carry out an investigation, including planning control variables **Enquire and Analyse:** collect and present measurements **Analyse and Communicate**: identify patterns in data and describe and explain your conclusion. **Analyse** graphical data to determine the resultant forces on a skydiver hitting terminal velocity.	**Practical Competencies** **Analyse:** evaluate data, showing awareness of potential sources of random and systematic error. Use scientific terminology when explaining the role of levers, pulleys, and gears in simple machines, applying their knowledge to other appliances around the home. Carry out simple calculations for work **Solve:** evaluate data, showing awareness of potential sources of random and systematic error. Using scientific terminology when forming their hypotheses, and when analysing and evaluating data Using estimation for temperatures in familiar situations, and compare these to temperatures in unfamiliar situations. **Maths and literacy skills** Explaining observations and conclusions using scientific terminology.

			Recording numerical data in tables, calculating means, and interpreting data to draw conclusions. **Communicate:** communicate ideas **Enquire:** collect data, devise questions, and plan variables. Graph drawing and interpretation
Key Tier Three Vocabulary	amplitude, compression, electromagnetic spectrum, filter, focus, frequency gamma rays, infrared (IR) (radiation), ionisation, lens, longitudinal wave loudspeaker, microphone, microwaves, pitch, pressure wave, radio waves rarefaction, retina, superpose transmission, transverse wave, ultrasound, ultraviolet (UV), visible light, wave X-rays	atmospheric pressure, centre of gravity, centre of mass, compression, contact force, deformation, drag force, elastic limit, extension, fluid, friction gas pressure, Hooke's Law, incompressible, law of moments, liquid pressure, lubrication, moment, newton, newton metres, newtons per metre squared, pivot, pressure, reaction, streamlined, stress tension, upthrust, water resistance	conduction, convection, convection current, infrared radiation, radiation temperature, thermal conductor, thermal energy store, thermal imaging camera, thermal insulator, thermometer
Opportunities for reading			
Authentic Connections – Cross Curricular Links	Physics GCSE: Effects of ionising radiation (Cancer). Maths – Data interpretation and formulae rearrangement, using a protractor. Music – Frequency & Pitch, Volume & Amplitude A-level Biology – Frequency of action potentials	Physics GCSE – Static Electricity, Magnetic Forces Chemistry GCSE link – electrostatic and intermolecular forces. Maths – Data interpretation, rearranging formulae.	GCSE Chemistry – Density, Exothermic Reactions, Properties of Metals, Metallic Bonding. GCSE Biology – Insulation (Adaptations) Specialised cells, thermal regulation, respiration and photosynthesis.

Key Assessments	HT2 MA2	HT3 MA3	HT3 MA3

Year 9 Curriculum Sequencing Grid		
Subject: Physics	**Sequence of Units taught in one year**	
Unit	Unit 1: Energy	Unit 2: Electricity
Key Retainable Substantive Knowledge	Energy changes in a system, and the ways in which energy is stored Conservation and dissipation of energy National and global energy resources	Current, potential difference and resistance Series and parallel circuits Domestic uses and safety Energy transfers The National Grid Static electricity
Key Retainable Disciplinary Knowledge	**Describing:** Energy stores, energy transfers, and the processes by which energy transfers take place, as they are prompted by a variety of observations. High-attaining students will also describe factors affecting the capacity of energy stores. **Understand:** That work as energy transfer by a force on an object. **Maths:** Equation solving and manipulation with multiple variables. Graph drawing and interpretation **Recall:** that GPE is the energy an object gains as it increases its height from the ground, in most cases this energy is transferred into KE as the object falls. And that KE is the energy an object gains as it increases its mass and velocity. **Enquire:** collect data, devise questions, and plan variables. **Describe:** That power is the rate of energy transfer and how to calculate that using various equations.	**Enquire:** why some materials will gain or lose electrons when they are rubbed, as well as the role played by the electric field **Explain:** static electric effects and describing electric fields, by answering a series of questions about the experiment and demonstration **Practical Enquire:** how to build circuits and measure current/voltage/resistance. Students will find out the effect of resistors and ammeters. **Maths skills:** calculations using the equation which relates current, voltage, resistance, charge, and time. Graph plotting IV graphs. **Maths:** Equation solving and manipulation with multiple variables. Power and Efficiency. **Enquire:** make predictions using scientific knowledge and understanding **Enquire:** make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements

