Ark Curriculum+ Science Progression

Aims

The fundamental aim of the Ark Curriculum Plus science curriculum is that, through learning a body of knowledge relating to key concepts alongside learning about the practices of science, pupils will be equipped with the knowledge and skills required to understand the uses, limitations, and implications of science, today and in the future.

Through their study of key scientific concepts, such as the characteristics of living organisms, pupils start to make sense of the world around them, and as such develop a sense of excitement and become curious about phenomena in nature (Ofsted *Research Review Series: Science*, 2021). Through learning about the scientific method, it is intended that pupils develop an understanding of the nature, processes, and methods of science. This is achieved by exposing pupils to different types of scientific enquiry, enabling them to answer increasingly complex scientific questions. By learning how scientific knowledge becomes established through scientific enquiry, pupils will also appreciate the nature and status of scientific knowledge—for example, knowing that 'facts' are open to revision in the light of new evidence.

As pupils learn science, they also learn about its uses and significance to society and their own lives. This highlights the significant historical contribution science has made to our lives—for example, through our understanding of how to maintain a healthy body. Pupils will also learn about the continuing importance of science in solving contemporary global challenges such as climate change and food availability.

Substantive and disciplinary content in science

To become experts in the field of science, pupils need to build both substantive and disciplinary knowledge. Substantive knowledge refers to the knowledge of science—its concepts, models, laws, and theories. Disciplinary knowledge is knowledge of the practices of science—also known as the scientific method. It enables scientists to collect, understand, and evaluate scientific evidence.

The Ark Curriculum Plus science curriculum ensures that pupils not only have broad and strong substantive knowledge—a coherent knowledge of key scientific concepts—but also an understanding of the scientific method. The content is structured so that pupils learn substantive content (the 'facts') alongside disciplinary content ('how we know this'). By learning substantive and disciplinary knowledge together, pupils develop an understanding of the foundations of scientific knowledge and are able to articulate how this knowledge was gained and may be applied in a range of contexts. This enables pupils to begin to make connections between different aspects of their knowledge, securing a deeper level of understanding and providing a springboard to science learning at secondary level and beyond.

Substantive knowledge

Substantive scientific knowledge is generally divided into three subject strands—Biology, Physics, and Chemistry. However, this distinction is not used in the National Curriculum until Key Stage 3. Therefore, individual topic names (as stated in the National Curriculum) are used in the progression map below. For reference, this table shows which overall strand of knowledge the topics are taken from:

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Biology	Physics	Chemistry
Plants Animals, including humans Living things and their habitats Evolution and inheritance	Light Forces and magnets Sound Electricity Earth and space Weather and seasons	Materials

Disciplinary knowledge

Disciplinary knowledge is referred to as 'Working Scientifically' in the National Curriculum Programmes of study. Here, it specifies the understanding of the nature, processes, and methods of science which should be covered for each year group. It includes exposing pupils to the many different types of scientific enquiry and knowing how to carry out practical procedures. It also teaches pupils how scientific knowledge becomes established and gets revised. The Working Scientifically curriculum is fully integrated with substantive knowledge throughout the Ark Curriculum Plus science curriculum, in line with best practice in developing scientific curricula.

The disciplinary concepts we focus on in KS1 and KS2 are:

DC1: Ask relevant questions and use different types of scientific enquiries to answer them.

DC2: Plan simple scientific enquiries.

DC3: Use a range of equipment.

DC4: Make careful observations.

DC5: Record findings using simple scientific language, drawings, and labelled diagrams.

DC6: Present data.

DC7: Use results to draw simple conclusions and make predictions. Report on findings from enquiries, including oral and written explanations.

DC8: Use models to represent a scientific concept or process.

Science sequence rationale

Science Mastery aims to enable pupils to recognise the connectedness of science, and how each new topic connects to everyday life and familiar contexts. Each unit provides a strong foundation of scientific knowledge and skills that can empower and equip pupils to participate, challenge, and reshape the world around them.

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The National Curriculum states that science teaching should ensure pupils develop:

- their scientific knowledge and conceptual understanding in the specific disciplines of biology, chemistry, and physics
- an understanding of the nature, processes, and methods of science through different types of science enquiries that help them to answer specific questions about the world around them
- a 'toolkit' of the scientific knowledge required to understand the uses and implications of science today and for the future.

The AC+ science curriculum is fully aligned to the National Curriculum. The units of work ensure pupils gain the knowledge they need to discover, understand, and begin to explain the world and phenomena around them whilst also ensuring pupils are equipped with the skills and knowledge of processes through which science is achieved and applied. The knowledge builds sequentially in the three disciplines, with pupils often revisiting an idea or concept in a later unit. In some units, progression is clear. However, in others, it is within a more complex thread of learning:

Biology	Organisms, ecosystems, and genes
Chemistry	Properties of matter, uses of matter, and changing matter
Physics	Forces, energy, and Earth physics

The unit order is built in a way that ensures pupils have the knowledge they need to work scientifically in a meaningful way. Rather than pupils learning solely from practical work, they will gain knowledge of the scientific concept first, before deepening it through 'working scientifically'. The different types of scientific enquiry have been incorporated across the units and, as a result, pupils encounter opportunities to take part in observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair testing, and researching using secondary sources.

Pupils are also entitled to understand how science works in their own lives and in the lives of others. Understanding science will support pupils in developing positive attitudes towards the discipline and may mean that pupils are motivated to study science further. Science matters in the world and therefore pupils have the right to be scientifically literate.

You can find the prior and future learning in the *Unit planning guide* for every unit.

