Scheme of Work

**Teaching Key Stage 3 in three years**

The following pages show the full plan out the scheme of work for Collins Key Stage 3 Science Teacher Pack 1 taught over 3 years.

**Teaching Key Stage 3 in two years?**

If you are using the Collins KS3 Science scheme to deliver the Programme of Study in two years there are three ways you can do it:

1. Focus on the lessons shaded in the table. By so doing you will have visited all the key ideas.
2. Use the shaded lessons as a starting point but draw on ideas, activities and questions as necessary, i.e., ‘swapping out’ the occasional activity on an indicated lesson.
3. Use the introductory lesson and/or the ‘Applying key ideas’ lesson to see what students are more confident with and what time would be better spent on.

Collins Connect is our digital learning platform that offers a range of linked resources to enhance your lessons.

|  |
| --- |
| **Chapter 1: Cells – the Building Blocks of Life** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 1.1.2 | Historical ideas about living things | Cells as the fundamental unit of living organisms, including how to observe and record cell structure using a light microscope | Summarise some historical ideas about living things; explain how evidence can change ideas; select evidence to support or disprove ideas. | Worksheet 1.1.2 | Quick starter; Slideshow: Historical ideas about living things; The Naked Scientist: How do plants know where to grow? |  |
| 1.1.3 | Comparing plant and animal cells | Cells as the fundamental unit of living organisms, including how to observe and record cell structure using a light microscopeThe functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplastsThe similarities and differences between animal and plant cells | Develop models to explain the differences between animal and plant cells; record evidence using a microscope; communicate ideas about cells effectively using scientific terminology. | Worksheet 1.1.3aWorksheet 1.1.3bPractical sheet 1.1.3aPractical sheet 1.1.3bTechnician’s notes 1.1.3 | Quick starter; Video: Common structures in animal and plant cells; Slideshow: Differences between animal and plant cells; Interactive activity: Animal or plant?; Ice-cream splat: Key vocabulary game |  |
| 1.1.4 | Describing cells | The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts The similarities and differences between animal and plant cells | Classify specialised cells as animal or plant cells; describe different specialised animal and plant cells; explain the structure and function of specialised cells using models. | Worksheet 1.1.4 | Quick starter; Interactive activity: Match the animal cells to their functions; Video: Specialised plant cells |  |
| 1.1.5 | Understanding unicellular organisms | The structural adaptations of some unicellular organisms | Recognise different types of unicellular organisms; describe differences in unicellular organisms; compare and contrast the features of unicellular organisms. | Worksheet 1.1.5 | Quick starter; Interactive activity: Prokaryotes and Eukaryotes ; Ice-cream splat: Key vocabulary game | May be reduced in scope |
| 1.1.6 | Understanding diffusion | The role of diffusion in the movement of materials in and between cellsDiffusion in liquids and gases driven by differences in concentration | Describe the process of diffusion and its relation to the cell; plan a fair test investigation to explore the factors affecting diffusion; explain how the different factors speed up or slow down diffusion. | Worksheet 1.1.6Practical sheet 1.1.6aPractical sheet 1.1.6bPractical sheet 1.1.6cTechnician’s notes 1.1.6 | Quick starter; Interactive activity: How molecules of perfume move across a room; Slideshow: Understanding how factors affect the rate of diffusion; Interactive activity: Diffusion  |  |
| 1.1.7 | Understanding organisation in multicellular organisms | Hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms | Define the terms tissues, organs and organ systems; explain the organisational structure in multicellular organisms; compare the strengths and weaknesses of multicellular organisms and single-celled organisms. | Worksheet 1.1.7 | Quick starter; Interactive activity: Organisation in multicellular organisms; Interactive activity: How did cells evolve?; Ice-cream splat: Key vocabulary game |  |
| 1.1.8 | Applying key ideas |  | Extract ideas about the structure of plant and animal cells from earlier topics using the context of skin; apply ideas about the adaptations of specialised animal cells using examples from cells in the skin; use ideas about information to explain the structure and differences between multicellular and unicellular organisms. | Worksheet 1.1.8aWorksheet 1.1.8b |  |  |
| 1.1.9 | Comparing flowering plants | Reproduction in plants, including flower structure, wind and insect pollination | Describe the structure and function of parts in the flowering plant; explain why different plants have such diverse structures; evaluate the differences between wind-pollinated and insect-pollinated plants. | Worksheet 1.1.9 | Quick starter; Interactive activity: Reproductive organs of flowers; Video: Attracting insects: bees collecting pollen |  |
| 1.1.10 | Knowing how pollination leads to fertilisation | Reproduction in plants, including flower structure, wind and insect pollination, fertilisation | Describe the processes of pollination and fertilisation; analyse and present data on the growth of pollen tubes; explain factors that affect the growth of pollen tubes. | Worksheet 1.1.10Practical sheet 1.1.10aPractical sheet 1.1.10bTechnician’s notes 1.1.10 | Quick starter ; Interactive activity: How the fertilisation of a plant takes place |  |
| 1.1.11 | Understanding the changes facing pollinators | The importance of plant reproduction through insect pollination in human food security | Describe the role of insects in crop production, using data; explain why bee populations are declining; make suggestions for increasing insect populations and hence crop production. | Worksheet 1.1.11 | Quick starter; Video: What causes hay fever?; Interactive activity: Problems for Bees; Ice-cream splat: Key vocabulary game |  |
| 1.1.12 | Understanding how seeds are dispersed by the wind | Reproduction in plants, including seed and fruit formation and dispersal | Recognise the variety of different structures shown by different seeds; describe the need for plants to disperse their seed; plan an investigation into seed dispersal by wind. | Worksheet 1.1.12aWorksheet 1.1.12b | Quick starter; Interactive activity: Seed dispersal; Video: A dandelion opens up and the seeds disperse |  |
| 1.1.13 | Understanding how fruits disperse seeds | Reproduction in plants, including seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms | Describe how fruits are used in seed dispersal; compare evidence about seed dispersal by wind and by fruit formation; use data to evaluate different seed dispersal mechanisms. | Worksheet 1.1.13 | Quick starter |  |
| 1.1.14 | Understanding the male reproductive system | Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems | Describe the structure and function of different parts of the male reproductive system; compare plant and human male reproductive structures; summarise the strengths and weaknesses of the human and plant male reproductive systems. | Worksheet 1.1.14aWorksheet 1.1.14b | Quick starter |  |
| 1.1.15 | Understanding the female reproductive system and fertility | Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth | Describe the structure and function of different parts of the female reproductive system; explain the process of fertilisation; explain problems of infertility and how they might be treated. | Worksheet 1.1.15aWorksheet 1.1.15b | Quick starter; Interactive activity: The process of fertilisation in humans; Interactive activity: In vitro fertilisation; Video: IVF ethics; Ice-cream splat: Key vocabulary game |  |
| 1.1.16 | Learning about changes in puberty | Reproduction in humans (as an example of a mammal), including the menstrual cycle (without details of hormones) | Recognise changes in the male and female body during puberty; describe the process of menstruation; explain how some problems with menstruation occur. | Worksheet 1.1.16 | Quick starter; Interactive activity: What changes happen in puberty?; Slideshow: Infertility problems and solutions |  |
| 1.1.17 | Learning how a foetus develops | Reproduction in humans (as an example of a mammal), fertilisation, gestation and birth | Recognise the process of growth; use data to show how the embryo grows during gestation; compare and contrast the pregnant uterus with normal uterus. | Worksheet 1.1.17 | Quick starter; Interactive activity: Different stages of human development; Slideshow: The menstrual cycle |  |
| 1.1.18 | Understanding factors affecting a developing foetus | Reproduction in humans (as an example of a mammal), to include the effect of maternal lifestyle on the foetus through the placenta | Describe the effects of different factors on the developing foetus; evaluate the strength of data. | Worksheet 1.1.18 | Quick starter; Slideshow: The effects of substances on the foetus; Ice-cream splat: Key vocabulary game |  |
|  |
| **Chapter 2: Eating, Drinking and Breathing** |
| 221.2.2 | Exploring a healthy diet | Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed  | Describe the components of a healthy diet; examine the importance of each component of a healthy diet; evaluate the quality of evidence contained in advertising about a healthy diet. | Worksheet 1.2.2 | Quick starterSlideshow: The seven food groups; Interactive activity: Drag the foods into the correct food groups; The Naked Scientist: How does the digestive system work? |  |
| 1.2.3 | Testing foods | Test foods for starch, sugars, protein and fat; predict the results of food tests for a range of foods; evaluate the risks involved in carrying out food tests. | Worksheet 1.2.3Practical sheet 1.2.3 Technician’s notes 1.2.3 | Quick starter; Slideshow: Food tests; Interactive activity: Match the food group to the test |  |
| 1.2.4 | Comparing energy needs | Calculations of energy requirements in a healthy daily dietComparing energy values of different foods (from labels) (kJ) | Describe how we use energy from food; compare the energy requirements of people of different ages and lifestyles; analyse numerical data about energy contents of foods. | Worksheet 1.2.4 | Quick starter; Interactive activity: How much energy? ; Video: Sugary drinks |  |
| 1.2.5 | Exploring obesity and starvation | The consequences of imbalances in the diet including obesity, starvation and deficiency diseases | Describe the physical effects of eating too much and eating too little; explain the physical effects of obesity and starvation; compare how deaths from obesity and starvation have changed over time. | Worksheet 1.2.5  | Quick starter; Interactive activity: Starvation and obesity; Video: Eating disorders |  |
| 1.2.6 | Understanding deficiency diseases | Identify the causes and effects of some deficiencies in the diet; suggest which foods could prevent well-known deficiencies; plan ways of communicating ideas about preventing deficiency diseases. | Worksheet 1.2.6  | Quick starter; Slideshow: Vitamin and mineral deficiencies; Interactive activity: Deficiency diseases; Ice-cream splat: Key vocabulary game |  |
| 1.2.7 | Understanding the human digestive system | The tissues and organs of the digestive system, including adaptations to function | Identify the organs of the human digestive system; explain the role of digestion; analyse links between digestion and the circulatory system. | Worksheet 1.2.7 | Quick starter; Interactive activity: Foods' journey through the body; Video: Rotating model of the human digestion system |  |
| 1.2.8 | Investigating the start of digestion | The tissues and organs of the digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) | Describe what is meant by chemical and physical digestion; explain how teeth and saliva are adapted to digestion; suggest how results can demonstrate that digestion begins in the mouth. | Worksheet 1.2.8 | Quick starter; Slideshow: Types of teeth; Interactive activity: Match the type of teeth to their function |  |
| 1.2.9 | Understanding the roles of the digestive system | The tissues and organs of the digestive system, including adaptations to function | Describe the roles of the oesophagus, stomach, intestine and pancreas in digestion; explain how the structure of each of the organs is adapted to its function. | Worksheet 1.2.9Technician’s notes 1.2.9 | Quick starter; Slideshow: Movement of food through the digestive system; Interactive activity: Drag the adaptation into the correct organ; Ice-cream splat: Key vocabulary game |  |
| 1.2.10 | Applying key ideas |  | Extract ideas from the text about diet and digestion in other animals; use information about the structure of other digestive systems to show how they are adapted to their function; apply ideas about digestive systems to the efficiency of digestion in different animals. | Worksheet 1.2.10 |  |  |
| 1.2.11 | Introducing enzymes | How the digestive system digests food (enzymes simply as biological catalysts) | Describe role of different enzymes in digestion; analyse a model of the digestive system; explain observations of a practical activity to explore the role of enzymes. | Worksheet 1.2.11Practical sheet 1.2.11Technician’s notes 1.2.11 | Quick starter; Slideshow: The role of enzymes in digestion; Interactive activity: Digestive enzymes |  |
| 1.2.12 | Recognising the role of bacteria | The importance of bacteria in the human digestive system | Describe the role of bacteria in our digestive system; explain how the natural flora of bacteria can be disturbed; analyse data about the effects of antibiotics on gut bacteria. | Worksheet 1.2.12 | Quick starter; Interactive activity: Bacteria in the gut; Video: Fighting the superbugs; Ice-cream splat: Key vocabulary game |  |
| 1.2.13 | Understanding how we breathe | The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases | Describe the mechanism of breathing in and out; evaluate a model of breathing; calculate changes in pressure and explain how these help us breathe. | Worksheet 1.2.13Technician’s notes 1.2.13 | Quick starter; Slideshow: How do you breathe in and out?; Interactive activity: Breathing in and out; Interactive activity: A bell jar model to demonstrate breathing | Include the practical activity exploring lung volume from lesson 1.2.14 |
| 1.2.14 | Measuring breathing | The mechanism of breathing to move air in and out of the lungs, including simple measurements of lung volume | Describe what is meant by lung volume and identify some simple methods to measure it; identify independent, dependent and control variables in a lung-volume investigation; interpret and evaluate data linked to lung volume. | Worksheet 1.2.14Technician’s notes 1.2.14 Practical sheet 1.2.14 | Quick starter; Interactive activity: A method you can use to measure lung volume |  |
| 1.2.15 | Evaluating gas exchange in humans | The structure and functions of the gas exchange system in humans, including adaptations to function | Describe the features of the human gas exchange system; explain how the features enable gases to be exchanged; evaluate how well adapted the human gas exchange system is to its function. | Worksheet 1.2.15 | Quick starter ; Interactive activity: How oxygen gets into the bloodstream; Video: Our gas exchange system |  |
| 1.2.16 | Investigating diffusion | The structure and functions of the gas exchange system in humans, including adaptations to functionDiffusion in liquids and gases driven by differences in concentrationDiffusion in terms of the particle model | Explain how diffusion makes breathing possible; observe the effects of diffusion; apply diffusion to our breathing system and ask questions to develop understanding. | Worksheet 1.2.16Technician’s notes 1.2.16 | Quick starter; Interactive activity: Diffusion: Match the term to its meaning; Slideshow: Diffusion: An explanation |  |
| 1.2.17 | Exploring the effects of disease and lifestyle | The impact of exercise, asthma and smoking on the human gas exchange system | Describe the physical effects of disease and lifestyle on the breathing system; explain the physical effects of disease and lifestyle on the breathing system; describe how our understanding of the effects of smoking has changed over time. | Worksheet 1.2.17Technician’s notes 1.2.17 | Quick starter; Interactive activity: The symptoms caused by smoking and asthma; Video: Hospital patients smoking; Ice-cream splat: Key vocabulary game |  |
|  |
| **Chapter 3: Mixing, Dissolving and Separating** |
| 1.3.2 | Working safely in a laboratory |  | Recognise and reduce risks when working in a laboratory; name and select appropriate equipment. | Worksheet 1.3.2 | Quick starter; Video: Scientists working in a laboratory; Interactive activity: Measuring, mixing or heating; The Naked Scientist: What causes my kettle to fur up? |  |
| 1.3.3 | Recording experiments |  | Represent scientific experiments clearly; make and record accurate measurements. | Worksheet 1.3.3 | Quick starter; Slideshow: Representing laboratory equipment; Interactive activity: Match the quantities to the correct apparatus |  |
| 1.3.4 | Recognising materials, substances and elements | Differences between atoms, elements and compoundsChemical symbols and formulae for elements and compoundsThe concept of a pure substance | Recognise the difference between materials, substances and elements; identify elements by their names and symbols; explain what is meant by a chemically pure substance.  | Worksheet 1.3.4 | Quick starter; Interactive activity: Order the elements from most to least abundant |  |
| 1.3.5 | Understanding water | The concept of a pure substance | Recognise the importance and different sources of water; explain the differences between types of water. | Worksheet 1.3.5Practical sheet 1.3.5Technician’s notes 1.3.5 | Quick starter; Interactive activity: Water facts; Slideshow: Ice, water and steam |  |
| 1.3.6 | Dissolving | Mixtures, including dissolving | Explain the terms solvent, solution, solute and soluble; identify factors that affect dissolving; explain the difference between a dilute solution and a concentrated solution. | Worksheet 1.3.6Practical sheet 1.3.6Technician’s notes 1.3.6 | Quick starter; Interactive activity: Sucrose solutions; Ice-cream splat: Key vocabulary game |  |
| 1.3.7 | Separating mixtures | Mixtures, including dissolvingSimple techniques for separating mixtures: filtration | Recognise the differences between substances and use these to separate them. | Worksheet 1.3.7  | Quick starter; Video: Using size to separate mixtures: Panning for gold; Slideshow: Sieving for a reason; Interactive activity: Steps for separating a mixture of salt and sand |  |
| 1.3.8 | Dissolving and evaporating | Mixtures, including dissolvingSimple techniques for separating mixtures: evaporation | Separate a soluble substance from water; form crystals from solutions; explain solubility. | Worksheet 1.3.8 | Quick starter; Video: Salt crystallizing under microscope; Interactive activity: Drag the quantity into the saturated solution |  |
| 1.3.9 | Extracting salt | Identify sources of salt and describe how it is extracted; recognise the uses and importance of salt; obtain pure salt from a mixture. | Worksheet 1.3.9Practical sheet 1.3.9aPractical sheet 1.3.9bPractical sheet 1.3.9c Technician’s notes 1.3.9 | Quick starter; Slideshow: Seawater and salt mines; Interactive activity: Extracting salt |  |
| 1.3.10 | Understanding distillation | Simple techniques for separating mixtures: distillation | Use distillation to separate substances; explain why distillation can purify substances. | Worksheet 1.3.10aWorksheet 1.3.10bPractical sheet 1.3.10Technician’s notes 1.3.10 | Quick starter; Interactive activity: Order the steps for distillation; Ice-cream splat: Key vocabulary game |  |
| 1.3.11 | Applying key ideas |  | Extract ideas about water being hard from the text; extract ideas about solubility to explain some of the implications of the concept; use ideas and information about elements, compounds and formulae to explain the properties of chemicals. |  |  |  |
| 1.3.12 | Finding out what air is made of | Simple techniques for separating mixtures: distillation The composition of the atmosphere | Describe the composition of air; separate gases from air. | Worksheet 1.3.12 | Quick starter; Slideshow: Discovering the gases that make up air; Interactive activity: What is air made of?; Video: Ash cloud from Iceland volcano |  |
| 1.3.13 | Exploring chromatography | Simple techniques for separating mixtures: chromatographyThe identification of pure substances | Use chromatography to separate dyes. | Worksheet 1.3.13 | Quick starter; Interactive activity: Chromatography; Slideshow: Useful chromatography |  |
| 1.3.14 | Using chromatography | Simple techniques for separating mixtures: chromatography | Use chromatography to identify unknown substances; draw conclusions from evidence. | Worksheet 1.3.14Practical sheet 1.3.14Technician’s notes 1.3.14 | Quick starter; Video: Chromatography and King Richard III | May be combined with 1.3.13 |
| 1.3.15 | Finding the best solvent | Mixtures, including dissolvingSimple techniques for separating mixtures: chromatography | Choose the best solvent; recognise hazards when using solvents. | Worksheet 1.3.15Technician’s notes 1.3.15  | Quick starter; Interactive activity: Solvents |  |
| 1.3.16 | Modelling mixtures and separation | Mixtures, including dissolvingConservation of mass, changes of state and chemical reactions | Explain what happens to mass during dissolving; use a circle model to explain dissolving and separation. | Worksheet 1.3.16 | Quick starter; Slideshow: Dissolving: A simple model; Interactive activity: Modelling dissolving; Ice-cream splat: Key vocabulary game |  |
|  |
| **Chapter 4: Elements, Compounds and Reactions** |
| 1.4.2 | Finding elements and building the Periodic Table | Chemical symbols and formulas for elements and compounds | Identify where and how different elements were found; recognise differences between elements; recognise that the Periodic Table has changed over time. | Worksheet 1.4.2 | Quick starter; Slideshow: When were elements discovered?; Interactive activity: Abundance by mass in the Earth’s crust; The Naked Scientist: What are atoms and elements? |  |