	Practical Skills: Accurately measure temperatures to compare the effectiveness of thermal insulators • present their results in a table and graph • describe materials as good or poor thermal insulators or conductors • Suggest explanations for the different thermal conductivities of materials • Comment on sources of error and repeatability • Plan an investigation into a investigate the factor affecting the effectiveness of a thermal insulator **Evaluate:** the validity of conclusions drawn from results **Understand:** that convection currents occur due to hot air rising and cold air sinking this is because of the difference in density of the two temperatures of the air. The origin of infrared radiation, this is what is generally known as heat, what materials best absorb and emit the radiation. **Understand:** that different materials have different specific heat capacities giving rise to their different uses. Calculating the amount of thermal energy transferred to an object. **Practical skills:** Enquire specific heat capacity for a variety of materials. **Determine:** Specific heat capacity from experimental results **Graph Skills:** plot cooling curves to determine which is the best thermal insulator. **Evaluate:** Energy resources environmentally and suitability of energy resources for differing locations: biofuel, nuclear fuel, tidal, wave, solar,	**Analyse:** present observations and data using appropriate methods, including tables and graphs. **Understand**: What direct and alternating current is and be able to identify sources of each. **Practical skills:** How to use an oscilloscope to measure the frequency and peak potential difference of an alternating current.

	hydroelectric, and wind turbines – and how they are used.	
Key Tier Three Vocabulary	dissipated energy / dissipation of energy efficiency elastic potential energy Kinetic energy Hooke's Law input energy power spring constant useful energy wasted energy work black body radiation infrared radiation specific heat capacity thermal conductivity biofuel carbon-neutral geothermal energy national grid nuclear fuel nucleus reactor core renewable energy	Electricity diode electric field electrons ion light-depending resistor (LDR) light-emitting diode (LED) line of force in an electric field neutrons Ohm's law parallel potential difference protons resistance series static electricity thermistor alternating current (a.c.), direct current (d.c.) earth wire fuse live wire neutral wire oscilloscope, plugs step-down transformers step-up transformers three-pin plug
Opportunities for reading		
Authentic Connections – Cross Curricular Links	Maths skills percentages and ratios, graph drawing , using formula	Maths skills percentages and ratios, graph drawing , using formula Food Tech food groups, PE heart an d circulation and breathing
Key Assessments		

Year 10 Curriculum Sequencing Grid			
Subject: Physics	**Sequence of Units taught in one year**		
Unit	Unit 3: Particle model of mater	Unit 4: Atomic Structure	Unit 5: Forces
Key Retainable Substantive Knowledge	Changes of state & internal energy Density Temperature changes in a system Pressure in gases (Triple Physics)	Radioactive decay and radiation Contamination Hazards and uses of radioactive emissions (Triple Physics) Nuclear fusion and fission (Triple Physics)	Forces between objects -Resultant force -Center of mass -Forces and parallagram (higher tier only) -Resolving forces (Higher only) Speed & DT graphs -Velocity -Acceleration & Velocity time graphs -Stopping distance -Falling under gravity & Gravitational fields -Newton's laws of motion -Momentum (higher tier only) -Conservation of momentum (higher tier only) -Impact forces (higher tier only) -Hooke's law - Moments -Levers and gears -Pressure -Pressure in fluids (higher tier only) -Atmospheric pressure -upthrust (higher tier only)
Key Retainable Disciplinary Knowledge	**Maths skills:** Solving algebraic equations, by substituting numbers into the equation and rearranging. (density) **Enquire practical:** Measure the mass and volume of given solids and liquids shape as regular and irregular three-dimensional	**Illustrate:** Construct diagrams of atoms using the Bohr model. The model includes the labelling of Protons, Neutrons and Electrons, as well as the shells and nucleus. **Enquire/Analyse:** Students will interpret results against a hypothesis to draw	Recall: vector or scalar quantities **Draw:** vector arrow diagrams to represent given quantities to either a specified scale. **Apply:** contact or non-contact forces into different contexts