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Physics

Weather and seasons
- Autumn and winter—Y1
- Spring and summer—Y1

Forces and magnets
- Forces and magnets—Y3
- Forces—Y5

Light
- Light and shadows—Y3
- Light—Y6

Sound
- Sound—Y4

Electricity
- Electricity—Y4
- Electricity—Y6

Earth and space
- Earth and space—Y5

Chemistry

Materials
- Everyday materials—Y1
- Uses of materials—Y2
- Rocks and fossils—Y3
- States of matter—Y4
- Materials: Properties and changes—Y5

Biology

Plants
- Plants—Y1
- Plants: Bulbs and growth—Y2
- Plants: Needs for survival—Y3

Animals including humans
- Amazing animals—Y1
- Animals: Needs for survival—Y2
- Skeletons, muscles, and nutrition—Y3
- Teeth and digestion—Y4
- Growing older –Y5
- Circulation and lifestyle—Y6

Living things and their habitats
- Habitats—Y2
- Protecting our environment—Y2
- Living things and environments—Y4
- Life cycles—Y5
- Classification—Y6

Evolution and inheritance
- Evolution and inheritance—Y6

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National Curriculum Unit Links

Early Years Foundation Stage

The Key Stage 1 and Key Stage 2 curriculum builds on the National Curriculum framework for Early Years Foundation Stage, especially the area of learning and development 'Understanding the World'. The framework gives three Early Learning Goals for this section. The goal below provides pupils with a strong foundation on which to build on their science knowledge and skills:

Understanding the World: *The Natural World*
Children at the expected level of development will: • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Key Stage 1

NC Requirement	Year 1	Year 2
Plants (Year 1, 2)	Unit 5: *Plants*	Unit 5: *Plants and growth*
Animals, including humans (Year 1, 2)	Unit 3: *Amazing animals*	Unit 2: *Animals and survival*
Everyday materials (Year 1)	Unit 1: *Everyday materials*	
Seasonal changes (Year 1)	Unit 2: *Autumn and winter* Unit 4: *Spring and summer*	
Living things and their habitats (Year 1)	Part of Units 2–4	
Uses of everyday materials (Year 2)		Unit 1: *Uses of materials*

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Key Stage 2

NC Requirement	Year 3	Year 4	Year 5	Year 6
Plants (Year 3)	Unit 4: *Plants—Needs for survival*			
Animals, including humans (Year 3, 4, 5, 6)	Unit 1: *Skeletons, muscles, and nutrition*	Unit 1: *Teeth and digestion*	Unit 5: *Growing older*	Unit 5: *Circulatory system and lifestyle*
Rocks (Year 3)	Unit 2: *Rocks and fossils*			
Light (Year 3, 6)	Unit 3: *Light and shadows*			Unit 1: *Light*
Forces and magnets (Year 3)	Unit 5: *Forces and magnets*			
Living things and their habitats (Year 4, 5, 6)		Unit 3: *Living things and environments*	Unit 4: *Life cycles*	Unit 2: *Classification*
States of matter (Year 4)		Unit 2: *States of matter*		
Sound (Year 4)		Unit 4: *Sound*		
Electricity (Year 4, 6)		Unit 5: *Electricity*		Unit 4: *Electricity*
Properties and changes of materials (Year 5)			Unit 3: *Materials*	
Earth and space (Year 5)			Unit 1: *Earth and space*	
Forces (Year 5)			Unit 2: *Forces*	
Evolution and inheritance (Year 6)				Unit 3: *Evolution and inheritance*

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Disciplinary concepts and working scientifically (from the National Curriculum):

	DC1: Asking scientific questions	DC2: Planning scientific enquiries	DC3: Using scientific equipment	DC4: Taking measurements and observations	DC5: Recording data	DC6: Presenting data	DC7: Forming conclusions	DC8: Using models
Year 1 & Year 2	Asking simple questions and recognising that they can be answered in different ways.		Observing closely, using simple equipment.	Observing closely, using simple equipment. Performing simple tests.	Gathering and recording data to help in answering questions.	Identifying and classifying.	Using their observations and ideas to suggest answers to questions.	
Year 3 & Year 4	Asking relevant questions and using different types of scientific enquiries to answer them. Using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions.	Setting up simple practical enquiries, comparative and fair tests.	Setting up simple practical enquiries, comparative and fair tests. Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. Identifying differences, similarities, or changes related to simple scientific ideas and processes.	Gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Reporting on findings from enquiries, including oral and written	Asking relevant questions and using different types of scientific enquiries to answer them. Using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions. Using straightforward scientific evidence to answer questions or to	Reporting on findings from enquiries, including oral and written explanations, displays, or presentations of results and conclusions.

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						explanations, displays, or presentations of results and conclusions.	support their findings.	
Year 5 & Year 6	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. Using test results to make predictions to set up further comparative and fair tests.	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs.	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs. Reporting and presenting findings from enquiries, including conclusions, causal relationships, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	Identifying scientific evidence that has been used to support or refute ideas or arguments.	Reporting and presenting findings from enquiries, including conclusions, causal relationships, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

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Planning resources	Progression document (1 per subject) *Where all the disciplinary, substantive, and key learning concepts can be found from Year 1–6 and the progression of these concepts.*	Unit planning guidance (1 per unit) *Teacher guidance on how to teach each step of the lesson and where to find the unit's prior and future learning, the substantive and disciplinary concepts within that unit, and the key terms and knowledge.*	Subject knowledge guide *(1 per unit)* *A teacher-facing resource to inform and guide the teacher on the basic subject knowledge they need to know to successfully and confidently teach that unit.*	
Teaching resources	PowerPoint teaching slides (1 set per lesson) *Slides to support and guide the teacher and pupils through each stage of the lesson.*			
Pupil resources	Workbook (KS1: 3 per year; KS2: 1 per year) *A pupil resource where pupils complete the majority of their activities.*	Additional lesson resources (number varies per lesson) *Extra documents to support pupil activities. E.g., sorting cards.*	Knowledge organiser (1 per unit) *A pupil resource which includes all the key learning of that unit. This could be sent home with pupils or attached to the workbook.*	Knowledge quiz booklet (KS1: 1 per year) *Every unit's knowledge quiz and score table for KS1.*

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Science Mastery

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Year 1, Unit 1: *Everyday materials*

Disciplinary concepts: DC1, DC4, DC5, DC7		**Substantive concepts:** Objects can be made from a variety of materials. Everyday materials include wood, plastic, glass, metal, water, and rock. Different materials have different physical properties.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are materials?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	material	A **material** is the substance that an object is made from.
2. Which materials are different objects made from?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	object	An **object** can be made from a variety of materials including wood, plastic, glass, and metal.
3. What are the properties of different materials?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	properties	Different materials have different **properties.**
4. What other properties can materials have?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	absorbent transparent waterproof	Properties of materials include being: **absorbent**, **transparent**, and/or **waterproof**.
5. Which materials should we use to make objects?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	test	To **test** something is to find out if it works successfully.
6. Can we use properties to group, compare, and sort materials?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	group	Objects can be **grouped** using the properties of the materials they are made from.