| 1.4.3  | Looking at the Periodic Table of elements | The principles underpinning the Mendeleev Periodic Table The Periodic Table: periods and groups; metals and non-metals | Navigate the Periodic Table and identify some of the elements; identify features of the Periodic Table and describe how it is organised; explain why the Periodic Table is useful.  | Worksheet 1.4.3aWorksheet 1.4.3bPractical sheet 1.4.3Technician’s notes 1.4.3 | Quick starter; Interactive activity: Match elements to their chemical symbol |  |
|  1.4.4 | Understanding elements and atoms | Differences between atoms, elements and compounds Chemical symbols and formulae for elements and compounds | Interpret chemical symbols; explain what is meant by ‘element’ and ‘atom’; work out the composition of different substances based on their names. | Worksheet 1.4.4Practical sheet 1.4.4Technician’s notes 1.4.4 | Quick starter; Interactive activity: Match elements to their atomic number; Slideshow: Names, symbols, numbers and masses; Ice-cream splat: Key vocabulary game |  |
|  1.4.5 | Understanding metals | The varying physical and chemical properties of different elementsThe properties of metals and non-metals | Recognise the properties and uses of metals; identify differences between metals. | Worksheet 1.4.5Practical sheet 1.4.5Technician’s notes 1.4.5 | Quick starter; Video; Interactive activity: Match each element to how it reacts with air and water |  |
|  1.4.6 | Understanding non-metals | The varying physical and chemical properties of different elementsThe properties of metals and non-metals | Identify uses of common non-metals; describe the properties of non-metals. | Worksheet 1.4.6Practical sheet 1.4.6Technician’s notes 1.4.6 | Quick starter; Slideshow: Allotropes of sulfur; Interactive activity: Drag the non-metals into the correct groups |  |
|  1.4.7 | Identifying metalloids | The varying physical and chemical properties of different elements | Describe semi-metals and their properties; identify some common uses of semi-metals. | Worksheet 1.4.7 | Quick starter; Slideshow: Sand and computers; Interactive activity: Metal, metalloid or non-metal? |  |
|  1.4.8 | Discovering the origin of metals | The varying physical and chemical properties of different elementsThe properties of metals and non-metalsChemical symbols and formulae for elements and compounds | Recognise that metals have to be extracted from ores; evaluate the impact of extracting metals from the Earth. | Worksheet 1.4.8aWorksheet 1.4.8bPractical sheet 1.4.8Technician’s notes 1.4.8 | Quick starter; Slideshow: Metals from their ores; Interactive activity: Metals are obtained from their ores |  |
| 1.4.9 | Choosing elements for a purpose | The varying physical and chemical properties of different elements | Recognise the elements and their differences from physical data; use data and the properties of elements to choose suitable materials. | Worksheet 1.4.9 | Quick starter; Ice-cream splat: Key vocabulary game |  |
| 1.4.10 | Applying key ideas |  | Extract ideas about tin or other elements from the text, including earlier sections of the chapter; apply ideas about the properties of tin to explain some of its applications; use ideas and information about elements, compounds and formulas to explain the properties of chemicals. | Worksheet 1.4.10 |  |  |
| 1.4.11 | Combining elements | Differences between atoms, elements and compoundsChemical symbols and formulae for elements and compounds | Explain what is meant by a compound; recognise how compounds are formed and named; interpret the ratio of atoms and formula of compounds. | Worksheet 1.4.11Practical sheet 1.4.11Technician’s notes 1.4.11 | Quick starter; Interactive activity: Chlorides, oxides or carbonates; Interactive activity: Match the compounds to the correct atom ratio |  |
| 1.4.12 | Using models to understand chemistry | Use a simple model to show the differences between atoms and molecules; use models to represent compounds. | Worksheet 1.4.12Practical sheet 1.4.12 | Quick starter; Interactive activity: Match the oxide to its coloured circle model |  |
| 1.4.13 | Understanding what happens when an element burns | Chemical reactions as the rearrangement of atomsRepresenting chemical reactions using formulae and using equationsCombustion | Make observations during chemical reactions; write word equations to demonstrate chemical changes; explain chemical changes using a model. | Worksheet 1.4.13Practical sheet 1.4.13Technician’s notes 1.4.13 | Quick starter; Interactive activity: Elements and compounds |  |
| 1.4.14 | Observing how elements react in different ways | The varying physical and chemical properties of different elementsRepresenting chemical reactions using formulae and using equationsThe chemical properties of metal and non-metal oxides with respect to acidity | Draw conclusions to explain observations; use symbols and models to describe a chemical reaction. | Worksheet 1.4.14aWorksheet 1.4.14bPractical sheet 1.4.14Technician’s notes 1.4.14 | Quick starter; Video; Interactive activity: Reversible or irreversible; Ice-cream splat: Key vocabulary game |  |
| 1.4.15 | Identifying the special features of carbon | The varying physical and chemical properties of different elements | Explain the importance of carbon in our lives; identify and explain the differences between an element and its compounds. | Worksheet 1.4.15Practical sheet 1.4.15aPractical sheet 1.4.15bTechnician’s notes 1.4.15 | Quick starter; Video; Slideshow: Hydrocarbons: What are they and what are they used for?; Interactive activity: Hydrocarbon, carbohydrate or carbonate?; Video: Plastic bags: Why might they cause problems? |  |
| 1.4.16 | Understanding oxidation | Representing chemical reactions using formulae and using equationsOxidation | Describe oxidation; recognise the effects of oxidation; use data to support conclusions. | Worksheet 1.4.16Practical sheet 1.4.16aPractical sheet 1.4.16bTechnician’s notes 1.4.16 | Quick starter; Interactive activity: Most to least reactive |  |
| 1.4.17 | Investigating carbonates | Conservation of mass changes of state and chemical reactionsCombustion**,** thermal decomposition,oxidationChemical symbols and formulae for elements and compoundsThermal decomposition | Describe the composition and uses of carbonate compounds; recognise and explain thermal decomposition reactions; identify carbon dioxide. | Worksheet 1.4.17Practical sheet 1.4.17aPractical sheet 1.4.17bTechnician’s notes 1.4.17 | Quick starter; Slideshow: Modelling the thermal decomposition of carbonates |  |
| 1.4.18 | Explaining changes | Differences between atoms, elements and compoundsChemical symbols and formulae for elements and compoundsConservation of mass changes of state and chemical reactionsChemical reactions as the rearrangement of atomsThermal decomposition, oxidation | Observe and explain mass changes; use scientific terms and simple models to explain chemical processes. | Worksheet 1.4.18 | Quick starter; Interactive activity: Oxidation, thermal decomposition or dissolving; Interactive activity: Match the missing mass to the chemical equation; Ice-cream splat: Key vocabulary game |  |
|  |
| **Chapter 5: Forces and their Effects** |
| 1.5.2 | Discovering forces | Forces as pushes or pulls arising from the interaction between two objectsUsing force arrows in diagrams | Recognise different examples of forces; list main types of force; represent forces using arrows. | Worksheet 1.5.2 | Quick starter; Slideshow: Examples of forces and magnetism; Video: Felix Baumgartner's freefall from space; Interactive activity: Balanced or unbalanced?; The Naked Scientist: What does it take to put a man on the Moon? |  |
| 1.5.3 | Measuring forces | Forces measured in newtons | Measure forces using newtonmeters; use correct unit for force; explain difference between mass and weight. | Worksheet 1.5.3Practical sheet 1.5.3 | Quick starter; Interactive activity: Forces definitions; Slideshow: How do we measure mass, and what is it? | May be combined with 1.5.2 |
| 1.5.4 | Understanding weight on other planets | Gravity forces acting at a distance on Earth and in space  | Explain the meaning of ‘weightless’; investigate weight on the Moon and on different planets; identify the link between weight and gravitational attraction. | Worksheet 1.5.4 | Quick starter; Slideshow: A look at Isaac Newton and his laws of gravity; Video: Diving on Earth and in space; Interactive activity: Order your weight on each planet |  |
| 1.5.5 | Exploring the effects of forces | Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion | Identify and describe the effects of forces of different sizes and directions; predict and explain the changes caused by forces; explain the concept of force pairs (action and reaction). | Worksheet 1.5.5Practical sheet 1.5.5Technician’s notes 1.5.5 | Quick starter; Interactive activity: True or false? |  |
| 1.5.6 | Understanding stretch and compression | Forces associated with deforming objectsMeasurements of stretch or compression as force is changed | Explain the relationship between applied force and the change of shape of an object; investigate forces involved in compressing and stretching materials; identify applications for compressible and stretchable materials. | Worksheet 1.5.6Practical sheet 1.5.6Technician’s notes 1.5.6 | Quick starter; Interactive activity: Stretch and compress |  |
| 1.5.7 | Investigating Hooke’s Law | Forces associated with deforming objects; stretching and squashing – springsMeasurements of stretch or compression as force is changedForce–extension linear relation; Hooke’s Law as a special case | Investigate the effects of applied forces on springs; generate data to produce a graph and analyse outcomes. | Worksheet 1.5.7Practical sheet 1.5.7Technician’s notes 1.5.7 | Quick starter; Slideshow: An introduction to Robert Hooke; Interactive activity: Match forces to the masses; Ice-cream splat: Key vocabulary game |  |
| 1.5.8 | Understanding friction | Rubbing and friction forces between surfaces | Identify the force of friction between two objects; describe the effects of friction; understand that friction acts in the opposite direction to the direction of movement. | Worksheet 1.5.8 | Quick starter; Interactive activity: Order the frictional forces |  |
| 1.5.9 | Exploring the benefits of friction | Describe applications that make use of friction; design procedures for investigating the force of friction. | Worksheet 1.5.9 | Quick starter; Slideshow: Get a grip; Video: Situations where sliding is bad; Interactive activity: Friction |  |
| 1.5.10 | Understanding air and water resistance  | Forces: pushing things out of the way; resistance to motion of air and water | Link frictional forces between surfaces to ‘drag’ between objects in a fluid; discuss examples of frictional drag in air and in water; consider the effects of friction on sky divers. | Worksheet 1.5.10 | Quick starter; Slideshow: How about that: Galileo and his thought experiment; Interactive activity: Describe terminal velocity |  |
| 1.5.11 | Discovering streamlining | Recognising natural and man-made examples of streamlining; link streamlining to fuel efficiency in vehicles; evaluate the use of data collected from investigations of drag. | Worksheet 1.5.11Practical sheet 1.5.11Technician’s notes 1.5.11 | Quick starter; Interactive activity: Streamlined or not streamlined?; Video: Fastest bike in the world; Ice-cream splat: Key vocabulary game |  |
| 1.5.12 | Applying key ideas |  | Identify and represent forces in a range of situations, including less familiar ones; apply ideas about elastic behaviour; use ideas about forces and air resistance in an unfamiliar context to analyse problems. |  |  |  |
| 1.5.13 | Exploring forces and motion | Forces being needed to cause objects to stop or start moving, or to change their speed or directionBalanced and unbalanced forces | Recognise that for an object to start moving there must be a force applied; describe the effects of balanced and unbalanced forces; explain the significance of balanced and unbalanced forces on a moving object. | Worksheet 1.5.13Practical sheet 1.5.13 | Quick starter; Interactive activity: Match the descriptions about speed |  |
| 1.5.14 | Exploring how forces affect speed and direction | Change depending on direction of force and its size | Recognise that the size of a force determines the effect; recognise that the direction of a force determines the effect; provide examples to illustrate where a force of precise strength and direction is needed. | Worksheet 1.5.14 | Quick starter; Slideshow: May the force be with you; Video: The arrow and the apple; Interactive activity: Drag the forces into the correct group |  |
| 1.5.15 | Understanding speed calculations | Change depending on direction of force and its sizeSpeed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) | List the factors involved in defining speed; explain a simple method to measure speed; use the speed formula. | Worksheet 1.5.15Practical sheet 1.5.15 | Quick starter; Slideshow: What is speed and how is it measured?; Interactive activity: Order the objects from fastest to slowest; Ice-cream splat: Key vocabulary game |  |
| 1.5.16 | Understanding turning forces | Moment as the turning effect of a force | Describe the forces acting on a see-saw; understand that the forces turn about the fulcrum; explain how to balance different weights on a see-saw. | Worksheet 1.5.16Practical sheet 1.5.16Technician’s notes 1.5.16 | Quick starter; Interactive activity: Turning forces; Video: Seesaw tricks and a 949 seesaw |  |
| 1.5.17 | Discovering moments | State and use the law of moments; describe how turning forces can be increased; list some examples of levers used as force multipliers. | Worksheet 1.5.17Practical sheet 1.5.17Technician’s notes 1.5.17 | Quick starter; Interactive activity: Order the size of the moments |  |
| 1.5.18 | Understanding the application of moments | Link the law of moments to the design of cranes; explain why counterweights are needed by cranes; investigate the lifting capacity of a crane. | Worksheet 1.5.18Practical sheet 1.5.18Technician’s notes 1.5.18 | Quick starter; Interactive activity: Counterweights; Ice-cream splat: Key vocabulary game | Include the definition of ‘moment’ and the law of moments from lesson 1.5.17 |
|  |
| **Chapter 6: Energy Transfers and Sound** |
| 1.6.2 | Exploring energy transfers | Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, burning fuelsEnergy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change | Recognise what energy is and its unit; describe a range of energy transfers using simple diagrams; use a Sankey diagram as a model to represent simple energy changes. | Worksheet 1.6.2 | Quick starter; Slideshow: Most of our energy comes from the Sun, but how?; Interactive activity: Energy transfers in a washing machine; Video: How does home insulation reduce energy use?; How do thunder and lightning work? |  |
| 1.6.3 | Understanding potential energy and kinetic energy | Other processes that involve energy transfer: changing motion, dropping an object | Recognise energy transfers due to falling objects; describe factors affecting energy transfers related to falling objects; explain how energy is conserved when objects fall. | Worksheet 1.6.3 | Quick starter; Slideshow: How do roller coasters work?; Interactive activity: Energy true and false |  |
| 1.6.4 | Doing work | Work done; simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged | Recognise situations where work is done; describe the relationship work done = force × distance; apply the equation for work done to different situations. | Worksheet 1.6.4 | Quick starter; Interactive activity: Order the work done from largest to smallest |  |
| 1.6.5 | Looking at dynamos | Other processes that involve energy transfer: changing motion, completing an electrical circuit | Describe the energy changes in a dynamo; explain how a dynamo works. | Worksheet 1.6.5Technician’s notes 1.6.5 | Quick starter; Slideshow: Dynamos and motors; Interactive activity: Dynamos |  |
| 1.6.6 | Understanding elastic potential energy | Other processes that involve energy transfer: stretching a spring.Work done and energy changes on deformation Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in elastic distortions | Describe different situations that use the energy stored in compressing and stretching elastic materials; describe how elastic potential energy in different materials can be compared; explain how elastic potential energy is transferred. | Worksheet 1.6.6Practical sheet 1.6.6Technician’s notes 1.6.6 | Quick starter; Interactive activity: Complete the sentences about elastic potential energy; Slideshow: Springs and clockwork; Video: The world’s oldest bungee jumper is 96!; Ice-cream splat: Key vocabulary game |  |
| 1.6.7 | Knowing the difference between heat and temperature | Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler oneComparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with temperatures | Recognise what we mean by temperature; describe how temperature differences lead to energy transfer; explain the difference between heat and temperature. | Worksheet 1.6.7Practical sheet 1.6.7Technician’s notes 1.6.7 | Quick starter; Interactive activity: Order the temperatures from highest to lowest |  |
| 1.6.8 | Thinking about fuels | Fuels and energy resources; other processes that involve energy transfer: burning fuels, metabolism of food | Identify examples of fuels and their uses; describe combustion of fuels and recognise that different fuels transfer different amounts of energy; describe the advantages and disadvantages of using different fuels. | Worksheet 1.6.8Technician’s notes 1.6.8 | Quick starter; Slideshow: How fuels got their energy; Interactive activity: Gas, liquid or solid; Video: Green cars | May be combined with 1.6.9 |
| 1.6.9 | Investigating fuels | Fuels and energy resources; other processes that involve energy transfer: burning fuelsComparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in chemical compositions | Describe how to measure the energy of fuels; collect evidence to investigate the energy of different fuels; present data using appropriate graphs and evaluate the quality of evidence collected. | Worksheet 1.6.9Practical sheet 1.6.9Technician’s notes 1.6.9 | Quick starter; Interactive activity: Match the fuels to their correct uses; Ice-cream splat: Key vocabulary game |  |
| 1.6.10 | Applying key ideas |  | Extract ideas about energy transfers and fuels from earlier sections of the chapter; apply ideas about how energy is transferred to explain its application in making electricity; use ideas and information about electricity generation to compare different energy transfers. | Worksheet 1.6.10 |  |  |
| 1.6.11 | Exploring sound | Sound produced by vibrations of objects; sound waves are longitudinal | Identify how sounds are made; describe how sound waves transfer energy; explain how loud and quiet sounds are made. | Worksheet 1.6.11Practical sheet 1.6.11Technician’s notes 1.6.11 | Quick starter; Video: Vegetable orchestra; Interactive activity: Order the sounds from loudest to quietest |  |
| 1.6.12 | Describing sound | Sound produced by vibrations of objects, in loudspeakers; detected by their effect on microphone diaphragm and the ear drumFrequencies of sound waves, measured in hertz (Hz) | Describe how the pitch of a sound wave can be changed; apply the terms frequency, wavelength and amplitude to different waveforms. | Worksheet 1.6.12Technician’s notes 1.6.12 | Quick starter; Slideshow: Tuning up an orchestra: What does 'in tune' mean?; Interactive activity: Match the 'sound' term to the correct definition | Include the nature of sound as a longitudinal wave, as introduced in lesson 1.6.11 |
| 1.6.13 | Measuring the speed of sound | Echoes; the speed of sound in air | Describe what an echo is; describe how the speed of sound can be measured using echoes; calculate distances using ideas about echoes. | Worksheet 1.6.13Practical sheet 1.6.13 | Quick starter; Interactive activity: Sound' statements; Ice-cream splat: Key vocabulary game | May be combined with 1.6.14 |
| 1.6.14 | Understanding how sounds travels through materials | Sound needs a medium to travel; the speed of sound in air, in water, in solids | Recognise how the speed of sound changes in different substances; use the particle model to explain why there are differences when sound travels through solids, liquids and gases. | Worksheet 1.6.14Practical sheet 1.6.14Technician’s notes 1.6.14 | Quick starter; Interactive activity: Speed of sound; Slideshow: Mach numbers and air density |  |
| 1.6.15 | Learning about the reflection and absorption of sound | Echoes, reflection and absorption of sound | Recognise which materials affect the quality of sound; analyse the effects of different materials on sound waves; use ideas about energy transfer to explain how soundproofing works. | Worksheet 1.6.15Practical sheet 1.6.15Technician’s notes 1.6.15 | Quick starter; Interactive activity: Good absorbers of sound? | May be reduced in scope |
| 1.6.16 | Hearing sounds | Sound produced by vibrations of objects, detected by their effects on microphone diaphragm and the ear drumWaves transferring information for conversion to electrical signals by microphone | Describe the structure and function of different parts of the ear; explain how the ear is able to hear and detect sounds. | Worksheet 1.6.16Practical sheet 1.6.16Technician’s notes 1.6.16 | Quick starter; Interactive activity: The passage of sound through the ear |  |
| 1.6.17 | Understanding factors affecting hearing | Auditory range of humans and animals | Describe factors which affect hearing; explain how to prevent damage to ears; understand the term hearing range. | Worksheet 1.6.17 | Quick starter; Slideshow: What are hearing aids and how do they work?; Interactive activity: Ear damage and solutions |  |
| 1.6.18 | Finding out about sounds we cannot hear | Auditory range of humans and animalsPressure waves transferring energy; use for cleaning and physiotherapy by ultrasound | Recognise what is meant by ultrasound and infrasound; describe some applications for ultrasound and infrasound; explain how some applications work. | Worksheet 1.6.18 | Quick starter; Interactive activity: Ultrasound; Video: Using ultrasound to examine a pregnant woman; Ice-cream splat: Key vocabulary game | Include the meaning of hearing range as presented in 1.6.17 |

