| **This 3-Year Scheme of Work offers a flexible approach for KS4. The suggested timings are based on three science lessons per fortnight (assuming a two week timetable of two lessons one week and one in the other) but can be tailored to suit the needs of a particular class or group of students. Lessons are assumed to be sessions of 40-60 minutes. The teaching scheme is scheduled to finish at end of Year 10 to allow time for revision and GCSE examinations.**  **Please note that there is sometimes allowance for more than one session for a lesson where this may be helpful so on occasion there are fewer than three lessons in a fortnight. The maths skills spreads are numbered as the last spread in a chapter but can be used at any appropriate point according to the needs of your students.** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Term** | **Week** | **Student Book spread number** | **Lesson title** | **Learning objectives** | **OCR specification reference** | **Lesson resources (on CD ROM)** | **Collins Connect resources** |
| **Chapter 1: Matter (12 lessons)** | | | | | | | | |
| 9 | 1 | 1/2 | 1.1 | Key concept: Developing ideas for the structure of the atom | * Understand how ideas about the structure of the atom have changed. * How evidence is used to test and improve models. | P1.1a, b, c | Worksheets 1.1.1, 1.1.2, 1.1.3 and 1.1.4 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 1 | 1/2 | 1.2 | Density | * Use the particle model to explain the different states of matter and differences in density. * Calculate density. | P1.1d, f | Worksheet 1.2; Practical sheet 1.2; Technician’s notes 1.2 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 1 | 1/2 | 1.3 | 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. | P1.1e | Worksheet 1.3; Practical sheet 1.3; Technician’s notes 1.3 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 1 | 3/4 | 1.4 | 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. | Prac P1, M1a, b, c, M5c | Worksheet 1.4; Practical sheet 1.4; Technician’s notes 1.4 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 1 | 3/4 | 1.5 | 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. | P1.2a, b | Worksheet 1.5; Practical sheet 1.5; Technician’s notes 1.5 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 1 | 5/6 | 1.6 | 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. | P1.2c | Worksheet 1.6; Practical sheets 1.6.1, 1.6.2, 1.6.3, 1.6.4, 1.6.5 and 1.6.6; Technician’s notes 1.6 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 1 | 5/6 | 1.7 | 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. | P1.2d (part), e | Worksheet 1.7; Practical sheet 1.7; Technician’s notes 1.7 | Quick starter  Homework worksheet  Homework quiz  Slideshow  Video |
| 9 | 1 | 5/6 | 1.8 | Specific 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. | P1.2d (part), f | Worksheet 1.8; Practical sheet 1.8; Technician’s notes 1.8 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 1 | 7/8 | 1.9 | Maths skills: Drawing and interpreting graphs | * Plot a graph of temperature against time, choosing a suitable scale. * Draw a line of best fit (which may be a curve). * Interpret a graph of temperature against time. * Comment on the specific heat capacity and specific latent heat of a substance. | PM1.2 I, ii, M2g, M4a, c | Worksheet 1.9, Practical sheet 1.9, Technician’s notes 1.9 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 1 | 7/8 | 1.10 | Practical: Investigating specific heat capacity | * Use theories to develop a hypothesis. * Evaluate a method and suggest improvements. * Perform calculations to support conclusions. | Prac P5, M1c, M3b, c, d | Worksheet 1.10; Practical sheet 1.10; Technician’s notes 1.10 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 1 | 9/10 | 1.11 | 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. | P1.2g, h | Worksheet 1.11; Practical sheet 1.11; Technician’s notes 1.11 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 1 | 9/10 | 1.12 | 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. | M2b, c, f | Worksheets 1.12.1, 1.12.2 and 1.16.3; Practical sheet 1.12; Technician’s notes 1.12 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 1 | 9/10 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect | | | |
| **Chapter 2: Forces (20 lessons)** | | | | | | | | |
| 9 | 1 | 11/12 | 2.1 | Scalars and vectors | * Define distance, displacement, speed, velocity and acceleration. * Recognise the difference between scalar and vector quantities. * State examples of scalar and vector quantities. | P2.1d | Worksheets 2.1.1, 2.1.2 and 2.1.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 1 | 11/12 | 2.2 | Speed | * Calculate speed using distance travelled divided by time taken. * Calculate speed from a distance–time graph. * Recall that distance = speed × time * Measure the gradient of a distance–time graph at any point. | P2.1a, b, c, e (part), g, M1c, M4a, d, e | Worksheets 2.2.1, 2.2.2 and 2.2.3; Practical sheet 2.2; Technician’s notes 2.2 | Quick starter  Homework worksheet  Homework quiz  Slideshow  Video |