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Science Mastery

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Year 1, Unit 2: *Autumn and winter*

Disciplinary concepts: DC1, DC4, DC5, DC6, DC7		**Substantive concepts:** There are four seasons—autumn, winter, spring, and summer. Different types of weather are associated with different seasons. Day length varies in different seasons.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are the four seasons?	DC6: Present data as a collage.	season	There are four **seasons** in the year—autumn, winter, spring, and summer.
2. What is the weather like in autumn?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	weather	In autumn, the **weather** gets colder. It can be sunny, cloudy, windy, and rainy.
3. What happens to plants and animals in autumn?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	migration	In autumn, some birds **migrate** to warmer places, while other animals store food for the winter.
4. How does the weather change from autumn to winter?	DC6: Present data as a pictogram. DC7: Report on findings from enquiries, including oral and written explanations.	daylight	The days get shorter as the seasons change from autumn to winter. There are fewer hours of **daylight** in winter.
5. What is the weather like in winter?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC6: Present data. DC7: Report on findings from enquiries, including oral and written explanations.	snow	In winter the weather is much colder and it may **snow**.
6. What happens to animals in winter?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data.	hibernate	Some animals **hibernate** during the winter.

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Science Mastery

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Year 1, Unit 3: *Amazing animals*

Disciplinary concepts:		**Substantive concepts:** Animals can be grouped into fish, amphibians, reptiles, birds, and mammals by their structural features. Animals can be grouped into carnivores, herbivores, and omnivores by the food they eat. The human body is made of many different parts; each has its own function. Humans have five senses: sight, hearing, touch, taste, and smell. Each sense uses different body parts.	
DC1, DC4, DC5			
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. Can we name and describe different animals?	DC4: Make careful observations.	animal	**Animals** are living things that eat, grow, breathe, reproduce, move, react, and get rid of waste.
2. Can we group animals into mammals, birds, and fish?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	categories	We can group animals into **categories**.
3. Can we group animals into reptiles and amphibians?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	characteristic	A **characteristic** is a feature some animals share.
4. What do mammals have in common?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	mammals	**Mammals** have fur or hair, are warm-blooded, have a backbone, and give birth to babies which they feed with milk.
5. Can we identify different birds?	DC4: Make careful observations.	birds	**Birds** have feathers, wings, and a beak. They are warm-blooded, have a backbone, and lay eggs.
6. Can we compare different fish?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	fish	**Fish** live in water and have scales, fins, and gills. They are cold-blooded, have a backbone, and lay eggs.

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	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.		
7. Can we compare animals from different categories?	DC4: Make careful observations.	compare	When **comparing** animals, you should mention both their similarities and their differences.
8. What do animals eat?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	teeth	**Teeth** are the hard, white things in our mouths that we use to eat food.
9. What makes a good and happy pet?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	pet	All **pets** need food, water, space, shelter, and medicine.
10. What are the basic parts of the human body? What do they do?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	skeleton	The body is made of many parts such as the **skeleton** which helps you to stand up and move around.

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Year 1, Unit 4: *Spring and summer*

Disciplinary concepts: DC4, DC5, DC6, DC7		**Substantive concepts:** There are four seasons—autumn, winter, spring, and summer. Different types of weather are associated with different seasons. Day length varies in different seasons.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. Can we describe the four seasons?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data.	month	There are twelve **months** in a year.
2. How does the weather change from winter to spring?	DC6: Present data as a pictogram. DC7: Report on findings from enquiries, including oral and written explanations.	temperature	The **temperature** is how we measure how hot or cold it is.
3. What happens to plants and animals in spring?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	spring	**Spring** is the season between winter and summer when plants begin to grow.
4. How does the weather change from spring to summer?	DC3: Use a range of equipment.	the Sun	The **Sun** is a star that gives Earth light and heat.
5. What happens to plants and animals in summer?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	summer	**Summer** is the warmest season of the year, coming between spring and autumn.
6. How do the changing seasons affect humans?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	celebrations	A **celebration** is a special event.

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Science Mastery

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Year 1, Unit 5: *Plants*

Disciplinary concepts: DC3, DC4, DC5, DC6, DC7		**Substantive concepts:** A plant is a living thing. The main parts of a plant are the stem, leaves, and roots. Plants can be grown by people or grow in the wild.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is a plant?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	plant	A **plant** is a living thing that usually has a stem, leaves, and roots.
2. What are the main parts of a plant?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC6: Present data as a diagram.	stem	The **stem** holds up the plant and carries water to the leaves.
3. What are some common garden plants?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a diagram.	garden plants	**Garden plants** are plants that people choose to grow.
4. What are some common wild plants?	DC4: Make careful observations. DC5: Record findings using scientific language, drawings, and labelled diagrams. DC6: Present data as a diagram.	wild plants	**Wild plants** grow by themselves.
5. What are the main parts of a tree?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using scientific language, drawings, and labelled diagrams. DC6: Present data as a diagram.	tree	A **tree** is a tall plant that can live a long time.
6. Why are plants important?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a diagram. DC7: Use results to draw simple conclusions and make predictions. Report on findings from enquiries, including oral and written explanations.	uses	To **use** something is to do something with it for a purpose.

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Year 2, Unit 1: *Uses of materials*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC4, DC5, DC7	Everyday materials include wood, metal, plastic, glass, brick, rock, paper, and cardboard. The material chosen to make an object or device is based on the suitability of its properties. The shapes of solid objects made from some materials can be changed by squashing, bending, twisting, and stretching.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. Can we identify the materials that different objects are made from?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	materials	**Materials** are what objects are made of.
2. Can we identify how materials are used in my local area?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	properties	A material is chosen to make an object because of its **properties**.
3. Can we compare the suitability of different materials?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	suitability	The properties of a material determine its **suitability** for use in an object.
4. How can the shapes of objects made from some materials be changed?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	flexible	If a **flexible** object is squashed, bent, twisted, or stretched it can change shape.
5. How can we help to stop plastic pollution?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	recycle	If an object or material can be **recycled**, it can be reused to make something new.
6. How are new materials discovered?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	discover	Scientists and inventors **discover** new materials which change the way humans live.