Scheme of Work

**Teaching Key Stage 3 in three years**

The following pages show the full plan of the scheme of work for Collins Key Stage 3 Science Teacher Pack 2 taught over 3 years.

**Teaching Key Stage 3 in two years?**

If you are using the Collins KS3 Science scheme to deliver the Programme of Study in two years there are three ways you can do it:

1. Focus on the lessons shaded in the table. By so doing you will have visited all the key ideas.
2. Use the shaded lessons as a starting point but draw on ideas, activities and questions as necessary, i.e., ‘swapping out’ the occasional activity on an indicated lesson.
3. Use the introductory lesson and/or the ‘Applying key ideas’ lesson to see what students are more confident with and what time would be better spent on.

Collins Connect is our digital learning platform that offers a range of linked resources to enhance your lessons.

|  |
| --- |
| **Chapter 1: Getting the Energy your Body Needs** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.1.2 | Exploring the human skeleton | The structure and functions of the human skeleton, to include support, protection, movement and making blood cells | * Identify bones of the human skeleton
* Explain why we have different shapes and sizes of bones
* Communicate effectively to investigate the structure and function of bones
 | Worksheet 2.1.2 | Quick starter; Interactive activity: drag the bones to the correct part of the body; Slideshow: An introduction to the human skeleton, its evolution and uniqueness |  |
| 2.1.3 | Analysing the skeleton | The structure and functions of the human skeleton, to include support, protection, movement and making blood cells | * Describe the roles of the skeleton
* Explain the evidence for each of the roles of the skeleton
* Estimate height using bone measurement calculations and suggest reasons for differences between people
 | Worksheet 2.1.3; Practical sheet 2.1.3; Technician’s notes 2.1.3 | Quick starter; Interactive activity: drag the functions to the correct bone(s); Video |  |
| 2.1.4 | Understanding the role of skeletal joints | Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles | * Describe the roles of tendons, ligaments, joints and muscles
* Compare different joints within the human skeleton
* Collaborate effectively to interpret how we use joints
 | Worksheet 2.1.4; Practical sheet 2.1.4; Technician’s notes 2.1.4 | Quick starter; Interactive activity: Drag the example of joints to the correct group; Slideshow: Introduction to the joints of the thumb, a new born baby and the pelvis; Hangman: Key vocabulary game |  |
| 2.1.5 | Investigating muscle strength | Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles | * Identify muscles used in different activities
* Plan an investigation to compare strength of different muscles
* Make a prediction about which muscles are stronger than others
 | Worksheet 2.1.5; Practical sheet 2.1.5; Technician’s notes 2.1.5 | Quick starter; Interactive activity: Order the muscles of the human body, from head to toe; Interactive activity: Match the actions to the muscles involved |  |
| 2.1.6 | Analysing muscle strength  | Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles | * Display data in a suitable graph
* Analyse data to compare the force of different muscles
* Explore the use of scientific ideas in identifying and treating muscle disorders
 | Worksheet 2.1.6a (copied onto card) and Worksheet 2.1.6b | Quick starter; Slideshow: A look at steroids and their side effects; Video |  |
| 2.1.7 | Examining interacting muscles | The function of muscles and examples of antagonistic muscles  | * Describe antagonistic muscles and give examples
* Explain how antagonistic muscles bring about movement
* Evaluate a model of antagonistic muscles
 | Worksheet 2.1.7; Practical sheet 2.1.7 (second page copied onto card); Technician’s notes 2.1.7 | Quick starter; Interactive activity: Match the muscles that work together in pairs |  |
| 2.1.8 | Exploring problems with the skeletal system | The structure and functions of the human skeleton, to include support, protection, movement and making blood cellsBiomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles | * Recall some medical problems with the skeletal system
* Describe treatments for some skeletal system problems
* Communicate effectively to learn how treatments have changed over time
 | Worksheet 2.1.8 | Quick starter; Interactive activity: Match the picture to the type of broken bone; Slideshow: A look at osteoporosis; Hangman: Key vocabulary game  |  |
| 2.1.9  | Applying key ideas |  | * Extract ideas about skeleton and muscles from the text, including earlier sections of the chapter
* Apply ideas about maintaining muscle and bone mass in relation to the effects of space travel
* Suggest how understanding the effects of space on the skeleton can be applied on Earth
 | Worksheet 2.1.9 |  |  |
| 2.1.10 | Understanding how our muscles get energy  | Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for lifeThe word equation for aerobic respiration | * Recall the equation for respiration and describe what it shows
* Explain the importance of respiration
* Apply what we know about respiration
 | Worksheet 2.1.10; Practical sheet 2.1.10; Technician’s notes 2.1.10 | Quick starter; Interactive activity: Match the words that are associated with proteins or carbohydrates; Slideshow: A comparison of the two essential life processes – photosynthesis and respiration |  |
| 2.1.11 | Investigating respiration | Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for lifeThe word equation for aerobic respiration | * Recall that respiration takes place in plants and animals
* Describe some experimental evidence for respiration
* Consider the quality of evidence for respiration
 | Cards from Worksheet 2.1.10 (as used in the previous lesson); Worksheet 2.1.11; Practical sheets 2.1.11a–d; Technician’s notes 2.1.11 | Quick starter; Interactive activity: Drag the respiration and photosynthesis phrases to the correct boxes |  |
| 2.1.12 | Analysing adaptations for respiration | Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life  | * Describe where in the cell respiration takes place
* Explain how mitochondria are adapted for respiration
* Compare and explain numbers of mitochondria in different cells
 | Worksheet 2.1.12 | Quick starter; Interactive activity: Match the mitochondria-rich cells with their energy-consuming function |  |
| 2.1.13 | Examining links between respiration and body systems | Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life  | * Describe some systems in animals and plants that are linked with respiration
* Explain how some systems and respiration are dependent
* Suggest the consequences of a failure in linked body systems
 | Worksheet 2.1.13 | Quick starter; Interactive activity; Match the body systems to their function; Slideshow: A look at the importance of body systems in respiration and the role of the liver; Hangman; Key vocabulary game |  |
| 2.1.14 | Exploring respiration in sport | Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life  | * Describe what is meant by anaerobic respiration
* Explain why some sports involve more aerobic or more anaerobic respiration
* Explain what is meant by oxygen debt
 | Worksheet 2.1.14 | Quick starter; Interactive activity: Match the sport to the main type of respiration that occurs; Interactive activity: Place into the correct order to describe how the body obtains and stores glucose; Video | Ensure important points about the role of respiration are covered, from lesson 2.1.13 |
| 2.1.15 | Understanding anaerobic respiration  | The process of anaerobic respiration in humans and micro-organisms, including fermentation, and the word equation for anaerobic respiration  | * Recall that microbes carry out anaerobic respiration
* Describe some evidence to show that anaerobic respiration produces carbon dioxide
* Construct a method to show what is produced in anaerobic respiration
 | Worksheet 2.1.15; Practical sheet 2.1.15; Technician’s notes 2.1.15 | Quick starter |  |
| 2.1.16 | Investigating fermentation | The process of anaerobic respiration in humans and micro-organisms, including fermentation, and the word equation for anaerobic respiration  | * Describe some applications of fermentation
* Identify dependent, independent and control variables in an investigation
* Analyse data and identify next steps
 | Worksheet 2.1.16; Practical sheet 2.1.16; Technician’s notes 2.1.16 | Quick starter; Slideshow: A look at how humans use yeast cells; Interactive activity: Match the products which are made by fermentation with the microbe involved; Interactive activity: Drag the phrase to the correct box – does it speed up reactions, slow them down, or both?; Video |  |
| 2.1.17 | Comparing aerobic and anaerobic respiration | The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism | * Describe some similarities and differences between aerobic and anaerobic respiration
* Work responsibly within a team to summarise respiration
 | Worksheet 2.1.17 | Quick starter; Interactive activity; Drag the correct respiration phrases into the correct groups; Slideshow: Explores the importance of enzymes in respiration; Hangman: Key vocabulary game |  |