| 9 | 1 | 11/12 | 2.3 | Acceleration | * Describe acceleration. * Calculate acceleration. | P2.1h (part) | Worksheets 2.3.1, 2.3.2 and 2.3.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 1/2 | 2.4 | Calculations of motion | * Describe motion with uniform acceleration. * Use an equation for motion with uniform acceleration. * Apply this equation to vertical motion. | P2.1h (part) | Worksheet 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5 and 2.4.6 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 1/2 | 2.5 | Velocity–time graphs **(HT)** | * Draw velocity–time graphs. * Calculate acceleration using a velocity–time graph. * Calculate displacement using a velocity–time graph. **(HT)** | P2.1e (part), f, M4a, c, d, f | Worksheets 2.5.1, 2.5.2 and 2.5.3; Practical sheet 2.5; Technician’s notes 2.5 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 2 | 1/2 | 2.6 | Maths skills: Making estimates of calculations | * Estimate the results of simple calculations. * Round numbers to make an estimate. * Calculate order of magnitude. | PM2.1i to iv, M1c, d, h, M3a, c, d | Worksheets 2.6.1, 2.6.2 and 2.6.3 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 2 | 3/4 | 2.7 | Forces explain how objects interact **(HT)** | * Describe a force. * Recognise the difference between contact and non-contact forces. * State examples of scalar and vector quantities. | P2.2a, b, c, f | Worksheets 2.7.1, 2.7.2 and 2.7.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 3/4 | 2.8 | Forces and motion **(HT)** | * Understand what a force does. * Explain what happens to an object if all the forces acting on it cancel each other out. * Analyse how this applies to everyday situations. | P2.2d, e (part), h (part), q | Worksheets 2.8.1, 2.8.2 and 2.8.3; Practical sheet 2.8; Technician’s notes 2.8 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 3/4 | 2.9 | Resultant forces **(HT)** | * Calculate the resultant of a number of 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. **(HT)** | P2.2e (part), g, h (part), M5a, b | Worksheets 2.9.1, 2.9.2 and 2.9.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 5/6 | 2.10 | Forces and acceleration **(HT)** | * 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. **(HT)** | P2.2i, j | Practical sheets 2.10.1, 2.10.2 and 2.10.3; Technician’s notes 2.10 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 5/6 | 2.11 | Momentum **(HT only)** | * Explain what is meant by momentum. * Apply ideas about rate of change of momentum to safety features in cars. * Use momentum calculations to predict what happens in a collision. | P2.2k | Worksheets 2.11.1, 2.11.2 and 2.11.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 5/6 | 2.12 | Practical: Investigating the acceleration of an object | * Plan an investigation to explore an idea. * Analysing results to identify patterns and draw conclusions. * Compare results with scientific theory. | P2.2i, Prac P3, M1c, M2g, M4a, c, d | Practical sheet 2.12; Technician’s notes 2.12 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 7/8 | 2.13 | Newton’s third law | * Identify force pairs. * Understand and be able to apply Newton’s third law. | P2.2o | Worksheets 2.13.1, 2.13.2 and 2.13.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 7/8 | 2.14 | 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. | P2.2l, m | Worksheets 2.14.1, 2.14.2, 2.14.3; Practical sheets 2.14.1 and 2.14.2; Technician’s notes 2.14 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 2 | 7/8 | 2.15 | Understanding power | * Define power. * Compare the rate of energy transfer by various machines and electrical appliances. * Calculate power. | P2.2n | Worksheet 2.15; Practical sheets 2.15.1 and 2.15.2; Technician’s notes 2.15.1 and 2.15.2 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 9/10 | 2.16 | 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. | Key concept | Worksheets 2.16.1, 2.16.2 and 2.16.3; Practical sheet 2.16; Technician’s notes 2.16 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 9 | 2 | 9/10 | 2.17 | 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. | P2.3a, b | Worksheets 2.17.1 and 2.17.2; Practical sheet 2.17; Technician’s notes 2.17 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 2 | 9/10 | 2.18 | 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. | P2.3c, d, e, Prac