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Year 2, Unit 2: *Animals and survival*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC4, DC5, DC7	Animals, including humans, have offspring which grow into adults. The basic needs of animals, including humans, for survival include water, food, and air. To remain healthy it is important for humans to exercise, eat the right amounts of different types of food, and have good hygiene.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What do animals need to survive?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	survive	All animals need three basic things to **survive**: water, food, and air.
2. How do animals change as they grow up?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	offspring	Animals (including humans) have **offspring** which grow into adults.
3. Why is exercise important?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	exercise	**Exercise** makes muscles (including the heart) and bones stronger.
4. What is a balanced diet?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	nutrients	Food provides **nutrients** which are essential for survival.
5. Do I eat a balanced diet?	DC7: Report on findings from enquiries, including oral and written explanations.	balanced diet	A **balanced diet** contains the right amount of all the food groups.
6. What is hygiene and why is it important?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	hygiene	**Hygiene** is about keeping yourself and your environment clean in order to stay healthy.

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Year 2, Unit 3: *Habitats*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC4, DC5, DC7, DC8	Things can be living, dead, or never been alive. Plants and animals live in a variety of habitats, including microhabitats. Most living things live in habitats to which they are suited. Habitats provide for the basic needs of different kinds of animals and plants. The living things in a habitat depend on each other for survival. Animals obtain their food from plants and other animals. This can be shown using a simple food chain.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. Is it alive?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	living	Plants and animals are **living** things.
2. How do you know it's alive?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	life processes	The **life processes** carried out by all living things include movement, reproduction, sensitivity, growth, and nutrition.
3. Where do plants live?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	habitat	A **habitat** is a place where a living thing lives.
4. What animals can we find?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	microhabitat	Minibeasts live in **microhabitats**, like a rotten log.
5. Where do worms live?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	earthworm	An **earthworm's** habitat is dark, damp, and normally underground.
6. What can we find out about the habitats of the Arctic and the Sahara?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	needs	Habitats meet the **needs** of different animals in different ways.
7. Who eats who?	DC8: Use models to represent a scientific concept or process.	food chain	A **food chain** shows what an animal eats in its habitat.

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8. What longer food chains can we find?	DC8: Use models to represent a scientific concept or process.	depend	The animals in a food chain all begin by **depending** on plants.
9. What can we see now in our habitat?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	season	Different plants and animals may be seen in a habitat in different **seasons**.
10. What do we know about worms now?	DC4: Make careful observations.	life processes	Movement, reproduction, sensitivity, growth, and nutrition are some examples of **life processes**.

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Year 2, Unit 4: *Protecting the environment*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC4, DC5, DC6, DC7	Humans and their activities pose dangers to wildlife, through housing, traffic, waste, and pollution. Where possible materials should be recycled to reduce landfill and pollution. To ensure a sustainable supply of water and energy, these resources must be used efficiently. Trees are a source of food, fuel, oxygen, and timber. Trees provide a habitat for many animals.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. Can we explain the dangers to the local environment and the animals in it?	DC4: Make careful observations.	wildlife	Housing, traffic, and pollution all pose dangers to **wildlife**.
2. Why is recycling important?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a bar chart. DC7: Use results to draw simple conclusions and make predictions.	recycling	**Recycling** of materials reduces waste, reducing landfill and pollution.
3. How can we save water?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	efficient	Water must be used **efficiently** and not wasted to make sure there is enough for everyone.
4. How can we be energy efficient with electricity?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	non-renewable	Most electricity is made from fossil fuels, these are **non-renewable**.
5. Why are trees important?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	oxygen	Trees are an important source of food, fuel, and timber as well as providing **oxygen** and a habitat for many animals.
6. What difference can I make at home and at school?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	environment	Using energy and water efficiently, recycling and reusing materials, and looking after trees are all ways of protecting the **environment**.

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Year 2, Unit 5: *Plants and growth*

Disciplinary concepts: DC1, DC2, DC3, DC4, DC5, DC7		**Substantive concepts:** Seeds and bulbs grow into mature plants. Plants need water, light, and a suitable temperature to grow and stay healthy.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is a seed?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	seeds	Most plants grow from **seeds**.
2. What is inside a seed?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	embryo	Inside a seed is an **embryo** which, under the right conditions, will sprout and grow into a plant.
3. What does a seed need to germinate?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations. Use results to draw simple conclusions and make predictions.	germination	**Germination** is when the embryo inside the seed sprouts and starts to grow into a plant.
4. What do plants need to grow and survive?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	survive	Plants need light, water, a suitable temperature, and air to **survive**.
5. What is the life cycle of a plant?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	life cycle	The five stages in a plant **life cycle** are: seed, germination, growth, reproduction, and dispersal.
6. Can we explain what seeds need to germinate and grow?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	instructions	Seed packets have **instructions** explaining what seeds need to germinate and how to care for a young growing plant.

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Year 3, Unit 1: *Skeletons, muscles, and nutrition*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC3, DC4, DC5, DC6, DC7	Animals, including humans, need the right types and amount of nutrition. Animals cannot make their own food; they get nutrition from what they eat. Humans and some other animals have skeletons and muscles for support, protection, and movement.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What does the human skeleton look like?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	skeleton	The human **skeleton** is a structure of bones that supports the human body.
2. What is the function of the human skeleton?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	support	The human skeleton has three main functions: to **support** the body, protect vital organs, and allow movement.
3. How do bones and muscles work together?	DC3: Use a range of equipment. DC4: Make careful observations. DC5 Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a bar chart. DC7: Use results to draw simple conclusions and make predictions.	muscle	**Muscles** pull on your bones to allow you to move.
4. How are skeletons different in animals?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	vertebrate	A **vertebrate** is an animal with a backbone.
5. What is nutrition and where does it come from?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	nutrition	**Nutrition** is the process of giving your body the food it needs to grow and work properly.
6. How do different animals get the nutrition they need?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	herbivore	Animals can be **herbivores**, carnivores, or omnivores.

