Physics Year 11	**Working towards expected outcomes** Your child is not yet making the expected progress within this course.	**Working at expected outcomes** Your child is achieving the expected progress for this point within the course.	**Working beyond expected outcomes** Your child is exceeding the expected progress.
Autumn Term Forces and their interactions	Students working **towards** expected outcomes in Y11 can: • Describe forces acting on objects and use force diagrams to show how they interact. • Use basic free-body diagrams to describe situations where forces are balanced or result in movement. • Apply key equations for weight (W = mg), work done (W = Fs), and moment (M = Fd) when values are given. • Identify that work done can lead to energy transfer, such as a rise in temperature due to friction. • Give examples of stretching, bending, and compression, and recognise that more than one force is needed to change an object's shape. • Know the difference between elastic and inelastic deformation and identify when a spring has gone past its limit of proportionality.	Students working **at** expected in Y11 can: • Accurately describe interactions between objects, showing that forces act in pairs and can be represented as vectors. • Use and interpret free-body diagrams to explain how forces combine to produce a resultant force, including balanced and unbalanced systems. • Apply equations like W = mg, W = Fs and M = Fd with converted values. • Explain that work done against friction increases temperature and describe how this energy transfer links to conservation of energy. • Describe how levers and gears help transmit the turning effect of forces. • Apply the spring equation (F = ke), interpret graphs and data and identify when relationships become non-linear.	Students working **beyond** expected in Y11 can: **In addition to all the skills listed under 'Working At' for this topic, students working beyond expected outcomes can:** • Use vector diagrams to calculate resultant forces and resolve components. • Solve multi-step problems using equations, including unit conversions and rearranging. • Evaluate the outcomes of the required practical and explain potential sources of error or uncertainty in force-extension data. • Interpret complex force-extension graphs and explain elastic behaviour. • Analyse floating and sinking in terms of density, pressure difference, and upthrust, including unfamiliar or quantitative contexts. • Use scale vector diagrams to solve force equilibrium problems and determine unknown forces or directions. • Justify how mechanical systems (e.g. gears, levers, hydraulics) improve

	• Apply the spring equation (F = ke) and describe a linear force–extension relationship. • Use results from the required practical to identify patterns between force and extension in a spring. • Use the equation for pressure on surfaces (P = F/A) and describe everyday examples of pressure. • Understand that pressure in fluids increases with depth and explain simple floating/sinking examples. • Recognise that atmospheric pressure decreases with height and describe how this affects objects at different altitudes.	• Use the required practical to calculate spring constant, interpret force-extension graphs and apply the formula for elastic potential energy ($E = 0.5 \times k \times e^2$). • Apply equations for pressure on surfaces and pressure in liquids (p = hρg) and use them to calculate pressure differences. • Describe how upthrust acts on submerged objects and how pressure differences result in floating or sinking. • Explain how atmospheric pressure changes with height, using models of the atmosphere and reasoning based on air particle density.	efficiency using principles of pressure and moments. • Evaluate how pressure models explain real-world situations like high-altitude breathing

Spring Term Magnetism and Electromagnetism	• Identify magnetic materials and describe attraction and repulsion between poles. • Use a compass to plot magnetic field patterns and draw simple field diagrams around magnets. • Recognise that electric currents create magnetic fields and describe their shape for wires and coils. • Understand that the Earth has a magnetic field and explain compass behaviour. • Describe how electromagnets are made stronger using coils and iron cores. • Use the equation F = BIL with provided values and identify directions using the left-hand rule. • Describe how moving a wire in a magnetic field can induce a potential difference. • Know that alternators produce alternating current and dynamos produce direct current. • Use simple transformer equations to link turns and potential difference.	• Draw accurate magnetic field diagrams around magnets, wires, and solenoids. • Explain how electromagnets work and how to vary their strength, including interpreting device diagrams. • Apply the left-hand rule and use the equation F = BIL to calculate magnetic forces. • Explain how electric motors work, including how magnetic forces cause rotation. • Describe and explain the function of loudspeakers, headphones and microphones. • Interpret potential difference–time graphs and explain how generators produce electricity. • Describe the operation of alternators and dynamos and compare their outputs. • Explain how transformers change potential difference and current using magnetic fields and apply related equations. • Describe how high potential differences help reduce energy losses during electricity transmission.	**In addition to all the skills listed under 'Working At' for this topic, students working beyond expected outcomes can:** • Apply their understanding to unfamiliar contexts, including field direction and force calculations. • Interpret complex diagrams of motors, loudspeakers, and transformers. • Use and rearrange equations fluently, including F = BIL and transformer equations, with correct units and conversions. • Analyse how changes in device design affect performance and efficiency, including real-world examples. • Evaluate how physics reduces energy loss in power transmission.

Summer 1 Space	• Describe how stars form from gas and dust pulled together by gravity. • Understand that fusion reactions inside stars release energy that balances the pull of gravity. • List the main stages in a star's life and understand that stars can end in different ways depending on their size. • Describe differences between planets, moons, and artificial satellites, and recognise that gravity keeps them in orbit. • Know that in circular orbits, speed stays the same but direction changes, and gravity causes this. • Understand that light from distant galaxies is stretched (red-shifted), showing that they are moving away. • Recognise that red-shift provides evidence for the Big Bang theory and suggests the universe is expanding.	• Explain how gravity causes stars to begin fusion and how fusion keeps a star stable during its life. • Describe how fusion creates new elements inside stars, especially during their later stages. • Explain the life cycle of stars, and how this differs for smaller vs larger stars. • Compare the orbits and purposes of planets, moons and satellites, and explain how gravity controls their motion. • Explain that in circular orbits, speed changes affect the size of the orbit. • Describe how red-shift supports the idea that galaxies are moving apart and the universe is expanding. • Explain how scientists use observations to develop theories like the Big Bang, while also recognising that parts of the universe are still not understood, like dark matter and dark energy.	**In addition to all the skills listed under 'Working At' for this topic, students working beyond expected outcomes can:** • Apply knowledge of fusion to explain how new elements form inside stars, including during their final stages. • Analyse how orbit radius and speed are linked, using gravitational reasoning. • Interpret red-shift data and use it to explain why the Big Bang theory is strongly supported, while also understanding its limitations. • Discuss how new discoveries (like dark energy) lead to changes in scientific understanding. • Evaluate the roles of different satellites and explain what makes an orbit stable or unstable.