P2, M2b, f, M4a, b, c, d | Practical sheet 2.18, Required practical 2.18, Technician’s notes 2.18 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 11/12 | 2.19 | 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. | P2.3f | Worksheets 2.19.1, 2.19.2 and 2.19.3; Practical sheet 2.19; Technician’s notes 2.19 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 11/12 | 2.20 | Heavy or massive? | * Identify the correct units for mass and weight. * Explain the difference between mass and weight. * Understand how weight is an effect of gravitational fields. | P2.3g, h, i | Worksheets 2.20.1, 2.20.2 and 2.20.3; Practical sheet 2.20; Technician’s notes 2.20 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 2 | 11/12 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect  End of teaching block test Collins Connect | | | |
| **Chapter 3: Electricity and Magnetism (21 lessons)** | | | | | | | | |
| 9 | 3 | 1/2 | 3.1 | Static electricity | * Describe how insulating materials can become charged. * Know that there are two kinds of electric charge. * Explain these observations in terms of electron transfer. | P3.1a, b, c | Worksheet 3.1 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 3 | 1/2 | 3.2 | Electric charge and currents | * Recall that an electric current is a rate of flow of electric charge. * Recall that current has the same value at any point in a single closed loop. * Recall and use the relationship between quantity of charge, current and time. | P3.1d, e, f | Worksheets 3.2.1, 3.2.2 and 3.2.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 1/2 | 3.3 | Electric circuits and potential difference | * Know circuit symbols. * Recall that current (*I*) depends on resistance (*R*) and potential difference (*V*) * Explain how an electric current passes round a circuit. | P3.2 b, c, d | Worksheets 3.3.1, 3.3.2, 3.3.3 and 3.3.4 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 3 | 3/4 | 3.4 | Series and parallel circuits | * Recognise series and parallel circuits. * Describe the changes in the current and potential difference in series and parallel circuits. | P3.2a, i and j (part) | Worksheets 3.4.1, 3.4.2 and 3.4.3 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 3 | 3/4 | 3.5 | Resistance | * Set up a circuit to investigate resistance. * Investigate the changing resistance of a filament lamp. * Compare the properties of a resistor and filament lamp. | P3.2 e, f, g, M1c, M4a, b, d | Practical sheet 3.5; Technician’s notes 3.5 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 9 | 3 | 3/4 | 3.6 | Practical: Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting resistance | * Use a circuit to determine resistance. * Gather valid data to use in calculations. * Apply the circuit to determine the resistance of different components. | P3.2h, k (part), Prac P6, M1c, M4a, b | Practical sheet 3.6 Technician’s notes 3.6 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 5/6 | 3.7 | Investigating circuits | * Use series circuits to test components and make measurements. * Carry out calculations on series circuits. | P3.2j (part) | Worksheets 3.7.1, 3.7.2 and 3.7.3; Practical sheet 3.7; Technician’s notes 3.7 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 5/6 | 3.8 | Control circuits | * Use a thermistor and light-dependent resistor (LDR). * Investigate the properties of thermistors, LDRs and diodes. | P3.2k (part) | Worksheet 3.8; Practical sheet 3.8; Technician’s notes 3.8 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 5/6 | 3.9 | Power and energy transfers | * Describe the energy transfers in different domestic appliances. * Describe power as a rate of energy transfer. * Calculate the energy transferred. | P3.2l (part) | Worksheets 3.9.1, 3.9.2 and 3.9.3; Practical sheet 3.9; Technician’s notes 3.9 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 7/8 | 3.10 | Calculating power | * Calculate power. * Use power equations to solve problems. * Consider power ratings and changes in stored energy. | P3.2l (part) | Worksheets 3.10.1, 3.10.2 and 3.10.3; Practical sheet 3.10; Technician’s notes 3.10 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 7/8 | 3.11 | Practical: Investigating series and parallel 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. | Prac P6, M4a, | Worksheets 3.11.1, 3.11.2 and 3.11.3; Practical sheet 3.11; Technician’s notes 3.11 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 9/10 | 3.12 | Key concept: What’s the difference between potential difference and current? | * Understand and be able to apply the concepts of current and potential difference. * Use these concepts to explain various situations. | Key concept | Worksheets 