Curriculum Map Year 11 Science – Physics

Topic Name		Scientific Skills	Essential Knowledge (misconceptions/ tricky bits highlighted in red)	Prior Learning (KS3 or Y10)	Assessment	Link to future learning
Magnets and electromagnets	*Autumn HT1 (approx. 6-8 lessons)*	**Demonstrating that I can:** **plot the magnetic field pattern of a magnet using a compass** ▪ **draw the magnetic field pattern of a bar magnet showing how strength and direction change from one point to another** **draw the magnetic field pattern for a straight wire carrying a current and for a solenoid (showing the direction of the field)**	**In this topic I must know:** ▪ **Explain what is meant by the poles of a magnet** ▪ **Plot the field around a bar magnet** ▪ **Describe magnetic materials and induced magnetism** ▪ **Describe the Earths magnetic field** ▪ **Describe the magnetic field of a current** ▪ **Know how to make an electromagnet and describe the uses** ▪ **Describe the force on a current carrying conductor in a magnetic field** ▪ **The role of transformers in the national grid** ▪ **HT** ▪ **Apply FLHR to determine the direction of force, field or current** ▪ **Explain the meaning of magnetic flux density** ▪ **Use F = BIL to calculate the magnitude of the force** ▪ **Describe how motors work and how to change the speed and direction** **Separates only** ▪ **Describe how loudspeakers and microphones work** ▪ **Describe electromagnetic induction** ▪ **Apply and use the transformer equation** ▪ **Explain how dynamos and alternators work**	**Magnetism** • **magnetic poles, attraction and repulsion** • **magnetic fields by plotting with compass, representation by field lines** • **Earth's magnetism, compass and navigation** • **the magnetic effect of a current, electromagnets, D.C. motors (principles only)**	**The topics highlight in PURPLE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.** **The topics highlighted in BLUE will be assessed through questions during the end of topic assessment.**	**Year 13:** ▪ **Magnetic fields** ▪ **Magnetic flux density** ▪ **Forces on current carrying wire and charged particles** ▪ **Electromagnetic induction** ▪ **Faraday's law and Lenz's law** ▪ **Transformers**

Forces	*Autumn HT2 and Spring HT3 (approx.15 lessons)*	**Demonstrating that I can** **MS 3b, c Students should be able to recall and apply this equation.** weight = mass × gravitational field strength $[W = m g]$ **MS 3b, c, 4a Students should be able to recall and apply this equation.** $force = spring\ constant \times extension$ $[F = k e]$ **Investigate the relationship between force and extension for a spring.** ▪ **AT 1 – use appropriate apparatus to make and record length accurately. AT 2 – use appropriate apparatus to measure and observe the effect of force on the extension of springs and collect the data required to plot a force-extension graph.** ▪ **WS 2.4 – carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations** ▪ **WS 2.6 – make and record observations and measurements using a range of apparatus and methods.** ▪ **WS 3.5 – interpret observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.** **Investigate the effect of varying the force on the acceleration of an object of constant mass and the effect of varying the mass of an object on the acceleration produced by a constant force.** ▪ **AT 1 – use appropriate apparatus to record measurements of length, mass and time accurately.** ▪ **AT 2 – use appropriate apparatus observe the effect of force.** ▪ **AT 3 – use appropriate apparatus and techniques for measuring motion, including determination of speed and rate of change of speed (acceleration/deceleration).**	**In this topic I will:** • **recognise different types of forces** • **draw and interpret free body diagrams** • **understand and calculate speed and acceleration** • **draw and interpret distance – time and velocity-time graphs** • **use equations of uniform motion** • **know the difference between mass and weight** • **know and apply Newton's three laws** • **HT apply principle of conservation of momentum** • **Identify factors that affect thinking and braking distance** **Separates only** • **Describe turning effect of forces** • **Understand how levers and gears act as simple machines** • **Calculate pressure in a fluid** • **Explain the effect of atmospheric pressure**	**Before I start this topic, I need to know:** • **moment as the turning effect of a force** • **force-extension linear relation; Hooke's Law as a special case** • **work done and energy changes on deformation** • **atmospheric pressure, decreases with increase of height as weight of air above** • **decreases with height** • **pressure in liquids, increasing with depth; upthrust effects, floating and sinking** • **pressure measured by ratio of force over area – acting normal to any surface.** ▪ **opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.** • **forces being needed to cause objects to stop or start moving, or to change their speed** • **or direction of motion (qualitative only)** • **change depending on direction of force and its size**	**Knowledge and skills will be assessed by:** **The topics highlight in PURPLE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.** **The topics highlighted in BLUE will be assessed through questions during the end of topic assessment.**	**Year 12: Forces** ▪ **Scalars and vectors** ▪ **Forces in equilibrium** ▪ **Moments** ▪ **Momentum** ▪ **D-T, V-T and A-T graphs** ▪ **Newton's laws of motion** ▪ **Equations of linear motion** ▪ **Work and power** ▪ **Projectile motion**

Waves	*Spring HT4 (approx.10 lessons*	**Demonstrating that I can** **Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements.** ▪ **AT 4 – make observations of waves in fluids and solids to identify the suitability of apparatus to measure speed, frequency and wavelength.** **Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.** ▪ **AT 1 – use appropriate apparatus to make and record temperature accurately.** ▪ **AT 4 – make observations of the effects of the interaction of electromagnetic waves with matter.**	**In this topic I will:** ▪ **Describe the features of a wave in terms of wavelength, frequency, period and amplitude** ▪ **Distinguish between longitudinal and transverse waves and give examples** ▪ **Understand how waves can be used to carry information** ▪ **Use and apply the wave equation** ▪ **Describe reflection and refraction** ▪ **Describe the em spectrum in order and know about the uses and dangers of the different waves** ▪ **Compare emission and absorption of radiation from different surfaces** **Separates only** ▪ **Explain how we hear sounds and how the waves travel in different media** ▪ **Describe ultrasound and how it is used in medicine** ▪ **Describe seismic waves and how these can be used to determine the structure of the earth** ▪ **state why coloured objects appear to be the colour they are** ▪ **understand what a lens does and be able to draw ray diagrams for convex and concave lenses** ▪ **describe the image formed in terms of real, virtual, upright, inverted, magnified or diminished**	**Before I start this topic, I need to know:** **Observed waves** • waves on water as undulations which travel through water with transverse motion; • these waves can be reflected, and add or cancel – superposition. **Sound waves** • frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption • of sound • sound needs a medium to travel, the speed of sound in air, in water, in solids • sound produced by vibrations of objects, in loud speakers, detected by their effects on • microphone diaphragm and the ear drum; sound waves are longitudinal • auditory range of humans and animals. • Energy and waves • pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; • waves transferring information for conversion to electrical signals by microphone Light waves the similarities and differences between light waves and waves in matter • light waves travelling through a vacuum; speed of light • the transmission of light through materials: absorption, diffuse scattering and specular	**Knowledge and skills will be assessed by:** **The topics highlight in PURPLE will be assessed in the topic booklet. This will be looking at the quality of practical work and any methods/graphs or tables produced. They may also be reassessed in the end of topic tests where appropriate.** **The topics highlighted in BLUE will be assessed through questions during the end of topic assessment.**	**Year 12: Waves** ▪ **Progressive waves** ▪ **Wave speed** ▪ **Transverse and longitudinal** ▪ **Diffraction** ▪ **Refractive index** ▪ **Critical angle and TIR**

Reflection and preparation for examinations	*Summer HT5*					
Examination period	*Summer HT6*					