|  |
| --- |
| **Chapter 2: Looking at Plants and Ecosystems** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.2.2 | Understanding the importance of plants | The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store, and to maintain levels of oxygen and carbon dioxide in the atmosphere | * Identify the importance of plants to life on Earth
* Use evidence to explain that plants do not use soil to grow
* Evaluate secondary data to start to explain how plants make food
 | Worksheet 2.2.2; Practical sheet 2.2.2; Technician’s notes 2.2.2 | Quick starter; Interactive activity: Sort trees into the products they are used for; Slideshow: Looking at the discovery of photosynthesis; Video |  |
| 2.2.3 | Exploring how plants make food | The reactants in, and products of, photosynthesis, and a word summary for photosynthesis Plants making carbohydrates in their leaves by photosynthesis | * Identify the reactants and products of photosynthesis
* Plan and predict the results of investigations
* Evaluate the risks of a procedure
 | Worksheet 2.2.3; Practical sheet 2.2.2; Practical sheet 2.2.3; Technician’s notes 2.2.3 | Quick starter; Interactive activity: Rearrange the steps in a method to explain how to test a leaf for the presence of starch |  |
| 2.2.4 | Looking at leaves | The adaptations of leaves for photosynthesis  | * Relate the size of a leaf to the availability of light
* Relate the function of the leaf to its structure and the types of cell
* Evaluate the structure of a cell related to its function
 | Worksheet 2.2.4; Practical sheet 2.2.4; Technician’s notes 2.2.4 | Quick starter; Slideshow: A detailed look at the different components of a leaf; Interactive activity: Match the adaptations of the leaf to its function; Hangman: Key vocabulary game |  |
| 2.2.5 | Exploring the role of stomata | The adaptations of leaves for photosynthesis The role of leaf stomata in gas exchange in plants | * Describe how stomata control gas exchange
* Explain how gas exchange occurs in leaves
* Analyse how stomata density is affected by different conditions
 | Worksheet 2.2.5a; Worksheet 2.2.5b (second page copied onto card); Practical sheet 2.2.5a; Practical sheet 2.2.5b; Technician’s notes 2.2.5 | Quick starter; Interactive activity: Which of the sentences about stomata are true, and which are false? | Recap on the adaptations of leaves, using key points from lesson 2.2.4 |
| 2.2.6 | Investigating photosynthesis | The reactants in, and products of, photosynthesis, and a word summary for photosynthesis | * Identify the factors that can affect photosynthesis
* Predict the results of the investigations
* Interpret secondary data about photosynthesis
 | Worksheet 2.2.6a; Worksheet 2.2.6b; Practical sheet 2.2.6a; Practical sheet 2.2.6b; Technician’s notes 2.2.6 | Quick starter; Interactive activity: Complete the sentences about photosynthesis |  |
| 2.2.7 | Exploring the movement of water and minerals in plants | Plants gain mineral nutrients and water from the soil via their roots | * Identify how water and minerals move through a plant
* Explain how water and minerals move through a plant
* Evaluate the cell structures that allow the movement of water and minerals through a plant
 | Worksheet 2.2.7a, Worksheet 2.2.7b; Technician’s notes 2.2.7 | Quick starter; Interactive activity: Rearrange the sentences to describe the movement of water through a plant | Refer to the role of minerals, from lesson 2.2.8 |
| 2.2.8 | Investigating the importance of minerals to plants | Plants gain mineral nutrients and water from the soil via their roots | * Identify the minerals essential to healthy plant growth
* Explain the effects of a deficiency in essential minerals
* Evaluate the limitations of evidence
 | Worksheet 2.2.8a copied onto card; Worksheet 2.2.8b; Practical sheet 2.2.8; Technician’s notes 2.2.8 | Quick starter; Slideshow: An introduction to plant mineral deficiencies; Interactive activity: Match the mineral deficiency to its effect on a plant; Video |  |
| 2.2.9 | Investigating chemosynthesis | The interdependence of organisms in an ecosystem, including food webs | * Describe how ocean vent communities survive
* Describe the adaptations of tubeworms
* Compare and contrast chemosynthesis and photosynthesis
* Evaluate models of chemosynthesis and photosynthesis
 | Worksheet 2.2.9 | Quick starter; Interactive activity: Which of the statements are true for photosynthesis, and which are true for chemosynthesis?; Hangman: Key vocabulary game |  |
| 2.2.10 | Applying key ideas |  | * Extract ideas about plant adaptations and nutrition from the text, including earlier sections of the chapter
* Apply ideas about plant nutrition to explain evidence
* Apply ideas and information about plant nutrition to propose the outcome of a situation
 | Worksheet 2.2.10a; Worksheet 2.2.10b |  |  |
| 2.2.11 | Understanding food webs | The interdependence of organisms in an ecosystem, including food webs | * Describe how food webs are made up of a number of food chains
* Make predictions about factors affecting plant and animal populations
* Analyse and evaluate changes in a food web
 | Worksheet 2.2.11a; Worksheet 2.2.11b copied on to card and cut up; Worksheet (teacher) 2.2.11c; Worksheet (teacher) 2.2.11d | Quick starter; Interactive activity: Organise organisms into a food chain |  |
| 2.2.12 | Exploring the importance of insects | The interdependence of organisms in an ecosystem, including insect-pollinated crops The importance of plant reproduction through insect pollination in human food security | * Describe the impact of low pollination on fruit production
* Explain why artificial pollination is used for some crops
* Evaluate the risks of monoculture on world food security
 | Worksheet 2.2.12; Practical sheet 2.2.12; Technician’s notes 2.2.12 | Quick starter; Slideshow: A description of how bees pollinate plants and how honey is made; Interactive activity: Define the conditions required for enhancing bee populations; Video |  |
| 2.2.13 | Looking at other examples of interdependence  | How organisms affect, and are affected by, their environment, including the accumulation of toxic materials | * Describe examples of the interdependence of organisms
* Explain how organisms help other organisms to survive
* Explain ideas about habitat destruction
 | Worksheet 2.2.13a; Worksheet 2.2.13b copied on to card and cut up | Quick starter; Slideshow: Some examples of interdependence; Interactive activity: Match the key interdependence terms to their definition; Hangman: Key vocabulary game |  |
| 2.2.14 | Understanding interactions in the environment  | How organisms affect, and are affected by, their environment, including the accumulation of toxic materials | * Describe some effects of human activity on the environment
* Explain why a range of species is endangered
* Analyse and evaluate secondary data and recommend solutions for species survival
 | Worksheet 2.2.14 | Quick starter; Slideshow: A look at some British species which are endangered; Interactive activity: Order the level of risk scientists assign to a species, from most to least threatened; Video |  |
| 2.2.15 | Learning about ecological balance | How organisms affect, and are affected by, their environment, including the accumulation of toxic materials | * Describe ways in which organisms affect their environment
* Explain why prey populations affect predator populations
* Evaluate a model of predator–prey populations and explain the importance of predators
 | Worksheet 2.2.15a; Worksheet 2.2.15b | Quick starter; Slideshow: A look at the predator-prey relationship between a Canadian lynx and a Snowshoe hare; Interactive activity: Sort the statements into those which refer to predators and those which refer to prey organisms | Include the impact of human activity from lesson 2.2.14 |
| 2.2.16 | Understanding the effects of toxins in the environment  | How organisms affect, and are affected by, their environment, including the accumulation of toxic materials | * Describe how toxins pass along the food chain
* Explain how toxins enter and accumulate in food chains
* Evaluate the advantages and disadvantages of using pesticides
 | Worksheet 2.2.16 | Quick starter; Interactive activity: Match the farming chemical to its use; Slideshow: A look at bioaccumulation of mercury |  |
| 2.2.17 | Exploring how organisms co-exist | How organisms affect, and are affected by, their environment, including the accumulation of toxic materials | * Describe the role of niches
* Explain the concept of resource partitioning
* Analyse and evaluate the role of variation in enabling organisms to co-exist
 | Worksheet 2.2.17; Practical sheet 2.2.17; Technician’s notes 2.2.17 | Quick starter; Interactive activity: Define four key ecological terms; Hangman: Key vocabulary game |  |

|  |
| --- |
| **Chapter 3: Explaining Physical Changes** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.3.2 | Using particles to explain matter  | The properties of different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure  | * Recognise differences between solids, liquids and gases
* Describe solids, liquids and gases in terms of the particle model
 | Worksheet 2.3.2; Practical sheet 2.3.2 (the last page copied onto card); Technician’s notes 2.3.2 | Quick starter; Interactive activity: Drag the solid, liquid or gas to the correct group when at 25°C and at atmospheric pressure; Interactive activity: Place the elements in order, from strongest to weakest forces between the elements |  |
| 2.3.3 | Understanding solids | The properties of different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure  | * Describe the properties of solids
* Relate the properties and behaviour of solids to the particle model
 | Worksheet 2.3.3; Practical sheet 2.3.3 (last page copied onto card); Technician’s notes 2.3.3 | Quick starter; Slideshow: Explaining properties of gases, liquids and solids | The principles of the particle model from lesson 2.3.2 should underpin this and the next two lessons |
| 2.3.4 | Exploring Brownian motion | Brownian motion in gases | * Describe how theories develop
* Describe and explain Brownian motion in terms of particles
 | Worksheet 2.3.4; Practical sheet 2.3.4; Technician’s notes 2.3.4 | Quick starter; Interactive activity: Re-order the statements about the movement of a drop of red dye in water |  |
| 2.3.5 | Understanding liquids and gases | The properties of different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure | * Compare different properties of liquids and gases
* Relate the properties and behaviour of liquids and gases to the particle model
 | Worksheet 2.3.5; Practical sheet 2.3.5; Technician’s notes 2.3.5 | Quick starter; Interactive activity: Place the fluids in order of most to least viscous at room temperature; Slideshow: Volume and compression; How much air is in a scuba tank?; Hangman: Key vocabulary game |  |
| 2.3.6 | Changing state | Changes of state in terms of the particle model | * Recognise changes of state as being reversible changes
* Use scientific terminology to describe changes of state
* Explain changes of state using the particle model and ideas of energy transfer
 | Worksheet 2.3.6; Practical sheet 2.3.6; Technician’s notes 2.3.6 | Quick starter; Interactive activity: Drag the examples of change in state to the correct group – melting, condensing or sublimation; Video |  |
| 2.3.7 | Understanding evaporation | Changes of state in terms of the particle modelEnergy changes on changes of state (qualitative) | * Investigate factors affecting evaporation
* Explain the differences between boiling and evaporation using the particle model
 | Worksheet 2.3.7; Practical sheet 2.3.7; Technician’s notes 2.3.7 | Quick starter; Interactive activity: Drag the items to the correct group – boiling point less or greater than water; Slideshow: Factors affecting evaporation: Why does nail varnish remover dry more quickly than water? |  |
| 2.3.8 | Exploring thermal expansion  | Changes with temperature in motion and spacing of particles | * Identify how heat affects the arrangement and movement of particles
* Use the particle model to explain the effects of heat on expansion
 | Worksheet 2.3.8; Practical sheet 2.3.8; Technician’s notes 2.3.8 | Quick starter; Video |  |
| 2.3.9 | Making sense of models | A simple Dalton atomic model | * Describe the concept of a ‘good enough’ model
* Link the particle model to elements and compounds
* Evaluate the strengths and weaknesses of the particle model
 | Worksheet 2.3.9; Technician’s notes 2.3.9 | Quick starter; Hangman: Key vocabulary game |  |
| 2.3.10 | Applying key ideas |  | * Extract ideas about changes of state, expansion and energy changes from the text, including earlier sections of the topic
* Apply ideas about the particle model to explain some physical processes
* Use ideas and information about particles to explain the properties of different states of matter and how changes of state can be applied
 | Worksheet 2.3.10; Technician’s notes 2.3.10 |  |  |
| 2.3.11 | Explaining density of solids and liquids | The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transitionSimilarities and differences, including density differences, between solids, liquids and gases | * Use the particle model to explain density differences between solids and liquids
* Use the particle model to explain anomalies between ice and water
 | Worksheet 2.3.11; Technician’s notes 2.3.11 | Quick starter; Slideshow: What is density?; Interactive activity: Drag the items to the correct group – density less or greater than water? | May be combined with lesson 2.3.12 |
| 2.3.12 | Explaining the density of gases | The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transitionSimilarities and differences, including density differences, between solids, liquids and gases | * Use the particle model to explain differences in the density of gases
* Evaluate a method of measuring density
 | Worksheet 2.3.12a; Worksheet 2.3.12b; Practical sheet 2.3.12; Technician’s notes 2.3.12 | Quick starter; Interactive activity: Place the gases in order, from highest to lowest density at standard room temperature; Video |  |
| 2.3.13 | Explaining concentration and pressure | The properties of different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure | * Describe what is meant by concentration and pressure.
* Use the particle model to explain differences in concentration and pressure
 | Worksheet 2.3.13; Practical sheet 2.3.13; Technician’s notes 2.3.13 | Quick starter; Slideshow: Working out concentration: A fizzy drink example  |  |
| 2.3.14 | Exploring diffusion | Diffusion in liquids and gases driven by differences in concentrationDiffusion in terms of the particle model | * Use the particle model to explain observations involving diffusion
 | Worksheet 2.3.14; Practical sheet 2.3.14; Technician’s notes 2.3.14 | Quick starter; Slideshow: Observing diffusion with bromine gas; Interactive activity: Drag the items to the correct group – speeds up or slows down diffusion of particles; Hangman: Key vocabulary game |  |
| 2.3.15 | Conserving mass | Conservation of massChanges of stateConservation of material and mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving | * Use the particle model to explain the Law of Conservation of Mass
 | Worksheet 2.3.15; Practical sheet 2.3.15a; Practical sheet 2.3.15b; Technician’s notes 2.3.15 | Quick starter; Interactive activity: Which of the statements about chemical reactions are true, and which are false? |  |
| 2.3.16 | Deciding between physical and chemical changes | Mixtures, including dissolvingThe difference between chemical and physical changes | * Use the particle model to explain the differences between physical and chemical changes
* Recognise that mass is conserved in all changes
 | Worksheet 2.3.16; Practical sheet 2.3.16; Technician’s notes 2.3.16 | Quick starter; Slideshow: Changes that are easily reversed and changes that are not easily reversed; Interactive activity: Drag the change into the correct group – physical or chemical change? | May be combined with lesson 2.3.17 |
| 2.3.17 | Explaining the properties of mixtures | Mixtures, including dissolvingThe properties of different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure | * Use the particle model to explain the properties of mixtures
 | Worksheet 2.3.17; Practical sheet 2.3.17; Technician’s notes 2.3.17 | Quick starter; Interactive activity: Match the terms about mixtures and changing states to their correct definition; Video |  |
| 2.3.18 | Using particle models | The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transition | * Use ‘good enough’ particles models to explain different observations
 | Worksheet 2.3.18; Practical sheet 2.3.18a; Practical sheet 2.3.18b; Technician’s notes 2.3.18 | Quick starter; Slideshow: A look at how sugar dissolves in water; Interactive activity: Place the events in order of how sugar dissolves in tea; Hangman: Key vocabulary game |  |

