SCIENCE – SUBSTANTIVE & DISCIPLINARY KNOWLEDGE PROGRESSION

EYFS to Year 6 | Biology • Chemistry • Physics •

Substantive knowledge is the subject knowledge and explicit vocabulary pupils use to learn about scientific content. **Disciplinary knowledge** considers how scientific knowledge originates and is revised, enabling pupils to think increasingly like scientists.

End points: By the end of Key Stage 1, children will have developed a secure foundation in scientific knowledge and the skills needed to become confident, curious young scientists. They will understand key concepts about plants, animals, materials and seasonal changes. Through practical investigations, they will ask questions, make observations, carry out simple tests and explain their findings using scientific vocabulary, preparing them for further scientific enquiry in Key Stage 2.

By the end of Key Stage 2, children will have developed secure scientific knowledge across biology, chemistry and physics, becoming confident, curious and increasingly independent scientists. They will ask relevant questions, plan and carry out investigations, take accurate measurements, identify patterns and draw conclusions using scientific evidence. Children will confidently use scientific vocabulary to explain their understanding, preparing them to think critically, investigate independently and build on their scientific knowledge at secondary school.

Half-term	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Autumn 1	Year A: Ourselves – growing up. Year B: Ourselves – growing up; harvest; autumn.	Ourselves: senses and body parts Seasonal changes: autumn	Oceans: habitats and food chains	Rocks and soils: classification, fossils and soil types	Plants	Forces	Light
Autumn 2	Year A: Space theme; light and dark. Year B: Space theme; winter.	Uses of everyday materials Planting seeds and beginning to understand plants	Need for exercise and a healthy diet Habitats and food chains	Light and dark and sun protection	Teeth and digestion	Earth and space	Electricity
Spring 1	Year A: Seasons – winter. Year B: Seasons – winter; life cycles of farm animals.	Seasonal changes: spring	Everyday materials: basic properties and testing Properties of materials Uses of everyday materials	Animals including humans: nutrition, skeletons and bones	Sound	Materials and their properties	Evolution and inheritance
Spring 2	Year A: Seasons – spring. Year B: Seasons – spring; life cycles of farm animals.	Animals including humans Plants	Living, dead and never alive Urban habitats Growing plants: seeds and hydroponics		Electricity	Materials and reactions	The circulatory system
Summer 1	Year A: Plants; forces; seasons – spring/summer. Year B: Plants; forces; healthy food; seasons – spring/summer.	Seasonal changes: summer Light and sound Senses and body parts	Rural habitats and food chains Plants Microhabitats	States of matter: solids, liquids, gases, changing states and the water cycle	Classification	Plants and animals: human development	Classification

Summer 2	Year A: Minibeasts – habitats and life cycles. Year B: Seasons – spring/summer; light and sound.	Seasonal changes: summer Animals including humans: wildlife	Materials and their uses	Independent enquiry	Independent enquiry	Independent enquiry	Human development and RSE

1. Substantive Knowledge Progression

Biology – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Plants – identifying plants	**I can** name some plants and flowers that I see around me.	**I can** identify and name common wild and garden plants. **I can** identify deciduous and evergreen trees.	**I can** identify plants in different habitats.		**I can** identify and describe different flowering plants.	**I can** identify flowering and non-flowering plants.	
Plants – structure	**I can** name some parts of a plant, such as a leaf, flower and stem.	**I can** identify the basic structure of common flowering plants and trees.	**I can** identify the main parts of a plant.		**I can** identify the roots, stem/trunk, leaves and flowers of a plant and explain what each part does.		
Plants – growth and needs	**I can** notice that plants grow and change. **I can** help to care for plants.		**I can** explain what plants need to grow and stay healthy. **I can** describe how seeds and bulbs grow into mature plants.		**I can** explain what plants need for life and growth, including air, light, water, nutrients and space.		
Plants – reproduction and life cycles	**I can** notice that plants change as they grow.		**I can** describe how a plant grows from a seed or bulb.		**I can** describe the life cycle of a flowering plant,	**I can** describe the life cycle of a flowering plant. including pollination, seed formation and seed dispersal.	
Plants – transport					**I can** explain that water is transported through a plant.		
Animals – identifying and grouping	**I can** name and talk about animals I know. **I can** sort animals in different ways.	**I can** identify and name common animals, including fish, amphibians, reptiles, birds and mammals.	**I can** identify animals in different habitats.	**I can** group animals according to their features.	**I can** group living things using different classification systems.		**I can** classify animals into broad groups using their characteristics.