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Year 3, Unit 2: *Rocks and fossils*

Disciplinary concepts: DC3, DC4, DC5, DC7		**Substantive concepts:** Rocks can be grouped by their appearance and simple physical properties. Fossils are formed when things that have lived are trapped within rock. Soils are made from rocks and organic matter.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are rocks?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	rock	**Rocks** are solid materials made up of minerals.
2. What are different types of rock?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	igneous rock metamorphic rock sedimentary rock	There are three types of rock: **sedimentary**, **igneous**, and **metamorphic**.
3. What are some of the properties of different types of rock?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	permeable	**Permeable** rocks allow water and air to pass through them.
4. How can we use different rocks?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	properties	The **properties** of different rocks make them suitable for different uses.
5. What are fossils and how are they formed?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	fossils	**Fossils** are the remains or trace of a plant or an animal from a long time ago.
6. What is soil?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	soil	**Soil** is a mixture of tiny particles of rock, dead plants and animals, air, and water.

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Year 3, Unit 3: *Light and shadows*

Disciplinary concepts:

DC1, DC3, DC4, DC5, DC7, DC8

Substantive concepts:

Light is needed to see things.
Darkness is the absence of light.
Light is reflected from surfaces.
Light from the sun can be dangerous, and eyes should be protected from sunlight.
Shadows are formed when the light from a light source is blocked by an opaque object.
There are patterns in the way that the size of shadows change.

Lesson sequence	Disciplinary concepts	Key terms	Key takeaway
1. What is a light source?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	light source	Objects that give off light are called **light sources**.
2. How can we protect ourselves from the Sun?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	Ultraviolet (UV) light	**Ultraviolet (UV)** light can result in sunburn, skin ageing, and illness.
3. How does light travel?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC8: Use models to represent a scientific concept or process.	light	**Light** travels in straight lines.
4. Does light travel through all materials?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	opaque	Transparent materials allow all light to pass through them whereas **opaque** materials allow no light to pass through them.
5. How are shadows formed?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	shadow	**Shadows** are formed when light is blocked by an object.

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6.	How can we vary the size and position of shadows?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	shadow	The closer an object is to a light source, the bigger the **shadow** becomes.
7.	How can we use shadows to tell a story?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	shadow	**Shadow** puppet images are produced when a puppet blocks light, forming a shadow on the screen.
8.	What types of materials reflect light?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	reflective	**Reflective** materials are smooth and shiny.
9.	What do mirrors do to light?	DC4: Make careful observations.	reflection	A mirror produces a reflected image, called a **reflection**.
10.	How can we see around corners?	DC4: Make careful observations. DC8: Use models to represent a scientific concept or process.	periscopes	**Periscopes** are used to see things when there is no direct line of sight.

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Year 3, Unit 4: *Plants—Needs for survival*

Disciplinary concepts: DC1, DC4, DC5, DC7		**Substantive concepts:** Flowering plants have roots, a stem/trunk, leaves, and flowers. Plants require air, light, water, nutrients from the soil, and room to grow. Water is transported within plants in vessels. Flowers play an important role in the life cycle of flowering plants, including pollination, seed formation, and seed dispersal.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What does a plant need to grow?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	nutrients	All plants need five things for life: light, water, air, **nutrients**, and space to grow.
2. Why do plants have roots?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	roots	**Roots** anchor a plant into the ground and take in water and nutrients from the soil.
3. Why do plants have a stem?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	stem	A **stem** supports the plant, holds the leaves towards the light, and transports water and nutrients from the roots to the rest of the plant in vessels.
4. Why do plants have leaves?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	leaves	Plants produce their own food using their **leaves** (by photosynthesis).
5. What are the parts of a flower?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	pollination	**Pollination** is the process by which pollen is transferred from an anther to a stigma.
6. What is the life cycle of a flowering plant?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	life cycle	There are five stages in the **life cycle** of a plant: germination, growing and

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	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.		flowering, pollination, fertilisation and seed formation, and seed dispersal.

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Year 3, Unit 5: *Forces and magnets*

Disciplinary concepts:	**Substantive concepts:**
DC3, DC4, DC5, DC7, DC8	Objects experience different amounts of friction on different surfaces. Some forces need contact between two objects, but magnetic forces can act at a distance. Some materials are magnetic, meaning they are attracted to a magnet. Magnets have two poles. Magnets can attract or repel each other, depending on which poles are facing each other.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are forces?	DC8: Use models to represent a scientific concept or process.	force	When a **force** is applied to an object, it will cause the object to change its speed, direction, or shape.
2. How do objects move on different surfaces?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions. DC8: Use models to represent a scientific concept or process.	friction	**Friction** is a force that slows down moving objects.
3. What is a magnet and how do magnets behave?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	magnet	All **magnets** have two poles (a north and a south pole) where the magnetic forces are the strongest.
4. Which materials are magnetic?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	magnetic material	**Magnetic materials** are usually metals. Iron, nickel, and cobalt are the only naturally occurring magnetic metals.

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5. Are some magnets stronger than others?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	magnetic material	You can investigate the strength of different magnets using **magnetic materials**.
6. How are magnets used in real-life situations?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	compass	Magnets have a number of uses, including inside a **compass** to help people to know the direction in which they are travelling.

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Year 4, Unit 1: *Teeth and digestion*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC2, DC3, DC4, DC5, DC7, DC8	The human digestive system contains a number of organs including the mouth, stomach, oesophagus, and intestines. The main types of human teeth are incisors, canines, molars, and premolars. Each type of tooth looks different and has a different function.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What do human teeth look like?	DC4: Make careful observations.	teeth	There are four different types of **teeth**: incisors, canines, premolars, and molars.
2. What can happen if we do not look after our teeth?	DC4: Make careful observations.	plaque	Removing **plaque** from teeth (by brushing) will prevent tooth decay.
3. Can eating and drinking damage our teeth?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	enamel	Food and drinks that contain sugar and acid can damage the **enamel** on teeth.
4. Do all animals have the same teeth?	DC4: Make careful observations.	canine	Different animals have different kinds of teeth, for example, carnivores have large **canines** for eating meat.
5. What makes up our digestive system?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	digestive system	The **digestive system** contains a number of organs including the mouth, oesophagus, stomach, and intestines.
6. How does our digestive system work?	DC8: Use models to represent a scientific concept or process.	nutrients	The digestive system breaks down food so that its **nutrients** can be absorbed into the bloodstream.

