ABBEY COLLEGE

Aspire & Challenge

Year 11 Physics Curriculum Overview

Topic	Timing	Key knowledge and skills	Progression and links	SEND/ More able	Assessment & recording; factual recall checks
Forces	Autumn Term	Students should: • Draw a scale diagram to represent a single vector. • Categorise a wide range of quantities as either a vector or a scalar. • Compare a scalar and a similar vector and explain how these quantities are different. • Use scale diagrams to represent the sizes of forces acting on an object. • Describe the action of pairs of forces in a limited range of scenarios. • Investigate the effect of different lubricants on the size of frictional forces. • Draw a scaled diagram of the forces acting in a range of situations using arrows to represent the forces. • Calculate resultant force produced by several forces acting on an object in coplanar directions. • Describe the effect of zero and non-zero resultant forces on the motion of moving and stationary objects. • Describe the uses of a force multiplier lever. • Perform calculations involving moments, including rearrangement of the equation. • Design a system for recording data and associated calculations clearly. • Describe the action of levers being used as force multipliers. • describe the action of a pair of gears in terms of increasing or decreasing the size of forces. • Investigate the action of a set of two gears. • describe an experimental technique to determine the centre of mass of an object. • Explain why a suspended object comes to rest with the centre of mass directly below the point of suspension in terms of balanced forces. • Compare the stability of objects to the position of their centre of mass of an object, identifying the likely sources of error leading to inaccuracy. • Use calculation of moments to determine if a seesaw is in equilibrium.	Numeracy • Graphs • Rearranging equations Literacy • Use of tier three words • Extended writing opportunities	Challenge: • Higher level questions – explaining conservation of momentum • Calculating distance travelled from a speed-time graph. Scaffold: • Pre prepared axes for graphs • Knowledge organisers • Scaffold for extended writing	• 5 questions to start – recall activity every lesson. • Close the gap questions • Self and peer feedback on tasks completed • Structure strip • Past paper exam Qs. • Summative assessment at the end of the unit

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Forces	Autumn Term	• Apply the principle of moments to determine if an object is in equilibrium. • Establish the possible range of a weight using repeat values. • Find the resultant of two forces at an acute angle by drawing a scale diagram. • Describe a system in equilibrium in which non-parallel forces are acting. • Calculate the component of a force using scale diagrams and ratios. • Resolve a single force into two perpendicular components. • Determine if an object is in equilibrium by considering the horizontal and vertical forces. • Calculate the weight of objects using their mass and the gravitational field strength. • Apply the concept of balanced forces to explain why an object falling through a fluid will reach a terminal velocity. • Investigate the relationship between the mass of an object and the terminal velocity. • Apply the equation p = mv to find the momentum, velocity or mass of an object. • Describe how the principle of conservation of momentum can be used to find the velocities of objects. • Investigate the behaviour of objects during explosions to verify the conservation of momentum. • Apply the law of conservation of momentum to find the momentum before and after impacts. • Calculate the momentum of a combination of objects after an impact. • Evaluate data used to verify the law of conservation of momentum. • Describe collisions in terms of forces and conservation of momentum. • Calculate the force involved in an impact from the change in momentum and time. • Explain the limitations of Hooke's law including the limit of proportionally. • Calculate the force required to cause a given extension in a spring using the spring constant. • Compare the behaviour of different materials under loads in terms of proportional and non-proportional behaviour. • Describe the effect on the pressure of changing the area of contact or weight acting on a surface.			

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Forces	Autumn Term	• Calculate forces or areas of contact. • Use SI prefixes in expressions for pressure as appropriate. • Use the concept of force, mass, and volume to explain why the pressure increases with depth in a liquid. • Calculate the pressure at a point in a liquid using p = hρg. • Use the concept of pressure in a liquid to explain a range of structural design features. • Calculate the forces produced be pressure differences. • Describe the change in pressure at different heights. • Use the equation p = hρg to determine pressure in a fluid. • Describe the relationship between upthrust and weight for floating and submerged objects. • Compare the density of an object with the density of a liquid to determine whether or not the object will float. • Plan an investigation into the relationship between the average density of an object and the distance it submerges.			

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Magnetism and Electromagnetism	Spring Term	Students should: • Sketch the shape of a magnetic field around a bar magnet. • Describe how the shape of a magnetic field can be investigated. • Compare the Earth's magnetic field to that of a bar magnet. • Use the corkscrew rule to determine the direction of the field around a current carrying wire. • Describe the shape of the field produced by a solenoid. • Describe the structure of an electromagnet in simple terms. • Describe the operation of simple devices that use electromagnets. • Investigate the factors that affect the strength of an electromagnet. • Describe the operation of a moving-coil loudspeaker. • Apply Fleming's left-hand rule to determine the direction of the force acting on a conductor. • Calculate the force acting on a conductor when it is placed in a magnetic field. • Describe electromagnetic induction in a wire. • Identify the factors that affect the size of an induced current in a wire. • Identify the direction of current induced in a solenoid. • Describe the operation of an alternator and microphone in simple terms. • Describe the operation of a d.c. generator. • Identify the period and peak output voltage for generators from an oscilloscope trace. • Describe the structure of a transformer. • Describe the operation of a transformer in simple terms. • Explain why transformers only operate with alternating currents. • Use the transformer equation to calculate input or output voltages for a transformer. • Calculate the secondary current in a transformer. • Measure the efficiency of a transformer.	Numeracy • Transformer equations Literacy • Use of tier three words • Extended writing opportunities	Challenge: • Use of Fleming's left hand rule. • Higher level questions – Explaining how transformers work. • Explaining how an electric bell works. Scaffold: • Cloze passages • Knowledge organisers • Scaffold for extended writing	• 5 questions to start – recall activity every lesson. • Close the gap questions • Self and peer feedback on tasks completed • Structure strip • Past paper exam Qs. • Summative assessment at the end of the unit

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Space	Spring Term	Students should: • Describe the formation of a protostar and planets. • Explain why a star radiates light in terms of nuclear fusion. • Describe how evidence for the early solar system is gathered. • Compare the life cycle of small and large stars, identifying the names of the stages. • Describe the formation of 'light' elements by stars in their main sequence. • Describe the forces that are acting when a star is in its main sequence. • State that, for a greater radius of orbit, the object must travel at a slower speed and orbit in a longer period. • Describe the forces acting on an object that cause it to travel in a circular path. • Describe the different orbits of a variety of satellites. • Describe how the frequency or wavelength of a wave can be altered by the movement of the source through the Doppler effect. • Compare galaxies in terms of their red-shift and distance from us. • State that all galaxies are moving away from each other and that this shows the universe is expanding. • Discuss why scientists were initially reluctant to accept the Big Bang model. • Describe the origin of the cosmic microwave background radiation (CMBR). • Describe changes in the universe from the time of the Big Bang to the present day.	Literacy • Use of tier three words • Extended writing opportunities	Challenge: • Explaining centripetal force. • Higher level questions – Future of the universe. • Explaining how red shift provides evidence of an expanding universe. Scaffold: • Cloze passages • Knowledge organisers • Scaffold for extended writing	• 5 questions to start – recall activity every lesson. • Close the gap questions • Self and peer feedback on tasks completed • Structure strip • Past paper exam Qs. • Summative assessment at the end of the unit