Biology – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Animals – body parts	**I can** name some parts of my body and talk about what they help me do.	**I can** identify and name parts of the human body. **I can** identify which parts are associated with each sense.					
Animals – offspring and growth	**I can** notice that babies grow and change as they get older.	**I can** recognise that animals, including humans, have offspring that grow into adults.			**I can** describe the stages of the human life cycle.	**I can** describe the life cycles of mammals, amphibians, insects and birds.	**I can** describe how humans grow from babies into adults.
Humans – basic needs	**I can** talk about what my body needs to stay healthy.		**I can** explain that animals, including humans, need water, food and air to survive.				
Humans – food and nutrition	**I can** talk about foods that help keep me healthy.	**I can** recognise that animals need food to survive.	**I can** describe the importance of eating a varied diet.	**I can** identify different nutrients and explain that humans need the right types and amounts of nutrition.			
Humans – skeleton and muscles	**I can** name some bones and parts of my body. **I can** talk about how my body moves.			**I can** identify that humans and some other animals have skeletons and muscles. **I can** explain how skeletons support and protect the body and help it move.			
Humans – digestion					**I can** identify the main parts of the digestive system and explain the role of each part.		
Humans – teeth	**I can** talk about looking after my teeth.		**I can** describe the different types of teeth and explain their functions.				
Humans – circulation							**I can** identify the main parts of the circulatory system. **I can** explain the functions of the heart, blood vessels and blood.

Biology – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Humans – exercise and health	**I can** talk about ways to keep my body healthy and active.		**I can** explain why exercise, hygiene and a healthy diet are important.				**I can** explain how exercise, diet, drugs and lifestyle can affect the body.
Living things – characteristics	**I can** say whether something is alive or not.	**I can** recognise that animals and plants are living things.	**I can** identify things that are living, dead and things that have never been alive.				**I can** describe the characteristics that living things share.
Habitats	**I can** explore plants and animals in different places.	**I can** identify animals and plants in my local environment.	**I can** describe how habitats provide what plants and animals need to survive.		**I can** describe how living things are suited to their habitats.		
Food chains	**I can** talk about what animals eat.		**I can** construct and describe simple food chains.			**I can** describe food chains and the roles of different organisms.	
Microhabitats	**I can** explore small habitats such as under logs or stones.		**I can** identify plants and animals in microhabitats.				
Classification	**I can** sort living things by what I notice about them.				**I can** use classification keys to identify and group living things.		**I can** classify living things into broad groups, including microorganisms, plants and animals. **I can** give reasons for my classifications.
Adaptation							**I can** explain how adaptations help organisms survive. **I can** describe how living things are adapted to their environments.
Life cycles	**I can** notice how living things change as they grow.		**I can** describe the basic life cycle of humans and other animals.	**I can** describe the life cycle of flowering plants.		**I can** compare the life cycles of mammals, amphibians, insects and birds.	
Evolution							**I can** recognise that living things have changed over time. **I can** explain that fossils provide information about

Biology – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
							living things that inhabited the Earth millions of years ago. **I can** explain that living things produce offspring of the same kind but are not identical. **I can** explain how adaptation and evolution occur over time.

Chemistry – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Materials – identifying materials	**I can** explore and name materials I use every day.	**I can** name everyday materials, including wood, plastic, glass, metal, water and rock.	**I can** identify and compare materials used for different purposes.				
Materials – properties	**I can** describe materials using words such as hard, soft, rough, smooth, shiny and bendy.	**I can** describe simple physical properties of materials.	**I can** compare the suitability of different materials for particular uses.	**I can** compare and group materials based on their properties.		**I can** compare and group everyday materials based on their properties.	
Materials – suitability	**I can** choose materials for a purpose and explain my choice.	**I can** explain why a material is suitable for a particular use.	**I can** explain why some materials are suitable for particular uses.				
Solids, liquids and gases	**I can** explore materials that are solid and liquid.				**I can** group materials as solids, liquids or gases. **I can** explain that some materials can change state.	**I can** identify the three states of matter and describe their properties.	
Changing state	**I can** notice when materials melt, freeze or change.				**I can** observe that some materials change state when they are heated or cooled.	**I can** explain melting, freezing, evaporation and condensation. **I can** explain that evaporation and condensation are linked to the water cycle.	