3.12.1, 3.12.2 and 3.12.3; Practical sheet 3.12; Technician’s notes 3.12 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 9 | 3 | 9/10 | 3.13 | Maths skills: Using algebra in electric circuit calculations | * Solve algebraic equations including using appropriate substitutions, numerical values and units. * Change the subject of an equation. * Use the symbols =, <, <<, >>, >, ~. | P3.2m, M1a, c, M3a, b, c, d | Worksheets 3.13.1, 3.13.2 and 3.13.3 | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 9/10 | 3.14 | 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. | PM3.1i, 3.2i to iv, M1a, c, M3a, b, c, d, M4a, b, d | Worksheets 3.14.1, 3.14.2 and 3.14.3; Practical sheet 3.14, Technician’s notes 3.14 | Quick starter  Homework worksheet  Homework quiz  Video |
| 9 | 3 | 11/12 | 3.15 | 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. | P3.3a, b | Worksheet 3.15; Practical sheet 3.15; Technician’s notes 3.15; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz |
| 9 | 3 | 11/12 | 3.16 | Compasses and magnetic fields | * Describe the Earth’s magnetic field. * Describe the magnetic effect of a current. | P3.3c, d, e, f | Worksheet 3.16; Practical sheet 3.16; Technician’s notes 3.16; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 9 | 3 | 11/12 | 3.17 **(HT)** | Magnetic effects | * Draw the magnetic field around a conducting wire and a solenoid. * Describe the force on a wire in a magnetic field. **(HT)** | P3.3g, h, i | Worksheets 3.17.1 and 3.17.2; Practical sheet 3.17; Technician’s notes 3.17; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 1 | 1/2 | 3.18 | Calculating the force on a conductor **(HT only)** | * Explain the meaning of magnetic flux density, *B*. * Calculate the force on a current-carrying conductor in a magnetic field. | P3.3j | Worksheet 3.18; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 1 | 1/2 | 3.19 | Electric motors **(HT only)** | * List equipment that uses motors. * Describe how motors work. * Describe how to change the speed and direction of rotation of a motor. * Explain how a dynamo generates direct current. | P3.3k | Worksheets 3.19.1 and 3.19.2; Practical sheet 3.19; Technician’s notes 3.19; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz |
| 10 | 1 | 1/2 | 3.20 | Key concept: The link between electricity and magnetism **(HT only)** | * Explore how electricity and magnetism are connected. | Key concept | Worksheets 3.20.1 and 3.20.2; Practical sheets 3.20.1, 3.20.2, 3.20.3 and 3.20.4; Technician’s notes 3.20; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz  Slideshow  Video |
| 10 | 1 | 3/4 | 3.21 | Maths skills: Rearranging equations **(HT only)** | * Change the subject of an equation. * Explain how the potential differences in two circuits linked by a transformer depend on the ratio of the numbers of turns. | PM3.3i, M1a, b, c, M3b, c, d | Worksheets 4.10.1 and 4.10.2 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 1 | 3/4 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect  End of teaching block test Collins Connect  End of year test Collins Connect | | | |
| **Chapter 4: Waves and radioactivity (21 lessons)** | | | | | | | | |
| 10 | 1 | 5/6 | 4.1 | Describing waves | * Describe wave motion. * Define wavelength and frequency. * Apply the relationship between wavelength, frequency and wave velocity. | P4.1a, b, c, d, M3b, c, d | Worksheets 4.1.1, 4.1.2, 4.1.3 and 4.1.4 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 1 | 5/6 | 4.2 | 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. | P4.1e | Worksheets 4.2.1, 4.2.2 and 4.2.3; PowerPoint presentation | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 1 | 5/6 | 4.3 | Measuring wave speeds **(HT)** | * 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. **(HT)** | P4.1f (part) | Worksheets 4.3.1, 4.3.2 and 4.3.3, Practical sheet 4.3, Technician’s notes 4.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 1 | 7/8 | 4.4 | 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. | P4.1f (part), Prac P4 | Practical sheet 4.4; Technician’s notes 4.4 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 1 | 7/8 | 4.5 | Maths skills: Using and rearranging equations | * Select and apply the equations *T* = 1/*f* and *v* = *fλ*. * Substitute numerical values into equations using appropriate units. * Change the subject of an equation. | PM4.1i, M3b, c, d | Worksheets 4.5.1, 4.5.2 and 4.5.3 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 1 | 9/10 | 4.6 | Key concept: Transferring energy or information by waves | * Understand that all waves have common properties. * Understand how waves can be used to carry information. * Understand various applications of energy transfer by different types of electromagnetic waves. | Key concept | Worksheet 4.6 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 10 | 1 | 9/10 | 4.7 | 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. | P4.2a, b, c, d, e, f | Worksheets 4.7.1, 4.7.2 and 4.7.