|  |
| --- |
| **Chapter 4: Explaining Chemical Changes** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.4.2 | Exploring acids | Defining acids and alkalis  | * Recognise acids used in everyday life
* Describe what all acids have in common
* Evaluate the hazards that acids pose
 | Worksheet 2.4.2 | Quick starter; Interactive activity: Match the foods to the main acid(s) they contain; Interactive activity: Match the hazard to the symbol; Slideshow: What do acids have in common?; Video |  |
| 2.4.3 | Exploring alkalis | Defining acids and alkalis | * Recognise alkalis used in everyday life
* Describe what all alkalis have in common
* Evaluate the hazards that alkalis pose
 | Worksheet 2.4.3 | Quick starter; Interactive activity: Drag the products to the correct group: acidic or alkaline?; Slideshow: What do alkalis have in common? |  |
| 2.4.4 | Using indicators | The pH scale for measuring acidity/alkalinity; and indicators  | * Use indicators to identify acids and alkalis
* Analyse data from different indicators
* Compare the effectiveness of different indicators
 | Worksheet 2.4.4; Practical sheet 2.4.4; Technician’s notes 2.4.4 | Quick starter; Slideshow: What are indicators? A look at different types of indicator; Interactive activity: Drag the acids to the correct group – strong or weak | May be combined with lesson 2.4.5 |
| 2.4.5 | Using universal indicator | The pH scale for measuring acidity/alkalinity; and indicators | * Describe what the pH scale measures
* Measure and record pH values
* Identify the advantages of universal indicator
 | Worksheet 2.4.5; Practical sheet 2.4.5; Technician’s notes 2.4.5 | Quick starter; Interactive activity: Match the colour given from universal indicator paper to the correct product; Hangman: Key vocabulary game |  |
| 2.4.6 | Exploring neutralisation | Defining acids and alkalis in terms of neutralisation reactions The pH scale for measuring acidity/alkalinity; and indicators | * Describe examples of neutralisation
* Use indicators to identify chemical reactions
* Explain colour changes in terms of pH and neutralisation
 | Worksheet 2.4.6; Practical sheet 2.4.6; Technician’s notes 2.4.6 | Quick starter; Interactive activity: Match the everyday neutralisation reactions together; Video |  |
| 2.4.7 | Explaining neutralisation | Defining acids and alkalis in terms of neutralisation reactions Chemical reactions as the rearrangement of atomsRepresenting chemical reactions using formulas and using equations Reactions of acids with alkalis to produce a salt plus water | * Recall the equation for a neutralisation reaction
* Explain how water is made during a neutralisation reaction
* Apply a model to explain neutralisation
 | Worksheet 2.4.7 | Quick starter; Interactive activity: Drag the chemicals to the correct group – product or reactant; Slideshow: A model for neutralisation |  |
| 2.4.8 | Understanding salts | Chemical reactions as the rearrangement of atomsRepresenting chemical reactions using formulas and using equations Reactions of acids with alkalis to produce a salt plus water | * Name examples of salts
* Describe the uses of common salts
* Predict the reactants used in and the salts made by different neutralisation reactions
 | Worksheet 2.4.8 | Quick starter; Interactive activity: Match the salts to their uses |  |
| 2.4.9 | Exploring the reactions of acids with metals | Reactions of acids with metals to produce a salt plus hydrogen  | * Describe the reaction between acids and metals
* Explain the reaction between acids and metals
* Compare the reactivity of different metals
 | Worksheet 2.4.9; Practical sheet 2.4.9; Technician’s notes 2.4.9 | Quick starter; Interactive activity: Drag the metal to the correct group, depending on how it reacts with acid |  |
| 2.4.10 | Exploring the reactions of acids with carbonates | Chemical reactions as the rearrangement of atomsRepresenting chemical reactions using formulas and using equations | * Describe the reaction between acids and carbonates
* Explain the reaction between acids and carbonates
* Write word equations for the reactions between acids and carbonates
 | Worksheet 2.4.10; Practical sheet 2.4.10; Technician’s notes 2.4.10 | Quick starter; Slideshow: Summarising the reactions of acids with carbonates; Hangman: Key vocabulary game |  |
| 2.4.11 | Applying key ideas |  | * Identify some factors that affect the pH of urine
* Explain how the pH of urine can be used by medical practitioners
* Apply knowledge about acids and alkalis to reactions in the body
 | Worksheet 2.4.11; Technician’s notes 2.4.11 |  |  |
| 2.4.12 | Investigating the effectiveness of antacids | Reactions of acids with alkalis to produce a salt plus water  | * Design an investigation to compare the effectiveness of indigestion remedies
* Analyse data to identify a suitable indigestion remedy
 | Worksheet 2.4.12; Practical sheet 2.4.12; Technician’s notes 2.4.12 | Quick starter; Interactive activity: Place the steps of the antacid experiment into the correct order |  |
| 2.4.13 | Understanding the importance of acids and alkalis | Defining acids and alkalis in terms of neutralisation reactions Reactions of acids with alkalis to produce a salt plus water | * Classify common useful chemicals as acids or alkalis
* Explain the importance of acids and alkalis in everyday life
* Explore common misconceptions about acids and alkalis
 | Worksheet 2.4.13 | Quick starter; Slideshow: Acids and alkalis in industry: The chlor-alkali industry; Interactive activity: Are the statements about acids and alkalis fact or fiction?; Video; Video |  |
| 2.4.14 | Exploring combustion  | CombustionFuels and energy resources | * Explain the terms fuel and combustion
* Recall what is needed for combustion
* Analyse the fire triangle and apply it to putting out fires
 | Worksheet 2.4.14; Technician’s sheet 2.4.14 | Quick starter; Interactive activity: Match the method of putting out a fire to what it removes from the fire triangle; Hangman: Key vocabulary game | Refer to reasons for selecting different fuels, from lesson 2.4.15 |
| 2.4.15 | Understanding combustion and the use of fuels | CombustionFuels and energy resources | * Identify applications of combustion reactions
* Identify fuels used in different applications
* Compare the energy of different fuels
 | Worksheet 2.4.15; Practical sheet 2.4.15; Technician’s notes 2.4.15 | Quick starter; Interactive activity: Exothermic or endothermic? Drag the phrases to the type of reaction they’re associated with; Slideshow: So many fuels: Fossil fuels and plants; Interactive activity: Place, in order, the fuels that you think hold the most to the least energy (in Joules/Kg) |  |
| 2.4.16 | Exploring the effects of burning | CombustionChemical reactions as the rearrangement of atomsRepresenting chemical reactions using formulas and using equationsThe production of carbon dioxide by human activity | * Summarise combustion using an equation
* Compare complete and incomplete combustion
* Explain what is meant by the conservation of mass
 | Worksheet 2.4.16 (with the second page copied onto card); Practical sheet 2.4.16; Technician’s notes 2.4.16 | Quick starter; Interactive activity: Drag the substances to the correct group – hydrocarbon or not |  |
| 2.4.17 | Understanding acid rain  | CombustionThe composition of the atmosphere | * Describe how combustion can cause acid rain
* Describe the effects of acid rain
* Explain the effects of acid rain
 | Worksheet 2.4.17 | Quick starter; Slideshow: How does burning affect rain?; Interactive activity: Re-order the process of acid rain formation from sulfur dioxide; Hangman: Key vocabulary game |  |

|  |
| --- |
| **Chapter 5: Exploring Contact and Non-Contact Forces** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.5.2 | Exploring magnets | Non-contact forces: forces between magnetsMagnetic poles, attraction and repulsion | * Explain magnetic attraction and repulsion
* Apply the concept of poles and laws of attraction and repulsion
* Predict the effects of arrangements of magnetic poles
 | Worksheet 2.5.2; Practical sheet 2.5.2; Technician’s notes 2.5.2 | Quick starter; Slideshow: Magnetic levitation: A look at the use of magnetic repulsion and attraction in the operation of Maglev trains; Interactive activity: Drag the statements about magnets into the correct true or false groups | May be combined with lesson 2.5.3 |
| 2.5.3 | Understanding magnetic fields | Magnetic poles, attraction and repulsionMagnetic fields by plotting with compass, representation by field linesEarth’s magnetism | * Describe magnetic fields
* Explore the field around a magnet
* Explain the shape, size and direction of magnetic fields
 | Worksheet 2.5.3; Practical sheet 2.5.3; Technician’s notes 2.5.3 | Quick starter; Interactive activity: Complete the sentences about magnetic fields |  |
| 2.5.4 | Investigating static charge | Non-contact forces: forces due to static electricitySeparation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects | * Recognise the effects of static charge
* Explain how static charge can be generated
* Use evidence to develop ideas about static charge
 | Worksheet 2.5.4; Practical sheet 2.5.4; Technician’s notes 2.5.4 | Quick starter; Interactive activity: Drag the materials to classify them as conductors or insulators | May be combined with lesson 2.5.5 |
| 2.5.5 | Explaining static charge | Non-contact forces: forces due to static electricitySeparation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects | * Explain static charge in terms of electron transfer
* Apply this explanation to various examples
 | Worksheet 2.5.5; Practical sheet 2.5.5;Technician’s notes 2.5.5 | Quick starter; Slideshow: Atoms and ions: How electron transfer between atoms forms ions, which assemble into alternating lattices due to electrostatic attractions; Interactive activity: Arrange the sentences on static charge into the correct order; Hangman: Key vocabulary game |  |
| 2.5.6 | Understanding electric fields | Non-contact forces: forces due to static electricitySeparation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objectsThe idea of electric field, forces acting across the space between objects not in contact | * Explain static electricity in terms of fields
* Explain how charged objects affect other objects
 | Worksheet 2.5.6; Technician’s notes 2.5.6 | Quick starter; Interactive activity: Drag the sentences into the correct order, to explain why a statically charged balloon sticks to a wall |  |
| 2.5.7 | Applying what we know about electrostatics | Non-contact forces: forces due to static electricitySeparation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objectsThe idea of electric field, forces acting across the space between objects not in contact | * Apply an understanding of static electricity to various situations
* Explain how static electricity can be useful and can be dangerous
 | Worksheet 2.5.7 | Quick starter; Slideshow: Antistatic devices: Problems (as opposed to applications) of electrostatic attraction, and practical solutions to such problems; Interactive activity: Drag the sentences into the correct order, to explain electrostatic paint spraying; Video |  |
| 2.5.8 | Exploring gravity on Earth | Non-contact forces: gravity forces acting at a distance on Earth and in space | * Explain the effects of gravity
* Compare gravity to other non-contact forces
* Use the concept of a gravitational field
 | Worksheet 2.5.8; Practical sheet 2.5.8 | Quick starter; Slideshow: Weightlessness: Creating zero-gravity/weightlessness for astronaut training using a parabolic flight path; Interactive activity; Link the statement about gravitational fields with its correct description | Refer to applications from lesson 2.5.9 |
| 2.5.9 | Applying our understanding of gravity to space travel | Non-contact forces: gravity forces acting at a distance on Earth and in space | * Apply ideas about gravity on Earth to other places
* Explore how gravitational fields vary
* Consider the effects of these changes
 | Worksheet 2.5.9 | Quick starter; Interactive activity: Are the statements about space travel true or false?; Interactive activity: Complete the sentences about exploring the Earth’s atmosphere; Hangman: Key vocabulary game; Video |  |
| 2.5.10 | Applying key ideas |  | * To extract ideas about magnetism, electrostatic charge and gravity from the text, including earlier sections of the topic.
* To apply ideas about magnetism, electrostatics and gravity.
* To evaluate ideas in relation to magnetism, electrostatics and gravity.
 | Worksheet 2.5.10; Technician’s notes 2.5.10 |  |  |
| 2.5.11 | Exploring pressure on a solid surface | Pressure measured by ratio of force over area – acting normal to any surface | * Explain how pressure can be applied on a solid surface
* Describe some effects of varying pressure
 | Worksheet 2.5.11a (copied onto card); Worksheet 2.5.11b | Quick starter; Slideshow: Pressure, ice and snow: Effects of increasing and decreasing pressure on ice and snow. Applications to winter activities; Interactive activity: Drag the descriptions which represent high or low pressure; Video |  |
| 2.5.12 | Calculating pressure | Pressure measured by ratio of force over area – acting normal to any surface | * Identify the factors that determine the size of pressure on a solid
* Calculate the size of pressure exerted
 | Worksheet 2.5.12; Practical sheet 2.5.12; Technician’s notes 2.5.12 | Quick starter; Interactive activity: Order the pressures, from highest to lowest |  |
| 2.5.13 | Exploring pressure in a liquid | Pressure in liquids, increasing with depth; upthrust effects, floating and sinking | * Describe how pressure in a liquid alters with depth
* Explain pressure increases in relation to particles and gravity
 | Worksheet 2.5.13; Technician’s notes 2.5.13 | Quick starter; Interactive activity: Complete the sentences about pressure in liquids |  |
| 2.5.14 | Explaining floating and sinking | Pressure in liquids, increasing with depth; upthrust effects, floating and sinking | * Explain why some objects float and others sink
* Relate floating and sinking to density, displacement and upthrust
* Explain the implications of these ideas
 | Worksheet 2.5.14; Practical sheet 2.5.14; Technician’s notes 2.5.14 | Quick starter; Slideshow: Balloons: Hot-air, hydrogen and helium balloons – to emphasise that buoyancy isn’t limited to water; Interactive activity: Define the key terms about floating and sinking; Hangman: Key vocabulary game |  |
| 2.5.15 | Exploring gas pressure | Atmospheric pressure; decreases with increase of height as weight of air above decreases with height | * Explore how the pressure in a gas varies with height
* Explain the implications of this changing pressure
 | Worksheet 2.5.15; Technician’s notes 2.5.15 | Quick starter; Interactive activity: Drag the descriptions which represent high or low atmospheric pressure | May be combined with lesson 2.5.16 |
| 2.5.16 | Working with pressure | Atmospheric pressure; decreases with increase of height as weight of air above decreases with height | * Give examples of how pressure affects our lives
* Explain how pressure is used and managed
 | Worksheet 2.5.16; Practical sheet 2.5.16; Technician’s notes 2.5.16 | Quick starter; Slideshow: High tides and flooding: Effects of low atmospheric pressure on sea level, and the consequent effects when coupled with high tides; Interactive activity: Barometers are devices used to measure pressure. Order the statements to describe their operation; Hangman: Key vocabulary game |  |