Chemistry – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
The water cycle	**I can** notice that water can change and move around us.					**I can** describe the stages of the water cycle, including evaporation, condensation and precipitation.	
Rocks	**I can** explore and describe rocks that I find.			**I can** compare and group different kinds of rocks based on their appearance and physical properties. **I can** recognise how fossils are formed.			
Soils	**I can** explore soil and notice what is in it.			**I can** recognise that soils are made from rocks and organic matter.			
Fossils	**I can** notice fossils and talk about what they tell us about the past.			**I can** explain how fossils are formed.			**I can** explain how fossils provide evidence about living things from the past.
Reversible changes	**I can** notice that some changes can be undone.					**I can** explain that some changes of state are reversible.	**I can** demonstrate that some changes can be reversed.
Irreversible changes						**I can** recognise that some changes result in new materials being formed. **I can** explain that some changes create new materials and are not easily reversed.	
Dissolving			**I can** explore materials that dissolve in water.		**I can** recognise that some materials dissolve to form a solution.	**I can** explain the difference between dissolving, mixing and changes of state.	
Separating materials			**I can** explore how materials can be separated.			**I can** use sieving, filtering and evaporating to separate mixtures.	

Chemistry – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
						I can explain how different methods can be used to separate mixtures.	
Mixtures and solutions					**I can** recognise that some materials can be mixed together.	**I can** explain that some substances dissolve to form solutions and describe how mixtures can be separated.	
Burning and new materials						**I can** recognise that burning produces new materials and is an irreversible change.	
Chemical changes						**I can** explain that some changes result in the formation of new materials and that these changes are often irreversible.	

Physics – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Light – sources of light	**I can** notice light and dark. **I can** identify some sources of light.	**I can** identify natural and artificial sources of light.	**I can** recognise that light helps us to see.				
Light – shadows	**I can** explore shadows and notice how they change.			**I can** explain how shadows are formed.			**I can** investigate how the size of a shadow changes.
Light – reflection	**I can** explore how light reflects from different surfaces.			**I can** recognise that light can be reflected from surfaces.			**I can** explain how light travels and how we see objects.
Light – seeing	**I can** talk about what I can see when there is light.			**I can** recognise that we need light in order to see things and that darkness is the absence of light.			**I can** explain that light appears to travel in straight lines.

Physics – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Sound	**I can** explore sounds and talk about whether they are loud, quiet, high or low.			**I can** recognise that sounds are made when something vibrates.	**I can** recognise that sounds are made when objects vibrate and that vibrations travel through a medium to the ear. **I can** describe pitch and volume.		
Sound – pitch and volume	**I can** compare sounds that are loud, quiet, high or low.				**I can** identify patterns between the volume of a sound and the strength of the vibration. **I can** identify patterns between the pitch of a sound and the features of the object producing it.		
Electricity	**I can** explore things that use electricity.		**I can** identify some appliances that use electricity.		**I can** identify common appliances that run using electricity. **I can** construct a simple electrical circuit.		**I can** use recognised symbols to represent simple circuits. **I can** use symbols to represent components in a circuit. **I can** explain how the number and voltage of cells affects a circuit.
Electrical circuits	**I can** explore what happens when I connect electrical components with help.				**I can** construct a simple series circuit and identify whether a circuit is complete.		**I can** explain how components in a circuit affect one another. **I can** construct and draw more complex circuits using recognised symbols.
Conductors and insulators	**I can** explore materials that allow electricity to pass through them.				**I can** recognise that metals are good conductors of electricity. **I can** identify materials that are electrical insulators.		
Forces	**I can** explore how pushes and pulls make things move.					**I can** explain that a force is a push or pull. **I can** identify forces such as gravity, friction,	

