Year	Lesson title	Lesson objectives
Year 10	Atomic structure	● Describe the structure of the atom. ● Use symbols to represent particles. ● Describe ionisation. ●
	Developing ideas for the structure of the atom	● Understand how ideas about the structure of the atom have changed. ● Understand how evidence is used to test and improve models.
Year 10	Radioactive decay	● Describe radioactive decay. ● Describe the types of nuclear radiation. ●
	Nuclear equations	● Understand the processes of alpha decay and beta decay. ● Understand nuclear equations. ● Write balanced nuclear equations for alpha decay. ● Write balanced nuclear equations for beta decay.
Year 10	Background radiation	● Describe how different types of radiation have different ionising power. ● Recall the different penetrating powers of alpha, beta and gamma radiation.
Year 10	Radioactive half-life	● Explain what is meant by radioactive half-life. ● Calculate half-life. ● Graph drawing / interpretation ● Calculate radioactive half-life from a curve of best fit. ● Calculate the net decline in radioactivity.
Year	**Nuclear fission (separates)**	● *Describe nuclear fission.* ● *Explain how a chain reaction occurs.* ● *Explain how fission is used.*
Year	**Nuclear fusion (separates)**	● *Explain nuclear fusion.* ● *Describe the conditions needed for fusion.* ● *Describe how nuclear fusion may be an attractive energy source.*
Year 10	Hazards and uses of radiation Irradiation	● Describe radioactive contamination. ● Explain what is meant by irradiation. ● Understand the distinction between contamination and irradiation. ● Appreciate the importance of communication between scientists.
	Uses of radiation	***Separates:*** ● ***Describe some uses of nuclear radiation for medical diagnosis and therapy.*** ● ***Explore the risks and benefits of using nuclear radiation.*** ● ***Describe how internal organs can be explored.*** ● ***Understand how nuclear radiation can control or destroy unwanted tissue.***
10	Scalars and vector quantities (and units and prefixes)	● What is the difference between a quantity and a unit? ● State examples of scalar and vector quantities.

		● What are metric prefixes and why do we use them?
10	Speed	● Calculate speed using distance travelled divided by time taken. ● Calculate speed from a distance–time graph. ● Measure the gradient of a distance–time graph at any point.
10	Acceleration	● Describe acceleration. ● Calculate acceleration. ● Explain motion in a circle.
10	Velocity–time graphs	● Draw velocity–time graphs. ● Calculate acceleration using a velocity–time graph. ● Calculate displacement using a velocity–time graph.
10	Calculations of motion	● Describe uniform motion. ● Use an equation for uniform motion. ● Apply this equation to vertical motion.
10	Heavy or massive? Forces introduction	● Identify the correct units for mass and weight. ● Explain the difference between mass and weight. ● Understand how weight is an effect of gravitational fields. ● Describe a force. ● Understand what a force does.
10	Balanced forces	● Explain what happens to an object if all the forces acting on it cancel each other out. ● Analyse how this applies to everyday situations. ● Recognise the difference between contact and non-contact forces.
10	Resultant forces	● Calculate the resultant from opposing forces. ● Draw free-body diagrams to find resultant forces. ● Understand that a force can be resolved into two components acting at right angles to each other.
10	Forces and acceleration Terminal velocity	● Explain what happens to the motion of an object when the resultant force is not zero. ● Analyse situations in which a non-zero resultant force is acting. ● Explain what inertia is.
10	Work done and energy transfer	● Understand what is meant by work done. ● Explain the relationship between work done and force applied. ● Identify the transfers between energy stores when work is done against friction.
10	Resolving forces	● Understand that a force can be resolved into two components acting at right angles to each other.
10	Required practical: Investigating the acceleration of an object	● Plan an investigation to explore an idea. ● Analyse results to identify patterns and draw conclusions. ● Compare results with scientific theory.
10	Newton’s third law	● Identify force pairs. ● Understand and be able to apply Newton’s third law. ● What is the difference between a pair of balanced forces and a N3 pair of forces?
10	Momentum	● Explain what is meant by momentum. ● Use momentum calculations to predict what happens in a collision.
10	Keeping safe on the road	● Explain the factors that affect stopping distance.