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 1 | 9/10 | 4.8 | Gamma rays and X-rays **(HT)** | * List the properties of gamma rays and X-rays. * Recall examples of the practical uses of X-rays and gamma rays. * Compare gamma rays and X-rays. **(HT)** | P4.2g (part), h (part) | Worksheets 4.8.1, 4.8.2 and 4.8.3 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 10 | 1 | 11/12 | 4.9 | Ultraviolet and infrared radiation | * Describe the properties of ultraviolet and infrared radiation. * Describe some uses and hazards of ultraviolet radiation. * Describe some uses of infrared radiation. | P4.2g (part), h (part) | Worksheet 4.9; Practical sheet 4.9; Technician’s notes 4.9 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 1 | 11/12 | 4.10 | Microwaves | * List some properties of microwaves. * Describe how microwaves are used for communications. | P4.2g (part), h (part) | Worksheet 4.10 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 1 | 11/12 | 4.11 | Radio and microwave communication **(HT)** | * 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. **(HT)** | P4.2g (part), i | Worksheets 4.11.1, 4.11.2 and 4.11.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 1/2 | 4.12 | Reflection, refraction and wave fronts **(HT only)** | * Explain reflection and refraction and how these may vary with wavelength. * 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. | P4.2j (part), k | Worksheets 4.12.1, 4.12.2 and 4.12.3; Practical sheet 4.12; Technician’s notes 4.12 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 1/2 | 4.13 | 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. | P4.2j (part), Prac P4 | Worksheets 4.13.1 and 4.13.2; Practical sheets 4.13.1, 4.13.2, 4.13.3 and 4.13.4; Technician’s notes 4.13 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 1/2 | 4.14 | Atomic structure | * Describe the structure of the atom. * Use symbols to represent particles. * Describe ionisation. | P4.3a, b, c, h | Worksheets 4.14.1, 4.14.2 and 4.14.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 3/4 | 4.15 | Radioactive decay | * Describe radioactive decay. * Describe the types of nuclear radiation. * Understand the processes of alpha decay and beta decay. | P4.3d, e | Worksheets 4.15.1, 4.15.2 and 4.15.3; Technician’s notes 4.15 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 2 | 3/4 | 4.16 | Nuclear equations | * Understand nuclear equations. * Write balanced nuclear equations. | P4.3f, g, h | Worksheets 4.16.1, 4.16.2 and 4.16.3 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 2 | 3/4 | 4.17 | Radioactive half-life **(HT)** | * Explain what is meant by radioactive half-life. * Calculate half-life. **(HT)** * Choose the best radioisotope for a task. | P4.3j, M4a, c | Worksheets 4.17.1, 4.17.2 and 4.17.3; Practical sheet 4.17; Technician’s notes 4.17 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 5/6 | 4.18 | Background radiation | * Recall sources of background radiation. * Describe how different types of radiation have different ionising power. | P4.3i, l | Worksheets 4.18.1, 4.18.2 and 4.18.3 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 2 | 5/6 | 4.19 | Maths skills: Using ratios and proportional reasoning **(HT)** | * Draw a curve of best fit to calculate radioactive half-life. * Calculate the net decline. **(HT)** | P4.3k, M1c, M3c, M4a, c |  | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 2 | 5/6 | 4.20 | Hazards and uses of radiation | * Describe radioactive contamination. * Give examples of how radioactive tracers can be used. | P4.3m (part) | Worksheets 4.20.1, 4.20.2 and 4.20.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 7/8 | 4.21 | Irradiation | * Explain what is meant by irradiation. * Understand the distinction between contamination and irradiation. * Appreciate the importance of communication between scientists. | P4.3m (part) | Worksheets 4.21.1, 4.21.2 and 4.21.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 7/8 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect  End of teaching block test Collins Connect | | | |
| **Chapter 5: Energy (9 lessons)** | | | | | | | | |