Physics – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
						air resistance and water resistance. **I can** explain how forces can affect the movement of objects.	
Gravity	**I can** notice that things fall towards the ground.					**I can** recognise that gravity is a force that pulls objects towards the Earth.	
Friction	**I can** explore how surfaces affect how things move.					**I can** recognise that friction acts between surfaces and can slow objects down. **I can** explain how friction affects the movement of objects.	
Air and water resistance	**I can** explore how air and water can affect moving objects.					**I can** recognise that air resistance and water resistance act against movement.	
Levers, gears and pulleys						**I can** recognise that simple machines can make forces have a greater effect.	
Magnets	**I can** explore magnets and notice what they attract.			**I can** identify materials that are attracted to magnets. **I can** describe how magnets behave.			
Magnetic forces	**I can** explore how magnets attract and repel.			**I can** recognise that magnets have two poles and that like poles repel while unlike poles attract.			
Earth and space	**I can** talk about the Sun, Moon and stars.	**I can** observe changes in the seasons and describe associated weather.				**I can** describe the movement of the Earth and other planets relative to the Sun. **I can** describe the movement of the	

Physics – Substantive Knowledge	EYFS	Y1	Y2	Y3	Y4	Y5	Y6
						Moon relative to the Earth. **I can** use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.	
Seasons	**I can** notice changes in weather and the seasons.	**I can** observe and describe changes across the four seasons.	**I can** observe and describe changes across the four seasons.				
Day and night	**I can** talk about day and night.					**I can** explain day and night using the Earth's rotation.	
Earth, Sun and Moon	**I can** talk about the Earth, Sun and Moon.					**I can** describe the Sun as a star and explain the position and movement of the Earth and other planets in the Solar System.	
Forces and space						**I can** recognise that gravity is a force that acts between objects, including the Earth and other bodies in space.	

2. Disciplinary Knowledge – Working Scientifically

Disciplinary knowledge is taught and embedded within each unit of substantive knowledge. The progression below is drawn from the supplied school document.

Enquiry strategies embedded throughout: observing over time; identifying and classifying; looking for patterns; comparative and fair testing; answering questions using secondary sources; and using models. Different questions require different enquiry strategies.

Disciplinary knowledge	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1. Asking scientific questions	**I can** notice things around me and ask questions about what I see.	**I can** ask simple questions about things I observe.	**I can** ask questions and think about different ways I could find the answer.	**I can** ask relevant questions about what I observe.	**I can** ask questions and decide which type of enquiry could help me answer them.	**I can** ask my own scientific questions and decide how I could investigate them.	**I can** ask questions about scientific phenomena and plan an appropriate enquiry to answer them.
2. Observing	**I can** explore objects, living things and materials using my senses. **I can** notice similarities, differences and changes.	**I can** observe closely using simple equipment.	**I can** make careful observations and notice changes over time.	**I can** make systematic and careful observations.	**I can** make careful observations and look for changes and relationships.	**I can** make detailed observations and identify what they tell me about a scientific question.	**I can** make detailed and accurate observations and use them as evidence for my ideas.
3. Measuring and using equipment	**I can** explore and use simple tools safely to find out about the world.	**I can** use simple equipment to help me observe and investigate.	**I can** use simple equipment and make simple measurements.	**I can** take measurements using standard units and appropriate equipment.	**I can** choose and use a range of equipment, including thermometers and data loggers, to take measurements.	**I can** choose suitable scientific equipment and take measurements with increasing accuracy and precision.	**I can** use a range of scientific equipment accurately and precisely, repeating measurements when appropriate.
4. Comparing and testing	**I can** explore what happens when I change or combine things. **I can** compare what I notice.	**I can** carry out a simple test to compare things.	**I can** perform simple tests and use what I observe to answer questions.	**I can** set up a simple comparative or fair test.	**I can** plan and carry out a comparative or fair test and identify what needs to be kept the same.	**I can** plan a fair test and identify the variables that I need to change, measure and control.	**I can** plan different types of enquiries and recognise and control variables where necessary.
5. Classifying and grouping	**I can** sort objects, materials, plants and animals in different ways.	**I can** identify and group things using what I can see and observe.	**I can** sort and classify objects, materials and living things and explain my choices.	**I can** group things using their observable features.	**I can** use classification keys to identify and group living things.	**I can** choose useful features to classify and group things and explain why I have grouped them.	**I can** classify living things using similarities and differences and give reasons for my classifications.