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Year 4, Unit 2: *States of matter*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC3, DC4, DC5, DC7, DC8	Materials can be grouped according to whether they are solids, liquids, or gases. Materials can change state when they are heated or cooled—this happens at different temperatures for different materials. Evaporation and condensation are key processes in the water cycle. Rate of evaporation is affected by temperature.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are the states of matter?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	states of matter	The three **states of matter** are solids, liquids, and gases.
2. What happens when you freeze liquids?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	freezing	**Freezing** is the change of state from a liquid to a solid.
3. What happens when you heat solids?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	melting	**Melting** is a change of state from a solid to a liquid.
4. What is the melting point of different solids?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	melting point	The **melting point** is the temperature when a solid changes to liquid.
5. What is evaporation?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	evaporation	**Evaporation** is the change of state from liquid to gas.

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	DC7: Use results to draw simple conclusions and make predictions.		
6. What is the water cycle?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC8: Use models to represent a scientific concept or process.	condensation	**Condensation** is the change of state from gas to liquid.

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Year 4, Unit 3: *Living things and environments*

Disciplinary concepts: DC1, DC3, DC4, DC5, DC6, DC7, DC8		**Substantive concepts:** Living things can be grouped in a variety of ways. Classification keys can be used to help group, identify and name living things. Environments can change and this can sometimes pose dangers to living things.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is a living thing?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	characteristic	All organisms display the seven **characteristics** of life.
2. What is a habitat?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	habitat	A **habitat** is the natural home of a plant or animal.
3. What are food chains and food webs?	DC8: Use models to represent a scientific concept or process.	food chains	**Food chains** show the feeding relationships between organisms and therefore the flow of energy in an ecosystem.
4. What is a vertebrate?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC7: Report on findings from enquiries, including oral and written explanations.	vertebrate	**Vertebrates** are animals with a backbone.
5. What is an invertebrate?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a pictogram. DC7: Report on findings from enquiries, including oral and written explanations.	invertebrate	**Invertebrates** are animals without a backbone.
6. What are classification keys?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	classification	**Classification** keys can be used to identify a living thing, or decide which group it belongs to by answering questions.

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7. How do you use classification keys?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	flowering	Classification keys can be used to identify **flowering** plants as these plants produce flowers and fruits.
8. How can environments change?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC7: Identifying differences, similarities, or changes related to simple scientific ideas and processes.	environment	Any change in an **environment** (caused naturally or by humans) will affect the organisms living there.
9. What is climate change and how can we prevent environmental change?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	global warming	Human activities are releasing gases (such as carbon dioxide) into the atmosphere which are causing **global warming**.
10. What impact are we having on our local environment?	DC7: Report on findings from enquiries, including oral and written explanations.	impact	Environmental changes can have a negative or positive **impact** on the environment.

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Year 4, Unit 4: *Sound*

Disciplinary concepts:	**Substantive concepts:**
DC2, DC3, DC4, DC5, DC7	Sounds are made when something vibrates. Vibrations from sounds travel through a medium to the ear. The pitch of a sound is affected by how quickly an object vibrates. The volume of a sound is determined by the strength of the vibrations that produced it. Sounds get fainter as the distance from the sound source increase.

Lesson sequence	Disciplinary concepts	Key terms	Key takeaway
1. What is sound and how is it made?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	vibrations	All sounds are made by **vibrations**.
2. How does sound travel?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	sound waves	Sound travels through solids, liquids, and gases as **sound waves**.
3. How do we hear?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	eardrum	Inside the ear sound waves cause the **eardrum** to vibrate, this then causes the inner ear to vibrate and send signals to the brain so we hear.
4. What changes the volume of a sound?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	volume	The larger the vibration, the louder the **volume** of sound produced.
5. What changes the pitch of a sound?	DC3: Use a range of equipment. DC4: Make careful observations.	pitch	The faster the vibration, the higher the **pitch** of the sound produced.

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	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.		
6. Make your own musical instrument	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	instrument	All **instruments** make sounds by vibrating, either by plucking, bowing, striking, strumming, or blowing.

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Year 4, Unit 5: *Electricity*

Disciplinary concepts:	**Substantive concepts:**
DC3, DC4, DC5, DC7	The brightness of a lamp or the volume of a buzzer is associated with the number and voltage of cells used in the circuit. Switches can be used to turn components on and off in a circuit. Circuit symbols are used when representing a simple circuit in a diagram.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is electricity and how do we use it?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	electricity	**Electricity** (electrical current) flows through wires and is used to make devices and appliances work.
2. How do I make an electrical circuit?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	circuit	A **circuit** is a complete loop of wire which lets electricity flow.
3. How can I make bulbs light up and turn off?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	switch	A **switch** can change a circuit to be complete or incomplete, turning components on and off.
4. What changes the brightness of a bulb in a circuit?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	light bulb	Adding more batteries to a circuit makes the **light bulbs** brighter.
5. What materials are conductors and insulators of electricity?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	conductor	**Conductors** are materials that allow electricity to pass through them.

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6. Design challenge	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	buzzer	A switch can be used in electrical appliances to turn on a component, such as a light, a **buzzer**, or motor.

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Year 5, Unit 1: *Earth and space*

Disciplinary concepts:	**Substantive concepts:**
DC4, DC5, DC6, DC7, DC8	Earth and other planets in the Solar System orbit around the Sun. The Moon orbits round Earth. The Sun, Earth, and the Moon are approximately spherical bodies. The rotation of Earth results in day and night, and the apparent movement of the Sun across the sky.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is the Sun and what is Earth?	DC8: Use models to represent a scientific concept or process.	Sun	The **Sun** is a star, a huge ball of burning gas that gives off light and heat.
2. What is the Solar System?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	Solar System	The **Solar System** has eight planets: (in order) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
3. Can we find patterns in the Solar System?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a bar chart. DC7: Use results to draw simple conclusions and make predictions. DC8: Use models to represent a scientific concept or process.	planet	The further a **planet** is away from the sun, the colder it is and the longer it takes it to orbit the Sun.
4. Why do we have night and day?	DC8: Use models to represent a scientific concept or process.	day	Earth takes 24 hours (one **day**) to fully rotate on its axis.
5. What are the phases of the Moon?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC8: Use models to represent a scientific concept or process.	moon	The **Moon** does not create its own light—we see the part of the Moon that is lit by the Sun.
6. How have theories about Earth and space changed over time?	DC8: Use models to represent a scientific concept or process.	universe	Scientists' ideas about the structure of the **universe** have changed over time.