	bodies. Calculate the densities of the materials. **State:** particle models for solids, liquids and gases. Their relative density's, Kinetic, potential and internal energy's. **Enquire practical:** Students will monitor the temperature of a substance as it changes state and discover the main features of the heating curve of a pure substance. **Maths skills** Tabulating data and graph drawing. **Analyse:** analyse patterns, discuss limitations, draw conclusions, and present data **Enquire practical:** Students will carry out an experiment to measure either the specific latent heat of fusion of ice or the specific latent heat of vaporisation of water. **Maths:** Be able to calculate pressure on a container and understand how this pressure increases linearly with temperature.	conclusions which allows them to explain why our previous understanding of the atomic structure "plumb pudding" was wrong. **Illustrate:** Show the structure, atomic mass, atomic number, charge, symbols, penetration power, ionisation power of alpha, beta, gamma through classroom dialogue through the demo to construct a information chart. **Maths:** Students will focus on writing alpha, beta, gamma decay equations in symbol format along with mass and atomic numbers and other products. **Enquire:** modelling random decay practical **Interpolate:** half-life graphs **Calculate/Maths:** Half-life's and counts based on examples give. **Evaluate:** Risk and benefit of use of radiation in medicine through looking at a scenario of cancer. **Illustrate:** Using diagrams the process of nuclear fission and how this is harnessed to generate electricity. **Communicate:** The importance of peer review in the scientific community. **Illustrate:** Using diagrams the process of nuclear fusion and how this could be harnessed to generate clear energy. **Evaluate:** the similarities and difference of fission and fusion	**Calculate:** Resultant forces for higher tier students this could be calculated through the use of a scale diagram after having constructed a free body diagram. **Recall:** Newton's third law and apply it to different scenarios involving forces. Recall a moment and calculate its effect on a system. **Practical Competencies:** Optional practical where students investigate moments using a ruler suspended at a single point, changing the distance and size of the force. **Math's:** Use of the moments equation, for higher tier students they may need to rearrange the equation. **Understand:** the use of levers and gears in order to decrease the force needed to move objects and how gear systems work on the moment laws. **Maths skills:** Solving algebraic equations, by substituting numbers into the equation and rearranging. (speed, distance, time, acceleration, force, mass, weight) **Graph skills:** Describe and interpret a distance time graph, calculate the gradient at different points, they should also be able to plot distance time graphs from given data. For higher tier students they must be able to identify acceleration from a given distance time graph.

		Evaluate: the seriousness depending on the source type of irradiation and contamination	**Graph Skills:** velocity time graph and calculate the gradient and area at different points, plot a velocity time graphs from given data. For higher tier students they must be able to identify non-uniform acceleration and distance from a given velocity time graph. Terminal velocity graphs. **Describe:** what happens to objects as they fall through a fluid in terms of the balanced and unbalanced forces that act upon them. **Practical competencies:** measure; length, mass, time, the effect of a force, speed, acceleration and deceleration. (Newtons 2nd Law) **Understand:** relationship between speed and stopping distance, higher tier students we look at and calculate the stopping distance. **Define:** momentum and recall the conservation of momentum law. **Calculate**: momentum and change in momentum for a given collision. **Enquire:** Experiment with mass and extension in a spring **Graph skills:** Find the spring constant of a spring using a graph of force-extension. Include plotting a graph, drawing a line of best fit and calculating a gradient.

