Lesson number	Lesson title	Lesson objectives
	P1 Energy	
1.1	Potential energy	• Consider what happens when a spring is stretched. • Describe what is meant by gravitational potential energy. • Calculate the energy stored by an object raised above ground level.
1.2	Investigating kinetic energy	• Describe how the kinetic energy store of an object changes as its speed changes • Calculate kinetic energy. • Consider how energy is transferred.
1.3	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.
1.4	Understanding power	• Define power. • Compare the rate of energy transfer by various machines and electrical appliances. • Calculate power.
1.5	Specific heat capacity	• Understand how things heat up. • Find out about heating water. • Find out about specific heat capacity.
1.6	Required practical: Investigating specific heat capacity	• Use theories to develop a hypothesis. • Evaluate a method and suggest improvements. • Perform calculations to support conclusions.
1.7	Dissipation of energy	• Explain ways of reducing unwanted energy transfer. • Describe what affects the rate of cooling of a building. • Understand that energy is dissipated.
1.8	Energy efficiency	• Explain what is meant by energy efficiency. • Calculate the efficiency of energy transfers. • Find out about conservation of energy.
1.9	Using energy resources	• Describe the main energy sources available for use on Earth. • Distinguish between renewable and non-renewable resources. • Explain the ways in which the energy resources are used.
1.10	Global energy supplies	• Analyse global trends in energy use. • Understand what the issues are when using energy resources.
1.11	Key Concept: Energy transfer	• Understand why energy is a key concept in science. • Use ideas about energy stores and transfers to explain what happens when a system is changed. • Understand why accounting for energy transfers is a useful idea.
1.12	Maths skills: Calculations using significant figures	• Substitute numerical values into equations and use appropriate units. • Change the subject of an equation. • Give an answer using an appropriate number of significant figures.
1.13	Maths skills: Handling data	• Recognise the difference between mean, mode and median. • Explain the use of tables and frequency tables. • Explain when to use scatter diagrams, bar charts and histograms.

Lesson number	Lesson title	Lesson objectives
	P2 Electricity	
2.1	Electric current	• Know circuit symbols. • Recall that current is a rate of flow of electric charge. • Recall that current (I) depends on resistance (R) and potential difference (V) • Explain how an electric current passes round a circuit.
2.2	Series and parallel circuits	• Recognise series and parallel circuits. • Describe the changes in the current in series and parallel circuits. • Describe the changes in the potential difference in series and parallel circuits.
2.3	Investigating circuits	• Use series circuits to test components and make measurements. • Carry out calculations on series circuits.
2.4	Circuit components	• Set up a circuit to investigate resistance. • Investigate the changing resistance of a filament lamp. • Compare the properties of a resistor and a filament lamp.
2.5	Required practical: Investigate, using circuit diagrams to construct circuits, the *I*-*V* characteristics of a filament lamp, a diode and a resistor at constant temperature	• Understand how an experiment can be designed to test an idea. • Evaluate how an experimental procedure can yield more accurate data. • Interpret and explain graphs using scientific ideas.
2.6	Required practical: Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits.	• Use a circuit to determine resistance. • Gather valid data to use in calculations. • Apply the circuit to determine the resistance of combinations of components. including the length of a wire at a constant temperature and combinations of resistors in series and parallel
2.7	Control circuits	• Use a thermistor and a light-dependent resistor (LDR). • Investigate the properties of thermistors, LDRs and diodes.
2.8	Electricity in the home	• Recall that the domestic supply in the UK is 230 V ac and 50 Hz. • Describe the main features of live, neutral and earth wires.
2.9	Transmitting electricity	• Describe how electricity is transmitted using the National Grid. • Explain why electrical power is transmitted at high potential differences. • Understand the role of transformers.
2.10	Power and energy transfers	• Describe the energy transfers in different domestic appliances. • Describe power as a rate of energy transfer. • Calculate the energy transferred.
2.11	Calculating power	• Calculate power. • Use power equations to solve problems. • Consider power ratings and changes in stored energy.
2.12	Key concept: What's the difference between potential difference and current?	• Understand the concepts of current and potential difference. • Apply the concepts of current and potential difference. • Use these concepts to explain various situations.
2.13	Maths skills: Using formulae and understanding graphs	• Recognise how algebraic equations define the relationships between variables. • Solve simple algebraic equations by substituting numerical values. • Describe relationships expressed in graphical form.

Lesson number	Lesson title	Lesson objectives
		P3 Particle model of matter
3.1	Density	• Use the particle model to explain the different states of matter. • Describe differences in density for different states of matter. • Calculate density for the different states of matter.
3.2	Required practical: To investigate the densities of regular and irregular solid objects and liquids	• Interpret observations and data. • Use spatial models to solve problems. • Plan experiments and devise procedures. • Use an appropriate number of significant figures in measurements and calculations.
3.3	Changes of state	• Describe how, when substances change state, mass is conserved. • Describe energy transfer in changes of state. • Explain changes of state in terms of particles.
3.4	Internal energy	• Describe the particle model of matter. • Understand what is meant by the internal energy of a system. • Describe the effect of heating on the energy stored within a system.
3.5	Specific heat capacity	• Describe the effect of increasing the temperature of a system in terms of particles. • State the factors that are affected by an increase in temperature of a substance. • Explain specific heat capacity.
3.6	Latent heat	• Explain what is meant by latent heat. • Describe that when a change of state occurs it changes the energy stored but not the temperature. • Perform calculations involving specific latent heat.
3.7	Particle motion in gases	• Relate the temperature of a gas to the average kinetic energy of the particles. • Explain how a gas has a pressure. • Explain that changing the temperature of a gas held at constant volume changes its pressure.
3.8	Key concept: Particle model and changes of state	• Use the particle model to explain states of matter. • Use ideas about energy and bonds to explain changes of state. • Explain the relationship between temperature and energy.
3.9	Maths skills: Drawing and interpreting graphs	• Plot a graph of temperature against time, choosing a suitable scale. • Draw a line or curve of best fit. • Interpret a graph of temperature against time.

Lesson number	Lesson title	Lesson objectives
	P4 Atomic Structure	
4.1	Atomic Structure	• Describe the structure of the atom. • Use symbols to represent particles. • Describe ionisation.
4.2	Radioactive decay	• Describe radioactive decay. • Describe the types of nuclear radiation. • Understand the processes of alpha decay and beta decay.
4.3	Properties of radiation and its hazards	• Describe radioactive contamination. • Give examples of how radioactive tracers can be used. • Explain how contaminated waste is disposed of.
4.4	Nuclear equations	• Understand nuclear equations. • Write balanced nuclear equations for alpha decay. • Write balanced nuclear equations for beta decay.
4.5	Radioactive half-life	• Explain what is meant by radioactive half-life. • Calculate half-life. • Choose the best radioisotope for a task.
4.6	Irradiation	• Explain what is meant by irradiation. • Understand the distinction between contamination and irradiation. • Appreciate the importance of communication between scientists.
4.7	Key concept: 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.
4.8	Maths skills: Using ratios and proportional reasoning	• Calculate radioactive half-life from a curve of best fit. • Calculate the net decline in radioactivity.