



Science Progression Map

This progression map outlines how pupils develop both **substantive knowledge** and **disciplinary knowledge** from Early Years to the end of Key Stage 2. It ensures that learning is sequenced logically so that knowledge builds securely over time. At Ordsall, we define these types of knowledge as:

Substantive knowledge: The core, established facts and information within a specific subject or field of study.

Disciplinary knowledge: An understanding of the methods, theories, concepts, and perspectives that are unique to a specific subject. Developing the ability to think like someone who works within a particular discipline.

Threads

In Science, key threads run throughout the curriculum, providing continuity and coherence as pupils move through each year group. These recurring ideas help children make connections between different components of learning, deepen their understanding over time, and build a secure foundation of both substantive and disciplinary knowledge. We have identified the following threads within our curriculum.

Biology	Earth and Environmental	Physics
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Living things and their habitats: Classification of living things, Adaptation and environment, Food chains and life cycles (all year groups)

Animals, including humans: Body parts and senses (Y1), Human’s survival, eating and hygiene (Y2), Nutrition and skeletons (Y3), Digestion and teeth (Y4), Human life cycle (Y5), Circulatory system, diet, and health (Y6)

Plants: Common plants and trees (Y1), What a plant needs to grow (Y2), Functions of parts of plants (Y3), reproduction (Y5)

Seasonal change and Earth’s place in space: Seasonal change and Earth’s place in space (Y1), Earth and space (Y5) Light and shadows (Y3 & Y6),

Materials and their properties: Solids, liquids, gases (Y4), Reversible and irreversible changes (Y5)

Forces and magnets: Push and pull, magnetism (Y3) Air resistance, friction (Y5)

Electricity: Simple circuits and components (Y4) Voltage, symbols, and complex circuits (Y6)

Light and Sound: Light sources, shadows (Y3), Reflection, refraction, and seeing (Y6), Sound and vibrations (Y4)



Disciplinary Knowledge

Within our Science curriculum, we have identified the following core disciplinary areas that shape how pupils learn to think, investigate, and work like scientists.

Asking scientific questions using scientific language	Children learn to ask relevant scientific questions about the world around them.
Observing and measuring	Pupils make careful observations using scientific equipment, such as magnifying glasses and stopwatches.
Recording data (tables, charts, graphs)	They collect and record results using drawings, tables, bar charts, and line graphs.
Planning and carrying out investigations	Pupils begin to plan fair tests and recognize variables (things that can change). They select appropriate methods and tools.
Identify, group and classify	Pupils are able to identify, group and classify items using knowledge of their properties or their characteristic.
Predicting, drawing conclusions and evaluating	Children look for patterns in data, identify relationships, and start drawing conclusions.

Progression in Disciplinary Knowledge

Discipline	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking scientific questions using scientific language	Know how to show curiosity and ask questions.	Know how to express 'what if' questions during play. Know how to pronounce simple scientific vocabulary to discuss that I have found something out.	Know how to ask 'why' questions. Know how to remember and use relevant scientific vocabulary to explain what I have found out.	Know how to ask 'why' and 'what if' questions. Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out.	Know how to use knowledge and understanding to ask 'why' and 'what if' questions. Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.	Know how to use knowledge and understanding to develop scientific questions. Know how to use scientific vocabulary when giving oral and written explanations to describe and explain scientific ideas and observations.	Know how to use knowledge and understanding to ask questions about observations. Know how to use a range of scientific vocabulary accurately in oral and written explanations to describe and explain scientific ideas.	Know how to use knowledge and understanding to challenge scientific ideas and concept Know how to use a range of complex scientific vocabulary accurately in written reports, explanations and diagrams to show secure understanding of scientific ideas and concepts.