|  |
| --- |
| **Chapter 6: Magnetism and Electricity** |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 2.6.2 | Looking at the history of magnets | Earth’s magnetism, compass and navigation  | * Summarise historical ideas about magnetism
* Describe how historical ideas about magnetism have changed over time
 | Practical sheet 2.6.2; Technician’s notes 2.6.2 | Quick starter; Slideshow: Developing the compass: From a lodestone on a string to modern binnacle compasses; Interactive activity: Order the discoveries in magnetism, from the oldest to the most recent; Video |  |
| 2.6.3 | Exploring magnetic materials | Magnetic poles, attraction and repulsion  | * Investigate magnetism in materials
* Explain magnetism using the domain theory
 | Worksheet 2.6.3; Practical sheet 2.6.3; Technician’s notes 2.6.3 | Quick starter; Interactive activity: Classify the statements into those which can magnetise or demagnetise a magnetic material |  |
| 2.6.4 | Testing the strength of magnets | Magnetic poles, attraction and repulsion  | * Compare different methods of testing magnets
* Collect data to investigate the strength of magnetism
 | Practical sheet 2.6.3 (from previous lesson); Practical sheet 2.6.4; Technician’s notes 2.6.4 | Quick starter; Interactive activity: Order the sentences into a logical sequence, to show how to compare the strength of magnets |  |
| 2.6.5 | Describing the Earth’s magnetic field | Earth’s magnetism, compass and navigation | * Explain evidence for the Earth’s magnetic field
* Explain the impact the Earth’s magnetic field has on our planet
 | Worksheet 2.6.5 | Quick starter; Interactive activity: Complete the sentences about the Earth’s magnetic field; Slideshow: Solar wind: The effects on the atmosphere (aurora) and electrical storms |  |
| 2.6.6 | Investigating electromagnetism | The magnetic effect of a current, electromagnets  | * Describe what an electromagnet is
* Investigate the factors affecting the strength of electromagnets
 | Worksheet 2.6.6; Practical sheet 2.6.6; Technician’s notes 2.6.6 | Quick starter; Interactive activity: Classify the statements into those which will increase, or decrease, the strength of an electromagnet; Hangman: Key vocabulary game |  |
| 2.6.7 | Using electromagnets | Electromagnets | * Describe different applications of electromagnets
 | Worksheet 2.6.7; Technician’s notes 2.6.7 | Quick starter; Slideshow: Electromagnets at work: Magnetic sorting, fire-doors, MRI, Maglev and security tags; Interactive activity: Order the statements to describe the operation of an electric bell; Video |  |
| 2.6.8 | Exploring D.C. motors | Other processes that involve energy transfer: completing an electrical circuitThe magnetic effect of a current, D.C. motors (principles only) | * Describe the magnetic effect of a current and how this is applied to D.C. motors
 | Worksheet 2.6.8; Practical sheet 2.6.8; Technician’s notes 2.6.8 | Quick starter; Slideshow: Motors large and small: Robots, trains and toothbrushes; Interactive activity: Classify the statements into those which will increase, or decrease the forces produced by an electric motor; Hangman: Key vocabulary game |  |
| 2.6.9 | Applying key ideas  |  | * Extract ideas about magnets from the Student Book text, including earlier sections of the chapter.
* Apply ideas about the properties of magnets to explain some of their applications.
 | Worksheet 2.6.9 |  |  |
| 2.6.10 | Investigating batteries | Other processes that involve energy transfer: completing an electrical circuit | * Describe the link between chemical energy and electricity.
* Investigate how fruit batteries work
 | Worksheet 2.6.10; Technician’s notes 2.6.10 | Quick starter; Slideshow: Inside batteries: The similarities and differences between types of cell; Interactive activity: Complete the sentences about batteries; Video |  |
| 2.6.11 | Describing electric circuits | Other processes that involve energy transfer: completing an electrical circuitElectric current, measured in amperes, in circuits | * Describe and draw circuit diagrams
* Explain what is meant by current
* Explain how materials allow current to flow
 | Worksheet 2.6.11 (the second page printed onto card); Practical sheet 2.6.11; Technician’s notes 2.6.11 | Quick starter; Interactive activity: Match the statements about electric current |  |
| 2.6.12 | Understanding energy in circuits | Other processes that involve energy transfer: completing an electrical circuitElectric current, measured in amperes, in circuitsPotential difference, measured in volts, battery and bulb ratings | * Describe what the voltage does in a circuit
* Explain voltage using different analogies
 | Worksheet 2.6.12; Technician’s notes 2.6.12 | Quick starter; Interactive activity: Select the statements which describe current or voltage in an electric circuit; Hangman: Key vocabulary game |  |
| 2.6.13 | Explaining resistance | Potential difference, measured in volts, battery and bulb ratingsResistance, measured in ohms, as the ratio of potential difference (p.d.) to current | * Explain what resistance is and how it affects the circuit
* Investigate and identify the relationship between voltage and current
 | Worksheet 2.6.13; Practical sheet 2.6.13; Technician’s notes 2.6.13 | Quick starter; Slideshow: Measuring electricity: A look at multimeters and measuring V, I and R; Interactive activity: Complete the sentences about resistance in an electric circuit | Refer to factors affecting resistance, from lesson 2.6.14 |
| 2.6.14 | Investigating factors affecting resistance | Resistance, measured in ohms, as the ratio of potential difference (p.d.) to current Differences in resistance between conducting and insulating components (quantitative) | * Describe some uses of resistance
* Investigate and explain factors affecting resistance
 | Worksheet 2.6.14; Practical sheet 2.6.14; Technician’s notes 2.6.14 | Quick starter; Interactive activity: Choose the factors which increase the resistance of a wire, and those which decrease resistance; Slideshow: Using low and high resistances: A look at some factors that affects the resistance of materials |  |
| 2.6.15 | Explaining circuits using models | Potential difference, measured in volts, battery and bulb ratingsResistance, measured in ohms, as the ratio of potential difference (p.d.) to current | * Describe how the voltage, current and resistance are related in different circuits
* Use a model to explain the relationship between voltage, current and resistance
 | Worksheet 2.6.15; Practical sheet 2.6.15; Technician’s notes 2.6.15 | Quick starter; Interactive activity: Match the scientific ideas about electric circuits to the rope model analogy |  |
| 2.6.16 | Describing series and parallel circuits | Series and parallel circuits, currents add where branches meet and current as flow of charge | * Understand how voltage and current vary in a series circuit
* Understand how voltage and current vary in a parallel circuit
 | Worksheet 2.6.16; Technician’s notes 2.6.16 | Quick starter; Interactive activity: Choose the statements which best describe series circuits, and those which best describe parallel circuit; Slideshow: Splitters and multi-sockets: The dangers of overloading; Video |  |
| 2.6.17 | Comparing series and parallel circuits | Electric current, measured in amperes, in circuitsSeries and parallel circuits, currents add where branches meet and current as flow of chargePotential difference, measured in volts, battery and bulb ratings | * Investigate and explain current and voltage in series and parallel circuits
* Explain the circuits in our homes
 | Worksheet 2.6.17; Practical sheet 2.6.17; Technician’s notes 2.6.17 | Quick starter; Interactive activity: Order the circuits from the one with the highest current, to the one with the lowest |  |
| 2.6.18 | Applying circuits | Series and parallel circuits, currents add where branches meet and current as flow of charge | * Describe how circuits are arranged in common appliances
 | Worksheet 2.6.18, the second page copied onto card | Quick starter; Interactive activity: Complete the sentence about series and parallel circuits; Hangman: Key vocabulary game |  |

Scheme of Work

**Teaching Key Stage 3 in three years**

The following pages show the full plan of the scheme of work for Collins Key Stage 3 Science Teacher Pack 3 taught over 3 years.

**Teaching Key Stage 3 in two years**

If you are using the Collins KS3 Science scheme to deliver the Programme of Study in two years there are three ways you can do it:

1. Focus on the lessons shaded in the table. By so doing you will have visited all the key ideas.
2. Use the shaded lessons as a starting point but draw on ideas, activities and questions as necessary, i.e., ‘swapping out’ the occasional activity on an indicated lesson.
3. Use the introductory lesson and/or the ‘Applying key ideas’ lesson to see what students are more confident with and what time would be better spent on.

Collins Connect is our digital learning platform that offers a range of linked resources to enhance your lessons.

|  |
| --- |
| Chapter 1: Variation for Survival |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.1.2 | Exploring differences | Differences between speciesThe importance of maintaining biodiversity  | * Identify differences between different species
* Explain the importance of diversity
 | Worksheet 3.1.2a; Worksheet 3.1.2b | Quick starter; Slideshow: The five kingdoms – protoctists, prokaryotes, fungi, plants and animals; Interactive activity: Drag the animals to the correct phyla; Slideshow: Life in different environments – a look at how living things adapt to extreme environments; Slideshow: Hybrids: Definition and examples; Video |  |
| 3.1.3 | Looking more closely at variation  | The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation | * Explain the difference between continuous and discontinuous variation
* Investigate variation within a species
* Evaluate the importance of variation in organisms
 | Worksheet 3.1.3 | Quick starter; Interactive activity: Drag the statement to the correct correlation | Refer to differences between species and the importance of maintaining biodiversity, from 3.1.2 |
| 3.1.4 | Exploring the causes of variation | Heredity as the process by which genetic information is transmitted from one generation to the next | * Identify some features of organisms that are inherited and some that are determined by their environment
* Understand that offspring from the same parents may show considerable variation
* Evaluate the importance of genetic and environmental variation to the survival of the organism
 | Worksheet 3.1.4; Practical sheet 3.1.4; Technician's notes 3.1.4 | Quick starter; Slideshow: The causes of variation: A look at genetic and environmental factors; Interactive activity: Drag the characteristics to the correct group - caused by genetic factors, environmental factors, or both; Video |  |
| 3.1.5 | Learning about selective breeding | Heredity as the process by which genetic information is transmitted from one generation to the next | * Describe how selective breeding can produce organisms with desirable characteristics
* Explain the process of selective breeding
* Evaluate the importance of selective breeding, and explore the ethical issues involved
 | Worksheet 3.1.5 | Quick starter; Interactive activity: Reorder the sentences to describe the process of selective breeding of cattle |  |
| 3.1.6 | Finding out how organisms survive | The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection  | * Describe how variation causes competition for resources, and drives natural selection
* Explain the theories of Lamarck, Wallace and Darwin
* Evaluate the importance of Darwin’s work
 | Worksheet 3.1.6; Practical sheet 3.1.6 | Quick starter; Interactive activity: Reorder the sentences to describe the process of evolution by natural selection; Slideshow: How life on Earth evolved: A look at Charles Darwin's theory of evolution; Hangman: Key vocabulary game |  |
| 3.1.7 | Applying key ideas |  | * Extract ideas about variation within a species from the text, including earlier topics
* Apply ideas about variation to explain evidence
* Apply ideas and information about selective breeding to propose the outcome of a process
 | Worksheet 3.1.7 |  |  |
| 3.1.8 | Understanding why siblings are different | Heredity as the process by which genetic information is transmitted from one generation to the next | * Identify inherited features in plants and animals that vary between offspring
* Explain how inherited differences arise by genetic material from both parents combining
* Describe how identical twins occur and analyse data about their features
 | Worksheet 3.1.8; Practical sheet 3.1.8 | Quick starter; Video; Interactive activity: Drag the statements about twins to the correct group |  |
| 3.1.9 | Looking inside a cell’s nucleus  | A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model | * Identify that the nucleus contains chromosomes which carry inherited genetic information
* Explain that chromosomes are made of genes containing DNA, and describe the structure of DNA
* Assess the work of Watson, Crick, Wilkins and Franklin on DNA structure
 | Worksheet 3.1.9a; Worksheet 3.1.9b; Practical sheet 3.1.9 | Quick starter; Interactive activity: Complete the sentences about DNA | Include an introduction to the passing on of genetic information, from 3.1.8 |
| 3.1.10 | Learning about DNA | A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model | * Identify that all plant and animal cells contain DNA
* Explain why it is important for scientists to be able to extract DNA from cells
* Analyse and evaluate the use of extracted DNA
 | Worksheet 3.1.10a; Worksheet 3.1.10b; Practical sheet 3.1.10; Technician's notes 3.1.10 | Quick starter; Slideshow: Working with DNA – a look at DNA extraction and its use in forensics; Interactive activity: Drag the statements about DNA data to the correct group - ethical issue, scientific issue, or both |  |
| 3.1.11 | Exploring human chromosomes | A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model | * Identify that, at fertilisation, one chromosome in each pair comes from each parent
* Explain how fertilisation results in each new individual being genetically unique
* Explain how some genetic disorders arise
 | Worksheet 3.1.11a; Worksheet 3.1.11b; Practical sheet 3.1.11 | Quick starter; Interactive activity: Reorder the sentences to describe the process of sexual reproduction in humans; Interactive activity: Drag the symptoms to the correct genetic disorder - Down's syndrome or cystic fibrosis; Slideshow: Chromosomal disorders: Explanation and examples |  |
| 3.1.12 | Understanding cloning | A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model | * Define cloning and describe some natural cloning processes
* Explain how organisms may be artificially cloned
* Explore ethical issues around artificial cloning
* Compare and contrast asexual and sexual reproduction
 | Worksheet 3.1.12; Practical sheet 3.1.12; Technician's notes 3.1.12 | Quick starter; Interactive activity: Reorder the sentences to describe how to clone a spider plant; Interactive activity: Reorder the sentences to describe how Dolly the sheep was cloned; Video |  |
| 3.1.13 | Explaining extinction | Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material | * Identify changes which can cause a species to become extinct
* Explain the use of gene banks to preserve hereditary material before a species becomes extinct
* Analyse and evaluate theories of what caused the extinction of the dinosaurs
 | Worksheet 3.1.13 | Quick starter; Hangman: Key vocabulary game |  |

