Year 10	Week	Lesson Title	Lesson Objectives
	1 + 2	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.
	1 + 2	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.
	3 + 4	Background radiation	● Describe how different types of radiation have different ionising power. ● Recall the different penetrating powers of alpha, beta and gamma radiation.
	3 + 4	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.
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	5 + 6	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.
	7 + 8	Scalars and vectors, quantities and units (including 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?
	7 + 8	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.
	9 + 10	Acceleration	● Describe acceleration. ● Calculate acceleration.
	9 + 10	Velocity–time graphs	● Draw velocity–time graphs. ● Calculate acceleration using a velocity–time graph.

			● Calculate displacement using a velocity–time graph.
	11 + 12	Calculations of motion	● Describe uniform motion. ● Use an equation for uniform motion. ● Apply this equation to vertical motion.
	13 + 14	Forces	● Describe a force. ● Recognise the difference between contact and non-contact forces. ● Understand what a force does.
	13 + 14	Forces and motion	● Explain what happens to an object if all the forces acting on it cancel each other out. ● Analyse how this applies to everyday situations. ● Calculate the resultant from opposing forces. ● Draw free-body diagrams to find resultant forces.
	15 + 16	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.
	15 + 16	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.
	15 + 16	Resolving forces	● Understand that a force can be resolved into two components acting at right angles to each other.
	17 + 18	Required practical part 1: 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.
	17 + 18	Required practical part 2: 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.
	19 + 20	Newton's third law	● Identify force pairs. ● Understand and be able to apply Newton's third law.
	19 + 20	Momentum	● Explain what is meant by momentum.
	19 + 20	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.
	21 + 22	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.

			● Hook's law experiment
	21 + 22	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.
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	25 + 26	Describing waves	● Describe wave motion. ● Define wavelength and frequency. ● Apply the relationship between wavelength, frequency and wave velocity.
	25 + 26	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.
	25 + 26	Measuring wave speeds	● Explain how the speed of sound in air can be measured. ● Explain how the speed of water ripples can be measured.
	27 + 28	Required practical part 1: 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.
	27 + 28	Required practical part 2: 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.
	27 + 28	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.
	29 + 30	The electromagnetic spectrum	● Recall the similarities and differences between transverse and longitudinal waves. ● Recognise that electromagnetic waves are transverse waves. ● Describe the main groupings and wavelength ranges of the electromagnetic spectrum.
	31 + 32	Reflection and refraction of waves	● Describe reflection, transmission and absorption of waves. ● Construct ray diagrams to illustrate refraction. ● Explain reflection and refraction and how these may vary with wavelength.

		Reflection, refraction and wave fronts	● Construct ray diagrams to illustrate refraction. ● Use wave front diagrams to explain refraction in terms of the difference in velocity of the waves in different substances.
	31 + 32	Gamma rays and X-rays Ultraviolet and infrared radiation	● List the properties of gamma rays and X-rays. ● Compare gamma rays and X-rays. ● Describe the properties of ultraviolet and infrared radiation. ● Describe some uses and hazards of ultraviolet radiation. ● Describe some uses of infrared radiation.
	33 + 34	Radio and microwave communication	● List some properties of microwaves. ● Describe how microwaves are used for communications. ● Describe how radio waves are used for television and radio communications. ● Describe how microwaves are used in satellite communications. ● Describe the reflection and refraction of radio waves.
	33 + 34	Required practical: Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface	● Explain reasons for the equipment used to carry out an investigation. ● Explain the rationale for carrying out an investigation. ● Apply ideas from an investigation to a range of practical contexts.
	33 + 34	Required practical: Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface	● Explain reasons for the equipment used to carry out an investigation. ● Explain the rationale for carrying out an investigation. ● Apply ideas from an investigation to a range of practical contexts.
Year 11			
	1 + 2	Magnetism and magnetic forces	● Explain what is meant by the poles of a magnet. ● Plot the magnetic field around a bar magnet. ● Describe magnetic materials and induced magnetism.
	1 + 2	Compasses and magnetic fields	● Describe the Earth's magnetic field. ● Describe the magnetic effect of a current.
	1 + 2	The magnetic effect of a solenoid	● Draw the magnetic field around a conducting wire and a solenoid. ● Describe the force on a wire in a magnetic field. ● Apply the left-hand rule to work out the direction of a magnetic field, a current or a force around a wire, ● Explore how electricity and magnetism are connected.
	3 + 4	Calculating the force on a conductor	● Explain the meaning of magnetic flux density, *B*. ● Know the factors that make a more powerful motor. ● Calculate the force on a current-carrying conductor in a magnetic field.
	3 + 4	Electric motors	● List equipment that uses motors. ● Describe how motors work. ● Describe how to change the speed and direction of rotation of a motor. ● Describe the principle of the electric motor.
Revision			

	5 + 6	Energy Stores and systems	● Describe changes in the way energy is stored when a system changes
	5 + 6	Calculating Energy changes	● Calculate the energy changes involved when a system changes ● GPE, KE and Elastic potential
	7 + 8	Specific heat capacity and Internal energy	● Describe what is meant by internal energy ● Use specific heat capacity in calculations
	7 + 8	Refresh required practical for specific heat capacity	● Describe how to investigate the specific heat capacity of materials
	7 + 8	Reducing energy transfers	● Describe how thermal conductivity affects rate of cooling ● Describe how to reduce unwanted energy transfers (lubrication)
	9 +10	Renewable and Non renewable resources	● Distinguish between renewable and non-renewable energy resources ● Evaluate the uses of renewable and non-renewable energy resources
	9 + 10	Intro to electricity	● Draw and interpret circuit diagrams ● Calculate charge flowing through a circuit
	11 + 12	Resistance	● Calculate resistance through a circuit ● Explain how to investigate factors that affect resistance (required practical)
	11 + 12	IV characteristics	● Interpret IV graphs ● Describe the shape of IV graphs for various components
	13 + 14	Series and Parallel	● Explain the rules for series and parallel (resistance, current, voltage)
	13 + 14	Power	● Explain what is meant by power ● Apply the power equations
	15 + 16	Structure of the atom and Isotopes	● Recall the size of an atom ● Describe the structure of an atom ● Explain what an isotope is
	15 + 16	Models of atoms	● Describe the plum pudding model ● Describe the evidence that led to the nuclear model
	17 +18	Types of radiation	● Describe what the three types of radiation are ● Explain the difference between contamination and radiation
	17 + 18	Half life	● Work out the half-life of a radioactive isotope given information
	19 + 20	Decay equations	● Use balanced nuclear equations to show radioactive decay
	19 + 20	States of matter	● Describe the properties of the different states of matter ● Explain what is meant by internal energy and how that links to temperature and change of state
	19 + 20	Density	● Describe how to investigate the density of objects (required practical)
	21 + 22	Specific latent heat	● Calculate specific latent heat ● Relate S.L.H and S.H.C to a heat curve ● Use multi-step equations
	21 + 22	Pressure in gas	● Use the particles model to explain in gases
	23 + 24	Intro to forces	● Describe the difference between scalars and vectors ● Describe the difference between contact and non-contact ● Describe the difference between gravity and mass
	25 + 26	Resultant forces	● Calculate resultant forces ● Use vector diagram (HT)
	25 + 26	Forces and elasticity	● Explain the shape of a force extension graph ● Describe how to practically gain data to plot an extension and force graph