			Understand: the relationship between force and the areas they act in order to increase or decrease pressure. **Maths skills:** Use equations with substitution and rearranging for the pressure on surfaces by different forces. (Pressure, density) **Describe**: how altitude, temperature and volume effects gas pressure by looking at the exponential nature of gas pressure with altitude. **Describe:** how A partially (or totally) submerged object experiences a greater pressure on the bottom surface than on the top surface. Upthrust.
Key Tier Three Vocabulary	Particle model of matter boiling point Boyle's Law density freezing point internal energy latent heat melting point physical change pressure specific latent heat of fusion Lf specific latent heat of vaporisation Lv	Atomic model, half-life, radioactive isotopes, decay, Begurell, servert, counts per minute, Ionisation, hazards, fission, fusion, emissions.	Forces displacement driving force effort force multiplier forces free-body force diagram friction , load moment Newton's first law of motion Newton's hird law of motion parallelogram of forces principle of moments resultant force scalar vector Forces displacement driving force effort force multiplier forces free-body force diagram friction , load moment Newton's first law of motion Newton's hird law of motion parallelogram of forces principle of moments resultant force scalar vector Up thrust displacement driving force effort force multiplier forces free-body force diagram friction load moment
Opportunities for reading			

Authentic Connections – Cross Curricular Links	Maths skills percentages and ratios, graph drawing , using formula	History - History of medicine History of Nuclear disasters History of the discovery of radiation Nuclear power industry	Effects of ionising radiation (Cancer) STEM Oppertunitys and guest speakers Biology: Natural selection and the conflict with religion STEM Oppertunitys and guest speakers
Key Assessments			

Year 11 Curriculum Sequencing Grid			
Subject: Physics	**Sequence of Units taught in one year**		
Unit	Unit 6: Waves	Unit 7: Electromagnets	Unit 8: Space (Triple only)
Key Retainable Substantive Knowledge	-Wave properties -Reflection (higher tier only) -Refraction (higher tier only) -Dispersion of light (spectrum) -Lenses & Ray diagrams -Magnification -Sound and hearing -Ultrasound waves -Seismic waves -Types of electromagnetic wave -Properties of em waves & Uses of em waves	Forces of magnets and magnetic fields Interaction of magnetic fields (electromagnets) Using electromagnets Motor effect (higher tier only) Fleming's Left hand rule (higher tier only) Generator effect (higher tier only) AC generator (higher tier only) transformers (higher tier only) using transformers (higher tier only)	Solar system Lifecycle of a star Orbits Expanding universe Big bang
Key Retainable Disciplinary Knowledge	**Evaluate:** differences between longitudinal and transverse waves. **Interoperate:** wave diagrams to state frequency, amplitude, period and wavelength. **Maths skills** Students use equations to calculate; frequency, wave speed, wavelength and period of waves (substitution and rearranging) **Describe**: how waves are reflected from surfaces using the law of reflection. **Describe:** what happens to a light ray as it enters and leaves a medium, **Math's:** Measure the angles of incidence and refraction as it propagates through, linking this to the law of refraction.	**Draw:** field lines around a magnet as well as the field lines for repulsion and attraction. **Enquire:** use magnets in order to determine the different magnetic metals, they will also use iron filings and plotting compasses to determine the shape and strength of a magnets magnetic field. **Describe:** how to make an electromagnet as well as state some uses and benefits of them over standard bar magnets. **Enquire practical:** build electromagnets and change certain factors such as number of coils to investigate how to	**Describe:** The formation of star systems, and all the bodies in the system. Basic understanding of how the force of gravity and the nuclear fusion from the core of the star work against each other and are stable during the main sequence of a star's life cycle. **Describe:** How through the lifecycle of a star different elements are produced, up to iron and heavier than iron. **Describe:** the various stages of the life cycles of small – medium sizes stars like our Sun and those of larger stars **Understand:** What centripetal forces is and what conditions must be in play, gravity and changing velocity. How centripetal force acts on orbiting