|  |
| --- |
| Chapter 2: Our Health and the Effects of Drugs |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.2.2 | Exploring types of drugs | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processes | * State examples of the four main groups of drugs
* Describe the effects of different types of drugs on the body
* Explain the effects of each type of drug on the body
 | Worksheet 3.2.2 | Quick starter; Slideshow: Exploring types of drugs – information about the four main types of drug; Interactive activity: Drag the statements into the correct group - stimulant, depressant, painkiller or hallucinogen; Video |  |
| 3.2.3 | Understanding the impact of smoking | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processesThe impact of exercise, asthma and smoking on the human gas exchange system | * Describe the effects of smoking on the body
* Explain the risks of smoking on the body
* Examine the link between smoking and cancer
 | Worksheet 3.2.3 | Quick starter; Interactive activity: Match the component of tobacco to its harmful effect on the body | Include the four main groups of drugs from 3.2.2 |
| 3.2.4 | Considering the dangers of cannabis | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processesThe impact of exercise, asthma and smoking on the human gas exchange system | * Describe the medicinal uses for cannabis
* Describe the negative effects of cannabis on the body
* Give a balanced argument about whether cannabis should be legalised
 | Worksheet 3.2.4 | Quick starter; Interactive activity: Drag the statements into the correct group - for or against the legalisation of cannabis |  |
| 3.2.5 | Understanding the effects of alcohol | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processes | * Describe the short-term effects of alcohol on the body
* Explain the long-term effects of alcohol
* Suggest how alcoholism affects society
 | Worksheet 3.2.5 | Quick starter; Interactive activity: Reorder the sentences to describe what happens to the body if a person continues to drink alcohol; Slideshow: Understanding the effects of alcohol: Information about alcohol and the dangers of long-term use; Video |  |
| 3.2.6 | Exploring the effects of other drugs | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processes | * Describe the effects of different drugs on the body
* Compare the dangers of different drugs
 | Worksheet 3.2.6 | Quickstarter; Interactive activity: Drag the drugs into the correct group - legal or illegal |  |
| 3.2.7 | Learning about addiction | The effects of ‘recreational’ drugs (including substance misuse) on behaviour, health and life processes | * Define addiction
* Describe how drugs affect the brain
* Explain the effects of withdrawal on the body
 | Worksheet 3.2.7 | Quick starter; Interactive activity: Drag the withdrawal symptoms into the correct group - emotional or physical; Hangman: Key vocabulary game |  |
| 3.2.8 | Applying key ideas |  | * Extract information about the effects of alcohol and other drugs on drivers
* Consider reasons why it is difficult to gather evidence about the effects of drugs
* Use ideas and information about driving under the influence to form opinions and make reasoned arguments about solutions and punishments
 | Worksheet 3.2.8 |  |  |
| 3.2.9 | Understanding how diseases are spread | This part of this chapter is intended to embed and develop ideas from earlier in the Key Stage 3 course, including cell structure and function, micro-organisms and body systems. | * Describe how diseases are spread
* Consider ways of reducing the spread of specific diseases
 | Worksheet 3.2.9 | Quick starter; Slideshow: Preventing the spread of disease – a look at how infectious diseases are spread and how this can be prevented; Interactive activity: Match the way a disease is spread to the mechanism by which it can be prevented; Video |  |
| 3.2.10 | Exploring the body’s defences | This part of this chapter is intended to embed and develop ideas from earlier in the Key Stage 3 course, including cell structure and function, micro-organisms and body systems. | * Describe how the body resists infection
* Explain the role of white blood cells in fighting infection
 | Worksheet 3.2.10 | Quick starter; Interactive activity: Match the body barrier to the way it prevents microbe entry |  |
| 3.2.11 | Comparing microbes | This part of this chapter is intended to embed and develop ideas from earlier in the Key Stage 3 course, including cell structure and function, micro-organisms and body systems. | * Describe the characteristics of different types of microbe
* Recall examples of diseases caused by bacteria, viruses and fungi
* Evaluate a model of a microbe
 | Worksheet 3.2.11; Practical sheet 3.2.11; Technician's notes 3.2.11 | Quick starter; Slideshow: Types of microbe – a look at the features of fungi, viruses and bacteria; Video; Interactive activity: Drag the statements into the correct group - bacteria, virus or fungi |  |
| 3.2.12 | Investigating the growth of bacteria | This part of this chapter is intended to embed and develop ideas from earlier in the Key Stage 3 course, including cell structure and function, micro-organisms and body systems. | * Describe what bacteria need to survive
* Investigate bacterial growth in different conditions
* Analyse bacterial growth data
 | Worksheet 3.2.12; Practical sheet 3.2.12; Technician's notes 3.2.12 | Quick starter; Interactive activity: Order the surfaces based on the amount of bacteria present, from lowest to highest |  |
| 3.2.13 | Understanding how antibiotics work | These topics are aimed at embedding and developing ideas from topics earlier in the scheme, including cell structure and function, and body systems, in the context of health | * Investigate the effect of antibiotics on bacteria
* Explain how bacteria can become immune to antibiotics
* Evaluate the impact of superbugs on our health
 | Worksheet 3.2.13; Practical sheet 3.2.13; Technician's notes 3.2.13 | Quick starter; Interactive activity: Match the bacteria-killing chemical to its purpose; Slideshow: Antibiotics: A look at how antibiotics work and how you can test the effectiveness of an antibiotic |  |
| 3.2.14 | Learning about vaccination | These topics are aimed at embedding and developing ideas from topics earlier in the scheme, including cell structure and function, and body systems, in the context of health | * Describe how vaccines were discovered
* Explain how vaccines prevent a viral infection
* Evaluate the risks involved with vaccination
 | Worksheet 3.2.14 | Quick starter; Slideshow: Jenner, Fleming and Lister – a look at the famous scientists involved in the treatment or prevention of infectious disease; Interactive activity: Reorder the sentences to describe how a vaccination works; Hangman: Key vocabulary game |  |
| Chapter 3: Obtaining Useful Materials |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.3.2 | Obtaining metals from ores | Earth as a source of limited resources  | * Recognise how abundant common ores are in the Earth
* Explain how ores are extracted from the Earth
 | Worksheet 3.3.2 | Quick starter; Interactive activity: Drag the examples of substances to the correct group - native metals, non-native metals or ores; Video; Interactive activity: Place, in order, the metals from most to least reactive |  |
| 3.3.3 | Understanding reactivity | The order of metals and carbon in the reactivity series Representing chemical reactions using formulas and using equationsThermal decomposition  | * Use evidence to identify the reactivity series of metals
* Represent reactions using formulas and equations
 | Worksheet 3.3.3; Practical sheet 3.3.3; Technician's notes 3.3.3 | Quick starter; Interactive activity: Place, in order, the metals from most to least reactive; Slideshow: Reactivity of metals: Some examples |  |
| 3.3.4 | Making use of displacement reactions | The order of metals and carbon in the reactivity series Representing chemical reactions using formulas and using equationsDisplacement reactions Conservation of mass changes of state and chemical reactions | * Represent and explain displacement reactions using formulas and equations
* Make inferences about reactivity from displacement reactions
 | Worksheet 3.3.4; Practical sheet 3.3.4; Technician's notes 3.3.4 | Quick starter; Interactive activity: Match the reactants to the products; Interactive activity: Place, in order, the elements from most to least reactive |  |
| 3.3.5 | Using carbon to extract iron  | The use of carbon in obtaining metals from metal oxides Representing chemical reactions using formulas and using equationsConservation of mass changes of state and chemical reactions | * Represent displacement reactions with carbon and metal oxides using formulas and equations
* Explain how mass is conserved in the extraction of metals
 | Worksheet 3.3.5; Technician's notes 3.3.5 | Quick starter; Interactive activity: Drag the statements to the correct group; Slideshow: The blast furnace – what goes in, and what comes out |  |
| 3.3.6 | Extracting copper, lead and zinc | The use of carbon in obtaining metals from metal oxides Representing chemical reactions using formulas and using equations | * Explain how copper, lead and zinc are extracted from their ores
* Calculate the yield of the extraction process
 | Worksheet 3.3.6; Practical sheet 3.3.6; Technician's notes 3.3.6 | Quick starter; Interactive activity: Drag the statements to the correct group - reduction, oxidation or decomposition | Include the use of carbon to extract iron, from 3.3.5, and the impacts of extraction, from 3.3.7 |
| 3.3.7 | Looking at the impact of metal extraction | The use of carbon in obtaining metals from metal oxides The production of carbon dioxide by human activity and the impact on climate Earth as a source of limited resources and the efficacy of recycling | * Describe the environmental impacts of metal extraction
* Describe how recycling of metals reduces damage to the environment
 | Worksheet 3.3.7 | Quick starter; Video; Interactive activity: Match the pollution to its effect; Slideshow: Recycling metals – a look at how we recycle metals, including e-waste; Hangman: Key vocabulary game |  |
| 3.3.8 | Applying key ideas |  | * Extract ideas relating to how metals are used to protect each other
* Apply ideas about the reactivity series, writing word equations for displacement reactions
* Use ideas and information about particles to write balanced symbol equations and write detailed explanations of metal extraction processes
 |  |  |  |
| 3.8.9 | Understanding exothermic reactions  | Internal energy stored in materialsExothermic chemical reactions (qualitative)Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with chemical compositions | * Describe examples of exothermic reactions
* Explain the energy changes taking place during an exothermic reaction
 | Worksheet 3.3.9; Practical sheet 3.3.9; Technician's notes 3.3.9 | Quick starter; Interactive activity: Reorder the sentences to describe what happens when substances react |  |
| 3.3.10 | Comparing endothermic and exothermic reactions | Exothermic and endothermic chemical reactions (qualitative)Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with chemical compositions | * Describe examples of endothermic reactions
* Compare the energy changes during exothermic and endothermic reactions
 | Worksheet 3.3.10; Practical sheet 3.3.10; Technician's notes 3.3.10 | Quick starter; Interactive activity: Drag the statements to the correct group - exothermic or endothermic change | Begin by introducing exothermic reactions, from 3.3.9 |
| 3.3.11 | Explaining the use of catalysts | What catalysts do | * Describe what a catalyst is
* Explain how catalysts work
 | Worksheet 3.3.11; Practical sheet 3.3.11; Technician's notes 3.3.11 | Quick starter; Slideshow: Catalysis of hydrogen peroxide decomposition – a method to compare catalytic effectiveness; Interactive activity: Match the catalyst to its use |  |
| 3.3.12 | Exploring ceramics and their properties | Properties of ceramics (qualitative)  | * Describe what is meant by the term ceramic
* Describe the properties of ceramics
 | Worksheet 3.3.12; Practical sheet 3.3.12 | Quick starter; Interactive activity: Drag the statements to the correct group - ceramic, plastic or metal; Video |  |
| 3.3.13 | Matching properties of ceramics to their uses | Properties of ceramics (qualitative)  | * Explain how the properties of ceramics determine their uses
 | Worksheet 3.3.13 | Quick starter; Slideshow: Ceramic materials – what are they, and where are they used?; Interactive activity: Place the materials, in order, from highest to lowest melting point | Include a discussion of properties, from 3.3.12 |
| 3.3.14 | Exploring natural polymers | Properties of polymers (qualitative)  | * Explain what a polymer is
* Describe examples of natural polymers
 | Worksheet 3.3.14; Technician's notes 3.3.14 | Quick starter; Interactive activity: Match the monomer to the polymer; Slideshow: Some natural polymers – examples |  |
| 3.3.15 | Using human-made polymers | Properties of polymers (qualitative)  | * Describe how human-made polymers are made in simple terms
* Describe uses for human-made polymers
 | Worksheet 3.3.15 | Quick starter; Video; Interactive activity: Reorder the sentences to describe how to make polypropene film; Interactive activity: Match the polymer to its use |  |
| 3.3.16 | Explaining composites | Properties of composites (qualitative) | * Explain what is meant by the term ‘composite’
* Describe some uses of natural composites
 | Worksheet 3.3.16; Practical sheet 3.3.16; Technician's notes 3.3.16 | Quick starter; Slideshow: Composites – examples of use; Interactive activity: Drag the statements to the correct group - human-made composites, natural composites, binder or reinforcer | May be merged with 3.3.17 |
| 3.3.17 | Using human-made composites | Properties of composites (qualitative) | * Explain how human-made composites were developed
* Describe the properties and uses of human-made composites
 | Worksheet 3.3.17; Practical sheet 3.3.17; Technician's notes 3.3.17 | Quick starter; Interactive activity: Place the materials, in order, from least to most dense; Interactive activity: Matching metals and composites to their tensile strength:mass ratio; Hangman: Key vocabulary game | May be merged with 3.3.16 |
| Chapter 4: Using our Earth Sustainably |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.4.2 | Understanding our atmosphere | The composition of the atmosphere  | * Describe the composition of our atmosphere
* Describe how the atmosphere has changed over time
* Explain why the atmosphere has changed
 | Worksheet 3.4.2; Practical sheet 3.4.2; Technician's notes 3.4.2 | Quick starter; Interactive activity: Drag the statements to the correct group - element in clean air, compound in clean air, or pollutant in air; Interactive activity: Match the components of air to the percentages present |  |
| 3.4.3 | Exploring the effects of human activity | The production of carbon dioxide by human activity and the impact on climate  | * Describe examples of human activity that cause air pollution
* Explain the effects of smog, acid rain and damage to the ozone layer
 | Worksheet 3.4.3a; Worksheet 3.4.3b; Practical sheet 3.4.3; Technician's notes 3.4.3 | Quick starter; Slideshow: Effects of air pollution – carbon dioxide, UV, ozone and acid rain; Video | May be merged with 3.4.4 |
| 3.4.4 | Understanding the global warming debate | The production of carbon dioxide by human activity and the impact on climate | * Describe the effects of global warming
* Explain the consequences of global warming for living things
* Evaluate the arguments for human activity impacting on global warming
 | Worksheet 3.4.4 | Quick starter; Interactive activity: Reorder the sentences to describe how we receive energy from the Sun; Interactive activity: Match the sea surface temperature to the year | May be merged with 3.4.3 |
| 3.4.5 | Understanding how carbon is recycled | The carbon cycle | * Describe the carbon cycle
* Explain how human activity increases the amount of carbon in the atmosphere
* Explain what is meant by a ‘carbon footprint’
 | Worksheet 3.4.5; Practical sheet 3.4.5 | Quick starter; Interactive activity: Drag the statements to the correct group - decomposers or green plants; Slideshow – carbon cycle: releasing carbon dioxide; Interactive activity: Match the changes in the carbon cycle to the correct term |  |
| 3.4.6 | Exploring damage to the Earth’s resources | Earth as a source of limited resources and the efficacy of recycling | * Describe resources that the Earth provides
* Explain how human activity limits these resources
* Justify decisions about making changes to the environment
 | Worksheet 3.4.6 | Quick starter; Interactive activity: Drag the statements to the most appropriate group - scars the landscape, pollutes the air, or damages or destroys natural habitats; Video |  |
| 3.4.7 | Considering the importance of recycling | Earth as a source of limited resources and the efficacy of recycling | * Describe examples of recycling
* Explain the benefits and limitations of recycling schemes
* Compare the efficiency of recycling methods
 | Worksheet 3.4.7; Practical sheet 3.4.7; Technician's notes 3.4.7 | Quick starter; Interactive activity: Place the materials in order, from the fastest to decompose to the slowest; Slideshow: Recycling issues – a look at some issues of recycling, including its problems; Hangman: Key vocabulary game |  |
| 3.4.8 | Applying key ideas |  | * Extract ideas about damage to the Earth’s resources caused by landfill sites and the importance of recycling
* Apply ideas about recycling in nature and by humans to a new situation
* Use ideas and information about global warming
 | Worksheet 3.4.8 |  |  |
| 3.4.9 | Understanding the structure of the Earth | The composition of the EarthThe structure of the Earth  | * Describe the layers of the Earth
* Describe the characteristics of the different layers
* Explain how volcanoes change the Earth
 | Worksheet 3.4.9a; Worksheet 3.4.9b | Quick starter; Interactive activity: Drag the statements to the correct group - inner core, outer core, mantle or crust; Video; Interactive activity: Reorder the sentences to describe how volcanoes form and erupt |  |
| 3.4.10 | Exploring igneous rocks | The rock cycle and the formation of igneous, sedimentary and metamorphic rocks | * Describe how igneous rocks are formed
* Explain how the pH of the magma affects the formation of rocks
* Investigate the effect of cooling rate on the formation of crystals
 | Worksheet 3.4.10; Practical sheet 3.4.10a; Practical sheet 3.4.10b; Technician's notes 3.4.10 | Quick starter; Interactive activity: Drag the statements to the correct group - volcanoes producing acidic magma or alkaline magma; Interactive activity: Match the cooling rate to the crystal size |  |
| 3.4.11 | Studying sedimentary rocks  | The rock cycle and the formation of igneous, sedimentary and metamorphic rocks | * Describe how sedimentary rocks are formed
* Explain how fossils give clues about the past
* Explain the properties of sedimentary rocks
 | Worksheet 3.4.11; Practical sheet 3.4.11a; Practical sheet 3.4.11b; Technician's notes 3.4.11 | Quick starter; Video; Slideshow: Clues from fossils – what do fossils tell us?; Interactive activity: Reorder the sentences to describe the freeze-thaw process  |  |
| 3.4.12 | Using metamorphic rocks | The rock cycle and the formation of igneous, sedimentary and metamorphic rocks | * Name some examples of metamorphic rocks
* Describe how metamorphic rocks are formed
* Explain why metamorphic rocks are suited to their uses
 | Worksheet 3.4.12; Practical sheet 3.4.12; Technician's notes 3.4.12 | Quick starter; Interactive activity: Drag the statements to the correct group - metamorphic or rocks of other types; Interactive activity: Match the materials before and after metamorphic change |  |
| 3.4.13 | Understanding the rock cycle | The rock cycle and the formation of igneous, sedimentary and metamorphic rocks | * Describe the rock cycle
* Explain how rocks can change from one type to another
 | Worksheet 3.4.13a; Worksheet 3.4.13b; Practical sheet 3.4.13; Technician's notes 3.4.13 | Quick starter; Interactive activity: Place the processes of the rock cycle and the types of rock in the correct sequence, starting with 'Weathering and erosion'; Slideshow: Layers and folds – a look at how rocks are weathered; Hangman: Key vocabulary game |  |