		● Explain the dangers caused by large deceleration. ● Estimate the forces involved in the deceleration of a road vehicle. ● Apply ideas about rate of change of momentum to safety features in cars.
10	Moments	● Describe the turning effect of a force about a pivot. ● Explain and use the principle of moments. ● Explain what is meant by the centre of mass of an object.
10	Levers and gears	● Describe how levers and gears can be used to transmit the rotational effect of a force. ● Explain how levers and gears transmit forces.
10	Extra maths lesson for practice on moments, levers and gears	
10	Pressure in a fluid	● Explain how pressure acts in a fluid. ● Calculate pressure at different depths in a liquid. ● Explain what causes upthrust.
10	Increasing the pressure of a gas	● Describe the relationship between the pressure and volume of a gas at constant temperature. ● Calculate the change in the pressure or volume of a gas held at constant temperature when either the pressure or volume is increased or decreased. ● Explain how doing work on a gas can increase its temperature.
10	Atmospheric pressure	● Show that the atmosphere exerts a high pressure. ● Explain variations in atmospheric pressure with height. ● Describe a simple model of the Earth's atmosphere and atmospheric pressure.
10	Forces and energy in springs	● Explain why you need two forces to stretch a spring. ● Describe the difference between elastic and inelastic deformation. ● Calculate extension, compression and elastic potential energy.
10	Required practical: Investigate the relationship between force and the extension of a spring	● Interpret readings to show patterns and trends. ● Interpret graphs to form conclusions. ● Apply the equation for a straight line to the graph.
10	Key concept: Forces and acceleration	● Recognise examples of balanced and unbalanced forces. ● Apply ideas about speed and acceleration to explain sensations of movement. ● Apply ideas about inertia and circular motion to explain braking and cornering.
10	Making estimates of calculations	● Estimate the results of simple calculations. ● Round numbers to make an estimate. ● Calculate order of magnitude.
10	Describing waves	● Describe wave motion. ● Define wavelength and frequency. ● Apply the relationship between wavelength, frequency and wave velocity.
10	Transverse and longitudinal waves	● Compare the motion of transverse and longitudinal waves. ● Explain why water waves are transverse waves. ● Explain why sound waves are longitudinal waves.
10	Key concept: Transferring energy or information by waves	● To understand that all waves have common properties ● To understand how waves can be used to carry information ● To understand various applications of energy transfer by different types of electromagnetic waves
10	Measuring wave speeds	● Explain how the speed of sound in air can be measured. ● Explain how the speed of water ripples can be measured.

		● Describe the use of echo sounding.
10	Required practical: Measuring the wavelength, frequency and speed of waves in a ripple tank and waves in a solid	● Develop techniques for making observations of waves. ● Select suitable apparatus to measure frequency and wavelength. ● Use data to answer questions.
10	Reflection and refraction of waves	● Describe reflection, transmission and absorption of waves. ● Construct ray diagrams to illustrate reflection. ● Construct ray diagrams to illustrate refraction.
10	Required practical: Investigate the reflection of light by different types of surface and the refraction of light by different substances	● Make and record observations of how light is reflected and transmitted at different surfaces. ● Measure angles and discuss the method, apparatus and uncertainty in measurements. ● Draw conclusions from experimental results.
10	Sound waves	● Describe how we hear sound and state the range of frequencies we can hear. ● Explain that sound travels faster in a denser medium. ● Explain about reflection, absorption and transmission of sound.
10	Exploring ultrasound	● Explain what ultrasound is. ● Describe how ultrasound is used in industry to investigate or detect hidden or buried objects. ● Explain how ultrasound is used in medicine.
10	Seismic waves	● Describe how earthquakes are detected. ● Describe the properties of P waves and S waves. ● Explain how the properties of seismic waves allow us to investigate the inside of the Earth.