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Year 5, Unit 2: *Forces*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC2, DC3, DC4, DC5, DC7, DC8	Unsupported objects fall towards Earth because of the force of gravity acting between Earth and the falling object. Air resistance, water resistance, and friction act between moving surfaces. Some mechanisms including levers, pulleys, and gears allow a smaller force to have a greater effect.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What are forces?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC8: Use models to represent a scientific concept or process.	force	**Forces** are pushes, pulls, or twists.
2. What is gravity?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	gravity	The force of **gravity** pulls objects towards each other.
3. What is friction?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	friction	The force of **friction** acts when two objects rub against each other, slowing something down.
4. What is air resistance?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	air resistance	**Air resistance** is a type of friction that acts on objects moving through air.
5. What is water resistance?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	water resistance	**Water resistance** is a type of friction that acts on objects moving through water.

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	DC7: Report on findings from enquiries, including oral and written explanations.		
6. What can simple machines do to forces?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	lever	A **lever** can be used to turn a small force into a bigger force.

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Year 5, Unit 3: *Materials*

Disciplinary Concepts:	**Substantive concepts:**
DC2, DC3, DC4, DC5, DC6, DC7	The properties of materials include their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. The particular uses of everyday materials, including metals, wood, and plastic depend on their properties. Some materials will dissolve in liquid to form a solution. Mixtures can be separated using filtering, sieving, and evaporating. Dissolving, mixing, and changes of state are reversible changes. Changes that result in the formation of new materials are not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What properties do materials have?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	property	The **property** of a material describes what it looks like and what it does.
2. What is a conductor?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	conductor	**Conductors** are materials that allow heat or electricity to pass through them easily.
3. How do materials respond to magnets?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	magnetic	**Magnetic** materials are attracted to a magnet such as iron and steel.
4. Which materials are soluble?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	soluble	If a material dissolves in water it is **soluble**.

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5. What factors affect dissolving?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a bar chart. DC7: Use results to draw simple conclusions and make predictions.	dissolve	Temperature and stirring affect the rate a solute **dissolves**.
6. How do we separate a mixture using filtration?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	filtration	A mixture of a solid and a liquid can be separated using **filtration**.
7. How do we separate a mixture using sieving?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	sieving	A mixture of solids can be separated using **sieving**.
8. Which separation methods will we use?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	separate	Mixtures can be **separated** using filtering, sieving, and evaporating.
9. What are reversible and irreversible changes?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	irreversible	An **irreversible** change means that, after the change has happened, the original material cannot be recovered.
10. Is it reversible or irreversible?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	reversible	When a **reversible** change has happened, the original material can be recovered.

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Year 5, Unit 4: *Life cycles*

Disciplinary concepts: DC1, DC4, DC5		**Substantive concepts:** There are differences in the life cycles of mammals, amphibians, insects, and birds. Plants and animals produce offspring by the life process of reproduction.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is a life cycle?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	life cycle	A **life cycle** is a sequence of stages in the life of a living organism.
2. How are the life cycles of birds and amphibians different from mammals?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	fertilisation	Eggs have to be **fertilised** to develop into embryos; this can occur inside or outside of an animal's body.
3. What are the main stages in the life cycles of insects?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	metamorphosis	During their life cycle, insects undergo **metamorphosis** where they dramatically change their appearance and what they can do.
4. What is pollination in the life cycle of a flowering plant?	DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	pollination	**Pollination** occurs when pollen from the male part of the flower is transferred to the female part.
5. What happens to seeds in the life cycle of flowering plants?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	dispersal	Seeds are **dispersed** away from the parent plant to an area where they have space to grow.
6. Who has contributed to our understanding of life cycles?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	naturalist	**Naturalists** are scientists who study plants and animals in their natural habitat**.**

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Year 5, Unit 5: *Growing older*

Disciplinary concepts: DC1, DC5, DC7		**Substantive concepts:** Humans experience a number of changes as they develop to old age.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. How do humans change as they grow?	DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	foetus	Human stages of development include embryo, **foetus**, baby, childhood, adolescence, adulthood, and old age.
2. How do babies and children develop?	DC7: Report on findings from enquiries, including oral and written explanations.	gestation period	The **gestation period** (pregnancy) is the length of time a foetus develops inside the uterus.
3. How is gestation different for different animals?	DC7: Use results to draw simple conclusions and make predictions.	gestation period	The **gestation period** (pregnancy) is the length of time a foetus develops inside the uterus.
4. What is puberty?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	puberty	**Puberty** is the name for the physical changes that happen during adolescence.
5. What is adolescence?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	adolescence	**Adolescence** is the stage of development in humans between childhood and adulthood, it includes both physical and emotional changes.
6. How do adults grow into old age?	DC7: Use results to draw simple conclusions and make predictions.	fertility	As an adult ages, their **fertility**, bone mass, and brain activity decline.

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Year 6, Unit 1: *Light*

Disciplinary concepts:	**Substantive concepts:**
DC1, DC2, DC3, DC4, DC5, DC7	Light travels in straight lines. Objects are seen because they give out or reflect light into the eye. We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. As light travels in straight lines shadows have the same shape as the objects that cast them.

Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. How do we see?	DC2: Plan simple scientific enquiries. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations.	light source	**Light sources** give out light. The light bounces off objects and into our eyes so that we can see them.
2. What do shadows tell us about light?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC2: Plan simple scientific enquiries. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Report on findings from enquiries, including oral and written explanations. Use results to draw simple conclusions and make predictions. Identify differences and similarities related to simple scientific ideas.	shadow	**Shadows** are formed when light is blocked by an object.
3. What is reflection?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language and labelled diagrams.	reflection	When light bounces off an object and changes direction it is called **reflection**.
4. What is refraction?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language.	refraction	Light changes speed and direction when it travels through transparent materials. This is called **refraction**.

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	DC7: Identify differences, similarities, or changes related to simple scientific ideas and processes. Report on findings from enquiries using oral and written explanation.		
5. What colour is light?	DC3: Use a range of equipment. DC4: Make careful observations. DC7: Report on findings from enquiries using oral and written explanation.	colour	Light is made up of different **colours**.
6. What is light pollution?	DC1: Ask relevant questions. DC7: Report on findings from enquiries using oral and written explanations.	light pollution	**Light pollution** is caused by the use of too much artificial light.

