

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 species The importance of maintaining biodiversity	<ul style="list-style-type: none"> Identify differences between different species Explain the importance of diversity 	Worksheet 3.1.2a; Worksheet 3.1.2b	Quick starter; Slideshow: The five kingdoms – protocists, 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	<ul style="list-style-type: none"> 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

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3.1.4	Exploring the causes of variation	Heredity as the process by which genetic information is transmitted from one generation to the next	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

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3.1.7	Applying key ideas		<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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

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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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

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3.1.13	Explaining extinction	<p>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</p> <p>The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</p>	<ul style="list-style-type: none"> • 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	
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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	<ul style="list-style-type: none"> • 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	<p>The effects of 'recreational' drugs (including substance misuse) on behaviour, health and life processes</p> <p>The impact of exercise, asthma and smoking on the human gas exchange system</p>	<ul style="list-style-type: none"> • 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

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3.2.4	Considering the dangers of cannabis	<p>The effects of 'recreational' drugs (including substance misuse) on behaviour, health and life processes</p> <p>The impact of exercise, asthma and smoking on the human gas exchange system</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Drag the statements into the correct group - for or against the legalisation of cannabis</p>	
3.2.5	Understanding the effects of alcohol	<p>The effects of 'recreational' drugs (including substance misuse) on behaviour, health and life processes</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Reorder the sentences to describe what happens to the body if a person continues to drink alcohol;</p> <p>Slideshow: Understanding the effects of alcohol: Information about alcohol and the dangers of long-term use; Video</p>	
3.2.6	Exploring the effects of other drugs	<p>The effects of 'recreational' drugs (including substance misuse) on behaviour, health and life processes</p>	<ul style="list-style-type: none"> • Describe the effects of different drugs on the body • Compare the dangers of different drugs 	Worksheet 3.2.6	<p>Quickstarter;</p> <p>Interactive activity: Drag the drugs into the correct group - legal or illegal</p>	

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3.2.7	Learning about addiction	The effects of 'recreational' drugs (including substance misuse) on behaviour, health and life processes	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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	

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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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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	

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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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> 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	<p>The order of metals and carbon in the reactivity series</p> <p>Representing chemical reactions using formulas and using equations</p> <p>Thermal decomposition</p>	<ul style="list-style-type: none"> 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	

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3.3.4	Making use of displacement reactions	<p>The order of metals and carbon in the reactivity series</p> <p>Representing chemical reactions using formulas and using equations</p> <p>Displacement reactions</p> <p>Conservation of mass changes of state and chemical reactions</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Match the reactants to the products;</p> <p>Interactive activity: Place, in order, the elements from most to least reactive</p>	
3.3.5	Using carbon to extract iron	<p>The use of carbon in obtaining metals from metal oxides</p> <p>Representing chemical reactions using formulas and using equations</p> <p>Conservation of mass changes of state and chemical reactions</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Drag the statements to the correct group;</p> <p>Slideshow: The blast furnace – what goes in, and what comes out</p>	
3.3.6	Extracting copper, lead and zinc	<p>The use of carbon in obtaining metals from metal oxides</p> <p>Representing chemical reactions using formulas and using equations</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Drag the statements to the correct group - reduction, oxidation or decomposition</p>	Include the use of carbon to extract iron, from 3.3.5, and the impacts of extraction, from 3.3.7

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3.3.7	Looking at the impact of metal extraction	<p>The use of carbon in obtaining metals from metal oxides</p> <p>The production of carbon dioxide by human activity and the impact on climate</p> <p>Earth as a source of limited resources and the efficacy of recycling</p>	<ul style="list-style-type: none"> • Describe the environmental impacts of metal extraction • Describe how recycling of metals reduces damage to the environment 	Worksheet 3.3.7	<p>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</p>	
3.3.8	Applying key ideas		<ul style="list-style-type: none"> • 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 			

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3.8.9	Understanding exothermic reactions	Internal energy stored in materials Exothermic 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	

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3.3.12	Exploring ceramics and their properties	Properties of ceramics (qualitative)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	

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3.3.16	Explaining composites	Properties of composites (qualitative)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

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3.4.5	Understanding how carbon is recycled	The carbon cycle	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

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3.4.8	Applying key ideas		<ul style="list-style-type: none"> • 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	<p>The composition of the Earth</p> <p>The structure of the Earth</p>	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

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3.4.11	Studying sedimentary rocks	The rock cycle and the formation of igneous, sedimentary and metamorphic rocks	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

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3.5.5	Analysing equilibrium	<p>Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</p> <p>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces</p>	<ul style="list-style-type: none"> 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	<p>Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</p> <p>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces</p> <p>Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</p>	<ul style="list-style-type: none"> 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	

Scheme of Work

3.5.7	Applying key ideas		<ul style="list-style-type: none"> 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 \times gravitational field strength (g), on Earth $g = 10 \text{ N/kg}$, different on other planets and stars	<ul style="list-style-type: none"> 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 \times gravitational field strength (g), on Earth $g = 10 \text{ N/kg}$, different on other planets and stars	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	

Scheme of Work

3.5.11	Describing stars and galaxies	Our Sun as a star, other stars in our galaxy, other galaxies	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 matter Light waves travelling through a vacuum; speed of light	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

Scheme of Work

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	

Scheme of Work

3.6.8	Applying key ideas		<ul style="list-style-type: none"> • 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	<p>Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</p> <p>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</p> <p>Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes</p>	<ul style="list-style-type: none"> • 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	

Scheme of Work

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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	

Scheme of Work

3.6.13	Looking at the cost of energy use in the home	<p>Comparing power ratings of appliances in watts (W, kW)</p> <p>Comparing amounts of energy transferred (J, kJ, kW hour)</p> <p>Domestic fuel bills, fuel use and costs</p>	<ul style="list-style-type: none"> • 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	<p>Quick starter;</p> <p>Interactive activity: Match the descriptions to the numbers and units found on household electricity bills;</p> <p>Hangman: Key vocabulary game</p>	
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