|  |
| --- |
| Chapter 5: Motion on Earth and in Space |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.5.2 | Describing journeys with distance–time graphs | The representation of a journey on a distance–time graph  | * Gather relevant data to describe a journey
* Use the conventions of a distance–time graph
* Display the data on a distance–time graph
 | Worksheet 3.5.2; Practical sheet 3.5.2; Technician's notes 3.5.2 | Quick starter; Slideshow: Time-lapse photography – some examples; Interactive activity: Match the sentences about distance–time graphs for a car journey |  |
| 3.5.3 | Exploring journeys on distance–time graphs | The representation of a journey on a distance–time graph Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)  | * Interpret distance–time graphs to learn about the journeys represented
* Relate distance–time graphs to different situations and describe what they show
 | Worksheet 3.5.3; Practical sheet 3.5.3; Technician's notes 3.5.3 | Quick starter; Video; Interactive activity: Drag the statements into the correct group - those which describe acceleration, and those which do not |  |
| 3.5.4 | Understanding relative motion | Relative motion: trains and cars passing one another | * Describe the motion of objects in relation to each other
* Explain the concept of relative motion
* Apply the concept of relative motion to various situations
 | Worksheet 3.5.4; Practical sheet 3.5.4; Technician's notes 3.5.4 | Quick starter; Interactive activity: Order the relative speeds of the cars, from the fastest to the slowest |  |
| 3.5.5 | Analysing equilibrium | Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surfaceUsing force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces | * Analyse situations to identify the various forces that are acting
* Explore static situations in which objects are held in equilibrium and the nature of the forces involved
 | Worksheet 3.5.5; Practical sheet 3.5.5; Technician's notes 3.5.5 | Quick starter; Video; Interactive activity: Drag the statements into the correct group - those which describe forces in equilibrium, and those which do not |  |
| 3.5.6 | Exploring motion and equilibrium | Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forcesForces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) | * Explore dynamic situations which may involve equilibrium
* Apply ideas about equilibrium to a situation in which an object is moving
 | Worksheet 3.5.6; Practical sheet 3.5.6; Technician's notes 3.5.6 | Quick starter; Slideshow: Forces in sky-diving – from free-fall to an open parachute; Interactive activity: Match the sentences about motion and equilibrium; Hangman: Key vocabulary game |  |
| 3.5.7 | Applying key ideas |  | * Analyse distance–time data
* Interpret data and apply ideas about motion to the context of ferry and train travel
* Use ideas about forces, including equilibrium, to compare and explain various aspects of motion
 |  |  |  |
| 3.5.8 | Understanding gravitational fields | Gravity force, weight = mass × gravitational field strength (g), on Earth g = 10 N/kg, different on other planets and stars | * Describe gravity as a non-contact force
* Explore the concept of gravitational field and weight
* Relate this concept to life on Earth
 | Worksheet 3.5.8 | Quick starter; Video; Interactive activity: Order the weights, from largest to smallest; Slideshow: Mass and weight – an explanation of the two |  |
| 3.5.9 | Applying ideas about gravitational fields | Gravity force, weight = mass × gravitational field strength (g), on Earth g = 10 N/kg, different on other planets and stars | * Apply the concept of gravity causing weight to other situations
* Explore implications of varying gravitational field strength
 | Worksheet 3.5.9 | Quick starter; Interactive activity: Drag the statements into the correct group - those which describe a strong gravitational field, and those which describe a weaker field |  |
| 3.5.10 | Looking at motion in the Solar System | Gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)  | * Relate ideas about gravitational fields to the Sun–Earth–Moon system
* Use these ideas to explain position and motion of these bodies
 | Worksheet 3.5.10 | Quick starter; Interactive activity: Order the planets of the Solar System, from the furthest from the Sun to the nearest; Slideshow: Orbital motion – a look at how we put satellites into space |  |
| 3.5.11 | Describing stars and galaxies | Our Sun as a star, other stars in our galaxy, other galaxies  | * Describe the characteristics of a star
* Relate our Sun to other stars
* Explain the concept of galaxies and the position of our galaxy compared to others
 | Worksheet 3.5.11 | Quick starter; Interactive activity: Match the statements about stars, galaxies and the Universe |  |
| 3.5.12 | Explaining the effects of the Earth's motion | The seasons and the Earth’s tilt, day length at different times of year, in different hemispheres  | * Describe variation in length of day, apparent position of the Sun and seasonal variations
* Compare these with changes in the opposite hemisphere
* Explain these changes with reference to the motion of the Earth
 | Worksheet 3.5.12; Practical sheet 3.5.12; Technician's notes 3.5.12 | Quick starter; Video; Slideshow: The effects of rotation and tilt – the Sun shines by day, and the moon shines by night … don't they?; Interactive activity: Reorder the sentences to explain the effect of the Earth's tilted axis |  |
|  3.5.13 | Measuring distances in the Universe | The light year as a unit of astronomical distance | * Recall that the light year is used to measure astronomical distances
* Explain the limitation of units such as km in describing astronomical distances
* Describe a technique for measuring the distance to distant objects
 | Worksheet 3.5.13; Practical sheet 3.5.13 | Quick starter; Interactive activity: Match the descriptions to the correct astronomical distances; Hangman: Key vocabulary game |  |
| Chapter 6: Waves and Energy Transfer |
| **Lesson** | **Lesson title** | **Overarching objectives** | **Learning objectives** | **CD-ROM resources** | **Collins Connect resources** | **Notes for two-year scheme** |
| 3.6.2 | Making waves | Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition | * Describe the movement of waves in water
* Understand reflection of waves
* Understand superposition of waves
 | Worksheet 3.6.2; Practical sheet 3.6.2; Technician's notes 3.6.2 | Quick starter; Slideshow: Making waves – a look at the up and down movement of waves; Video; Interactive activity: Define the key terms about waves and wave motion |  |
| 3.6.3 | Exploring light waves | The similarities and differences between light and waves in matterLight waves travelling through a vacuum; speed of light  | * Describe light as travelling in waves
* Understand the similarities and differences between water waves and light waves
* Explain the frequency of a wave
 | Worksheet 3.6.3 | Quick starter; Interactive activity: Drag the statements about light and sound into the correct group - true or false |  |
| 3.6.4 | Explaining properties of light waves | The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface | * Describe how light passes through different materials
* Understand how light can be absorbed by materials
* Explain the difference between diffuse scattering and specular reflection
 | Worksheet 3.6.4; Practical sheet 3.6.4; Technician's notes 3.6.4 | Quick starter; Slideshow: Windows, shadows and mirrors; Interactive activity: Order the materials, from the most transparent to the most opaque |  |
| 3.6.5 | Using the ray model | Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and convex lens in focusing (qualitative); the human eye | * Describe the ray model of light
* Explain how the direction of light rays can be changed
* Explain how a pinhole camera and the eye work
 | Worksheet 3.6.5; Practical sheet 3.6.5 | Quick starter; Interactive activity: Reorder the sentences to describe how light enters the eye |  |
| 3.6.6 | Understanding energy transfer by light  | Light transferring energy from source to absorber, leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras  | * Describe light as a way of transferring energy
* Give examples of chemical and electrical effects when materials absorb light
* Explain changes that happen when materials absorb light
 | Worksheet 3.6.6; Practical sheet 3.6.6; Technician's notes 3.6.6 | Quick starter; Interactive activity: Drag the objects into the correct group - source of light, or reflector of light; Slideshow: Making use of light energy; Video |  |
| 3.6.7 | Exploring coloured light | Colour and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection | * Describe how a spectrum can be produced from white light
* Compare the properties of light of different frequencies
* Explain how light of different wavelengths can be split and recombined
 | Worksheet 3.6.7; Practical sheet 3.6.7; Technician's notes 3.6.7 | Quick starter; Slideshow: Separating and combining colours; Interactive activity: Order the colours of the spectrum, from the shortest wavelength to the longest; Slideshow: Explaining refraction; Hangman: Key vocabulary game |  |
| 3.6.8 | Applying key ideas |  | * Extract ideas from the text about light and its properties
* Use information about reflection and refraction to explain the formation of rainbows
* Apply the ideas to explain the way CDs and DVDs can produce coloured light
 |  |  |  |
| 3.6.9 | Understanding energy transfer and change | Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes | * Describe the ways in which energy is stored
* Describe the ways that energy can be transferred from one store to another
* Explain that any change – physical or chemical – results in a transfer of energy
 | Worksheet 3.6.9 | Quick starter; Interactive activity: Match the description to the type of energy store; Video |  |
| 3.6.10 | Explaining thermal conduction and radiation | Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators | * Describe the warming and cooling of objects
* Explain the relationship between energy transfer and temperature change
* Compare the transfer of energy by thermal conduction and by radiation
 | Worksheet 3.6.10; Practical sheet 3.6.10; Technician's notes 3.6.10 | Quick starter; Slideshow: Energy transfers around the home; Interactive activity: Drag the statements and descriptions into the correct group - energy transfer by conduction, or energy transfer by radiation |  |
| 3.6.11 | Understanding energy transfers by fuels and food | Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change Comparing energy values of different foods (from labels) (kJ) Other processes that involve energy transfer: metabolism of food, burning fuels | * Describe the use of fuels in the home
* Explain that foods are energy stores and that the amount stored can be measured
* Explain that energy is not a material and can be neither created nor destroyed
 | Worksheet 3.6.11 | Quick starter; Interactive activity: Drag the units into the correct group - unit of energy, or not a unit of energy; Video |  |
| 3.6.12 | Comparing rates of energy transfer | Comparing power ratings of appliances in watts (W, kW) Comparing amounts of energy transferred (J, kJ, kW hour)  | * Describe what is meant by ‘rate of energy transfer’
* Recall and use the correct units for rate of energy transfer
* Calculate quantities of energy transferred when change happens
 | Worksheet 3.6.12 | Quick starter; Interactive activity: Match the calculated quantity to the correct description |  |
| 3.6.13 | Looking at the cost of energy use in the home | Comparing power ratings of appliances in watts (W, kW) Comparing amounts of energy transferred (J, kJ, kW hour)Domestic fuel bills, fuel use and costs  | * Describe the information a typical fuel bill provides
* Explain and use the units used on a fuel bill
* Explain how the cost of energy used can be calculated
 | Worksheet 3.6.13 | Quick starter; Interactive activity: Match the descriptions to the numbers and units found on household electricity bills; Hangman: Key vocabulary game |  |