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Year 6, Unit 2: *Classification*

Disciplinary concepts: DC1, DC4, DC6, DC7		**Substantive concepts:** Living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants, and animals.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. How can we arrange organisms into groups?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	characteristic	Organisms can be arranged into smaller groups that share the same physical **characteristics**.
2. What is classification?	DC1**:** Ask relevant questions and use different types of scientific enquiries to answer them.	classification	Arranging organisms into groups based on physical characteristics is called **classification**.
3. How can we classify vertebrates?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC7: Identify differences and similarities related to simple scientific ideas and processes.	vertebrate	A **vertebrate** is an animal with a backbone.
4. How can we classify invertebrates?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations. DC6: Present data as a bar chart. DC7: Report on findings from enquiries, including oral and written explanations.	invertebrate	An **invertebrate** is an animal without a backbone.
5. How can we classify plants?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC4: Make careful observations.	flowering	**Flowering** plants produce flowers and reproduce using seeds
6. What are microorganisms?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	microorganisms	**Microorganisms** are organisms that can only be seen under a microscope.

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Year 6, Unit 3: *Evolution and inheritance*

Disciplinary concepts: DC1, DC2, DC3, DC4, DC5, DC6, DC7		**Substantive concepts:** Living things have changed over time. Fossils provide information about living things that inhabited Earth millions of years ago. Living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What can fossils tell us?	DC4: Make careful observations.	fossil	**Fossils** are the preserved remains or traces of plants and animals that lived millions of years ago.
2. What is variation?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC2: Plan simple scientific enquiries. DC4: Make careful observations. DC5: Record findings using simple scientific language. DC6: Present data as a bar chart DC7: Report on findings from enquiries, including oral and written explanations.	variation	**Variation** is the differences in characteristics of organisms of the same species.
3. What is inheritance?	DC4: Make careful observations.	inheritance	**Inheritance** is the passing on of characteristics from parents to their offspring.
4. What is an adaptation?	DC4: Make careful observations. DC7: Report on findings from enquiries, including oral and written explanations.	adaptation	An **adaptation** is a special feature or characteristic that helps an organism survive in its habitat.
5. Why do animals have adaptations?	DC4: Make careful observations.	adaptation	Animals have a range of **adaptations**, for example to survive seasonal changes, to find food and to escape predators.
6. What is natural selection?	DC7: Use results to draw simple conclusions and make predictions.	natural selection	**Natural selection** means that organisms that are better adapted to their environments are more likely to survive and reproduce.

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7. What is the theory of evolution?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	evolution	The theory of **evolution** describes how living things have developed from earlier forms over the history of the Earth.
8. What is evolution?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language. DC7: Use results to draw simple conclusions.	evolution	Living things **evolve** through the process of natural selection.
9. Why do animals become extinct?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	extinct	Living things can become **extinct** if they are not adapted to their environment.
10. How can we save endangered animals?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	endangered	**Endangered** animals are those at threat of becoming extinct.

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Year 6, Unit 4: *Electricity*

Disciplinary concepts: DC1, DC2, DC3, DC4, DC5, DC7		**Substantive concepts:** The brightness of a lamp or the volume of a buzzer is associated with the number and voltage of cells used in the circuit. Switches can be used to turn components on and off in a circuit. Circuit symbols are used when representing a simple circuit in a diagram.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. How do we use electricity?	DC1**:** Ask relevant questions and use different types of scientific enquiries to answer them. DC4**:** Make careful observations.	electricity	**Electricity** (electrical current) flows through wires and is used to make devices and appliances work.
2. Where do we get electricity from?	DC1**:** Ask relevant questions and use different types of scientific enquiries to answer them.	resource	Electricity is generated from renewable **resources** such as wind and sunlight and non-renewable resources such as coal and oil.
3. What is a series circuit?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	series circuit	A **series circuit** is a circuit where electricity flows along one pathway through every component one after another.
4. How do we use circuit diagrams to represent circuits?	DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC7: Use results to draw simple conclusions and make predictions.	(circuit) symbol	Series circuits can be drawn using circuit diagrams; each component of the circuit is represented with a different **symbol**.
5. How can we change circuits?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them. DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	cell	Changing the number of **cells** in a circuit affects the brightness of a light or the volume of a buzzer.

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	DC7: Use results to draw simple conclusions and make predictions.		
6. How will I use my knowledge to design a child's night light?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams.	switch	When a **switch** is on, the circuit is complete, so electricity will flow and light up the bulb.

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Year 6, Unit 5: *Circulatory system and lifestyle*

Disciplinary concepts:		**Substantive concepts:**	
DC2, DC3, DC4, DC5, DC6, DC7, DC8		The main parts of the human circulatory system include the heart, blood vessels, and blood. Nutrients and water are transported within animals, including humans, in the blood. Diet, exercise, drugs, and lifestyle can all affect the way our bodies function.	
Lesson sequence	**Disciplinary concepts**	**Key terms**	**Key takeaway**
1. What is the circulatory system?	DC8: Use models to represent a scientific concept or process.	circulatory system	The **circulatory system** has three main parts: the heart, the blood, and the blood vessels.
2. What does the heart do?	DC8: Use models to represent a scientific concept or process.	heart	The **heart** pumps blood around the body.
3. What is blood and why is it important?	DC8: Use models to represent a scientific concept or process.	blood	The **blood** carries oxygen, nutrients, water, and waste products around the body and protects the body from infection.
4. What are blood vessels and why are they important?	DC8: Use models to represent a scientific concept or process.	blood vessel	**Blood vessels** are tubes that carry blood around the body.
5. How does exercise affect the body?	DC2: Plan simple scientific enquiries. DC3: Use a range of equipment. DC4: Make careful observations. DC5: Record findings using simple scientific language, drawings, and labelled diagrams. DC6: Present data as a bar chart. DC7: Report on findings from enquiries including oral and written explanations.	heart rate	When a person exercises their **heart rate** increases as their heart beats faster to pump more oxygen around the body in the blood.
6. How do drugs affect the body?	DC1: Ask relevant questions and use different types of scientific enquiries to answer them.	drug	**Drugs** are chemicals that affect how the body works; some can be helpful, while others can cause harm.

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