Disciplinary knowledge	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
6. Looking for patterns	**I can** notice when things are the same, different or changing. **I can** talk about patterns I notice.	**I can** notice simple patterns in what I observe.	**I can** identify simple patterns and use them to help answer questions.	**I can** look for patterns in my observations and results.	**I can** identify patterns and relationships in my results.	**I can** look for patterns and relationships in data and use them to help answer a question.	**I can** identify patterns and possible relationships in data and consider whether the evidence supports my ideas.
7. Recording results	**I can** talk about what I have found and use drawings, marks or simple pictures to record my ideas.	**I can** record what I observe using drawings, words, photographs or simple tables.	**I can** gather and record data to help answer a question.	**I can** gather and record data using tables, drawings, labelled diagrams and keys.	**I can** record and present data using tables, diagrams, keys and bar charts.	**I can** record increasingly complex results using tables, diagrams, classification keys, bar charts and line graphs.	**I can** choose an appropriate way to record increasingly complex data, including tables, classification keys, scatter graphs, bar charts and line graphs.
8. Analysing results	**I can** talk about what I notice and what has changed.	**I can** use my observations to suggest an answer to a question.	**I can** use my observations and results to help answer a question.	**I can** use my results to identify what happened and describe what I found out.	**I can** look at my results and identify simple patterns and relationships.	**I can** analyse my results and identify patterns or relationships in my data.	**I can** analyse data, identify relationships and consider evidence that supports or challenges my ideas.
9. Drawing conclusions	**I can** talk about what I think happened and why.	**I can** say what I found out from my observations.	**I can** use what I have found out to answer a simple question.	**I can** draw a simple conclusion from my results.	**I can** use my results to draw a conclusion and explain what I found out.	**I can** draw conclusions from my results and explain them using scientific knowledge.	**I can** draw conclusions based on evidence and use scientific knowledge to explain my findings.
10. Using evidence	**I can** use what I have seen, heard or noticed to explain my ideas.	**I can** use my observations as evidence for my ideas.	**I can** use information I have collected to support an answer.	**I can** use my observations and results as evidence when explaining what happened.	**I can** use evidence from my investigation to support a conclusion.	**I can** use evidence from my results to support or challenge an idea.	**I can** use evidence to justify my scientific ideas and identify evidence that supports or refutes them.
11. Researching	**I can** find out about the world by talking to adults, looking at books and exploring my environment.	**I can** ask questions and use books, photographs and other sources to find out about science.	**I can** use simple secondary sources to find answers to scientific questions.	**I can** use books, websites and other secondary sources to find information.	**I can** choose useful secondary sources to help answer a scientific question.	**I can** identify which secondary sources are useful for answering my question.	**I can** select useful secondary sources, compare information and begin to distinguish fact from opinion.
12. Communicating scientifically	**I can** talk about what I have noticed and explain my ideas to others.	**I can** talk about what I have found out using simple scientific words.	**I can** communicate what I have found out using words, drawings, tables or simple charts.	**I can** communicate my findings using scientific vocabulary, drawings, labelled diagrams, tables and charts.	**I can** communicate my findings clearly using scientific language and appropriate diagrams, tables and charts.	**I can** use scientific vocabulary, diagrams, tables and graphs to communicate my findings clearly.	**I can** use scientific language, diagrams, graphs and evidence to explain and justify my scientific ideas.
13. Evaluating and improving enquiries	**I can** talk about what worked well and what I might try differently.	**I can** talk about what happened when I carried out a simple test.	**I can** talk about what I found out and how I found it out.	**I can** describe how I carried out my investigation and suggest improvements.	**I can** explain how I carried out my investigation and identify things that could affect my results.	**I can** use my results to decide whether I need to carry out further tests or observations.	**I can** evaluate my enquiry, recognise limitations in my results and identify when further testing or observations are needed.