| 10 | 2 | 9/10 | 5.1 | 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. | P5.1b (part), e (part) | Worksheets 5.1.1, 5.1.2 and 5.1.3; Practical sheets 5.1.1 and 5.1.2; Technician’s notes 5.1 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 2 | 9/10 | 5.2 | Work done and energy transfer | * Recall what is meant by work done. * Use the relationship between work done and force applied. * Identify the transfers between energy stores. | P5.1b (part), c (part) | Worksheets 5.2.1, 5.2.2 and 5.2.3;Practical sheets 5.2.1 and 5.2.2; Technician’s notes 5.2 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 2 | 9/10 | 5.3 | Specific heat capacity | * Understand how things heat up. * Find out about heating water. * Find out about specific heat capacity. | P5.1c (part) | Worksheets 5.3.1, 5.3.2 and 5.3.3; Practical sheet 5.3; Technician’s notes 5.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 11/12 | 5.4 | Energy and power | * Recall that energy cannot be created or destroyed, only transferred. * Describe the energy transfers in different domestic appliances. * Describe power as a rate of energy transfer. * Calculate the energy transferred. | P5.1c (part), d, P5.2b, c | Worksheets 5.4.1, 5.4.2 and 5.4.3, Practical sheet 5.4, Technician’s notes 5.4 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 2 | 11/12 | 5.5 | 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. | P5.2a, g | Worksheets 5.5.1, 5.5.2 and 5.5.3; Practical sheets 5.5.1, and 5.5.2, Technician’s notes 5.5 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 10 | 2 | 11/12 | 5.6 | Energy efficiency | * Explain what is meant by energy efficiency. * Calculate the efficiency of energy transfers. * Find out about conservation of energy. | P5.1a, P5.2d, e (part), g, PM5.2i, M1c, M4a, c, d, e | Worksheets 5.6.1 and 5.6.2; Practical sheets 5.6.1, 5.6.2, 5.6.3 and 5.6.4 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 3 | 1/2 | 5.7 | Practical: Investigating ways of reducing the unwanted energy transfers in a system | * Use scientific ideas to make predictions * Analyse data to identify trends. * Evaluate an experimental procedure. | P5.2e (part), f, Prac P5 | Worksheet 5.7; Practical sheet 5.7; Technician’s notes 5.7 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 3 | 1/2 | 5.8 | Key concept: Energy transfer | * Understand why energy is a key concept in science. * Use ideas about stores and transfers to explain what energy does. * Understand why accounting for energy transfers is a useful idea. | Key concept | Worksheet 5.8, Practical sheets 5.8.1 and 5.8.2, Technician’s notes 5.8.1 and 5.8.2 | Quick starter  Homework worksheet  Homework quiz  Slideshow |
| 10 | 3 | 1/2 | 5.9 | Maths skills: Calculations using significant figures | * Substitute numerical values into equations and use appropriate units. * Change the subject of an equation. * Give an answer to an appropriate number of significant figures. | M1a, c, M2a, b, c, d | Worksheets 5.9.1, 5.9.2 and 5.9.3, Technician’s notes 5.9 | Quick starter  Homework worksheet  Homework quiz  Video |
| 10 | 3 | 3/4 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect | | | |
| **Chapter 6: Global challenges (5 lessons)** | | | | | | | | |
| 10 | 3 | 3/4 | 6.1 | Keeping safe on the road | * Explain the factors that affect stopping distance. * Explain the dangers caused by large deceleration. | P6.1d, e, f | Worksheets 6.1.1, 6.1.2 and 6.1.3 | Quick starter  Homework worksheet  Homework quiz |
| 10 | 3 | 3/4 | 6.2 | Transmitting electricity | * Describe how electricity is transmitted using the National Grid. * Explain why energy is transmitted at high potential differences. * Understand the role of transformers. | P6.2c, d, e | Worksheet 6.2 | Quick starter  Homework worksheet  Homework quiz  Video 1  Video 2 |
| 10 | 3 | 5/6 | 6.3 | Using energy resources | * Describe the main energy resources available for use on Earth. * Distinguish between renewable and non-renewable resources. * Explain the ways in which the energy resources are used. | P6.2a | Worksheet 6.3, Practical sheet 6.3, Technician’s notes 6.3 | Quick starter  Homework worksheet  Homework quiz  Video 1  Video 2 |
| 10 | 3 | 5/6 | 6.4 | Global energy supplies | * Analyse global trends in energy use. * Understand what the issues are when using energy resources. | P6.2b | Worksheets 6.4.1, 6.4.2 and 6.4.3; Practical sheet 6.4, Technician’s notes 6.4 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 10 | 3 | 5/6 | 6.5 | Electricity in the home | * Recall that the domestic supply in the UK is a.c. at 50 Hz and about 230 V. * Describe the main features of live, neutral and earth wires. | P6.2f, g, h, i | Worksheets 6.5.1, 6.5.2 and 6.5.3 | Quick starter  Homework worksheet  Homework quiz  Video  Slideshow |
| 10 | 3 | 7/8 | **Assessment** | | End of chapter test Student Book  End of chapter test Collins Connect  End of teaching block test Collins Connect  End of year test Collins Connect  End of course test Collins Connect | | | |