	Describe: the path sound waves follow which allows us to hear, they should also be able to describe how sound travels through different states of matter and how these link to the inside of the ear. **Enquire:** investigate how to calculate the wave speed of water waves and waves on a string. **Measure:** speed/frequency/wavelength in a ripple tank and string generated wave. **Understand:** Snell's law of reflection, letteral inversion, real and virtual images. Specular reflection and diffuse scattering. Velocity at a boundary's **Describe:** how light bends when passing through a boundary of different materials & density of the material impacts the angle of refraction. **Enquire practical**: Demonstrate how changing the angle if incident impact the angle of refraction when light crosses a boundary. Using Ray Boxes. **Describe:** Effects of different combinations of coloured lights and colour filters on the colour of objects. **Evaluate:** the impact will be real or virtual dependent on the type of lens and the focal point in relation to the lens. **Maths:** Calculate distances and resultant objects observed. Calculate magnification. Be able to draw Ray diagrams.	increase the strength of their electromagnet. **Apply:** Fleming's left-hand rule to determine the motion of a current carrying with inside a magnetic field as well as explain how an electric motor works. **Maths:** calculate the force on a wire or the magnetic field strength of a magnet, this may include rearrangement and conversion of units. **Describe**: generator effect and factors that affect the size of the induced potential. difference/induced current. **Recall:** the factors that affect the direction of the induced potential difference/induced current. **Apply:** the principles of the generator effect in a given context. **Describe:** how step up and step-down transformers work and their applications. **Maths Skills:** use and rearrange the transformer equation to calculate the current drawn from the input supply to provide a particular power output and apply the equation linking the p.m.'s and number of turns in the two coils of a transformer to the currents and the power transfer involved.	objects. That orbital speed is inversely proportional to the orbital distance **Maths skills:** Speed, distance, time calculation, to calculate the number of complete orbits in each time. **Understand:** what is meant by the 'doppler effect' and relate that to the idea of red shift as evidence for the big bang theory. **Understand:** that by 'theory' we mean accepted current best understanding of a phenomenon that is agreed upon by much of the scientific community. **Understand:** The Big Bang Theory suggest that the universe began from a small region that was extremely hot and dense

Key Tier Three Vocabulary	amplitude compression echo, electromagnetic waves frequency longitudinal waves, mechanical wave oscillate primary seismic wave (P-wave), rarefaction reflection refraction secondary seismic wave (S-wave)seismic waves speed transmission/transmitted transverse wave ultrasound wave vibrate wavelength carrier waves charge-coupled device (CCD) contrast medium electromagnetic spectrum ionisation microwaves optical fibre radiation dose radio waves ultraviolet radiation (UV)wave speed white light angle of incidence angle of reflection concave (diverging) lens convex (converging) lens diffuse reflection focal length magnification magnifying glass normal opaque object principal focus real image refraction specular reflection translucent object transparent object virtual image	alternator dynamo electromagnet, electromagnetic induction Fleming's left-hand rule generator effect, induced magnetism magnetic field magnetic field line magnetic flux density motor effect solenoid split-ring commutator step-down transformer step-up transformer	Space Big Bang theory black dwarf black hole, centripetal force cosmic microwave background radiation (CMBR) dark matter main sequence neutron star protostar red giant red supergiant red-shift supernova white dwarf
Opportunities for reading			
Authentic Connections – Cross Curricular Links	Lenses in optometry, Car headlights, glare, ionising radiation hazards for UV waves, uses of EM waves in everyday life.	Magnets – compasses, bird migration. Practical electromagnetic applications such as scrap yard and recycling plant equipment,	Origins of the universe, astronomy, why cars/ambulances sound different as they pass – doppler effect.
Key Assessments			