Discipline	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Observing and measuring	Know how to use their observations to help them to answer their questions.	Know how to comment on what can be seen. Know how to use non-standard units to measure and compare two things.	Know how to comment on what can be seen during an investigation. Know how to use non-standard units to measure and compare.	Know how to identify changes during an investigation. Know how to measure length, mass and capacity using standard units, including centimetres (cm), metres (m), grams (g), kilograms (kg) millilitres (mL) and litres (L).	Know how to explain changes during an investigation Know how to measure and compare time using seconds, minutes and hours.	Know how to use knowledge and understanding to explain changes during an investigation. Know how to measure and compare temperature using degrees Celsius.	Know how to use knowledge and understanding to identify trends during an investigation. Know how to measure, convert and compare using standards units of measure, including force measured in Newtons (N).	Know how to identify trends during an investigation and make justified predictions for the rest of an investigation Know how to calculate an average from repeated measures
Recording data (tables, charts, graphs)	Know how to sort and group.	Know how information can be organised and shown in a simple table. Know how to use prepared pictograms to record observations.	Know how to use a simple given table to record information. Know how to construct a simple pictogram.	Know how to draw and use a simple table to tally and record totals. Know how to construct simple block charts.	Know how to draw and record a table of results. Know how to construct axes to construct a bar chart.	Know how to construct a simple table, with headings to compare, cause and effect. Know how to accurately and independently construct a bar chart.	Know how to construct a complex table, with multiple headings, of results to show data. Know how to use axes to construct a line graph.	Know how to construct a complex table of results to show repeated data. Know how to accurately and independently construct and scale a line graph.
Planning and carrying out investigations	Know how to make observations using their senses and simple equipment.	Know how to suggest what might be 'best' or 'worst'. Know how to use a range of everyday items to investigate.	Know how to suggest an idea to investigate and ask questions. Know how to use simple scientific equipment.	Know how to demonstrate how something might be investigated. Know how to use simple scientific equipment such as rulers and cylinders.	Know how to demonstrate and explain how something might be investigated. Know how to select suitable equipment for a given task.	Know how to plan a fair test by selecting variables to change and measure. Know how to select suitable equipment for a given task including electrical equipment and thermometers.	Know how to plan a fair test and ensure controlled variables are kept the same. Know how to select the most appropriate equipment for an independently designed task.	Know how to plan scientific enquires to answer questions including controlling variables. Know how to justify reasons for selecting specific equipment.



Discipline	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Identify, group and classify	Know how to make direct comparisons	Know how to notice and talk about things in the world that are related to science, such as plants, animals, materials and changes they observe. Know how to sort objects using familiar features, such as colour, size, shape or texture.	Know how to name a range of things related to science. Know how to sort objects by identifying similarities and differences between them.	Know how to identify simple scientific things and processes. Know how to sort objects into more than two groups based on different observable features.	Know how to name a range of science things, ideas and processes. Know how to create a simple criterion for sorting objects based on their characteristics.	Know how to name and describe changes in scientific processes. Know how to create and explain clear criteria for sorting and grouping objects or living things based on their observable characteristics.	Know how to use knowledge and understanding to identify unknown scientific things, ideas and processes. Know how to create a criterion for sorting including sub-groups based on shared characteristics.	Know how to use knowledge, understanding and secondary resources to identify unknown scientific things, ideas and processes. Know how to create and apply sorting criteria that include multiple sub-groups to classify in more detail.
Predicting, drawing conclusions and evaluating	Know how to talk about what they have done and found out.	Know how to suggest what might be 'best' or 'worst'. Know how to comment on changes that are observed during an investigation.	Know how to suggest what might happen before an investigation. Know how to describe the changes that are happening.	Know how to suggest what might happen in an investigation using the causal conjunction 'because'. Know how to recall and describe the changes that are happening.	Know how to predict cause and effect using the causal conjunction 'because' and wider evidence. Know how to describe the results linking cause and effect.	Know how to use knowledge and understanding to justify a prediction. Know how to describe trends and use scientific observations to explain.	Know how to predict a trend using a relationship prediction. Know how to use data and science to explain a conclusion.	Know how to use knowledge and understand to generate a testable hypothesis. Know how to use primary and secondary data and ideas when concluding.



Knowledge by year group

Nursery	
Disciplinary Knowledge	Substantive Knowledge
<p>Know how to show curiosity and ask questions.</p> <p>Know how to use their observations to help them to answer their questions.</p> <p>Know how to sort and group.</p> <p>Know how to make observations using their senses and simple equipment.</p> <p>Know how to make direct comparisons.</p> <p>Know how to talk about what they have done and found out.</p>	<p>I can use all my senses in hands-on exploration of natural materials.</p> <p>I can explore collections of materials with similar and/or different properties e.g. natural objects, wooden objects.</p> <p>I can talk about the differences between materials and changes I notice in activities such as cooking, melting, floating and sinking.</p> <p>I explore how things work.</p> <p>I can plant seeds and care for growing plants.</p> <p>I understand the key features of the life cycle of a plant and an animal.</p> <p>I am beginning to understand the need to respect and care for the natural environment and all living things.</p> <p>I explore and talk about different forces I can feel e.g. magnetics attracting/ repelling, how water pushes up trying to a push a plastic boat under it.</p> <p>I am beginning to explore how things work.</p> <p>I can plant a seed and watch it grow.</p> <p>I beginning to understand life cycles.</p> <p>I handle living things carefully.</p> <p>I know that plants are living things that grow.</p> <p>I know that I am growing and I used to be a baby.</p> <p>I recognise living things in the environment.</p>
Disciplinary Vocabulary	Substantive Vocabulary
<p>Look closely – to use your eyes carefully to notice details.</p> <p>Watch – to look at something over time to see what happens.</p> <p>Touch – to feel something with your hands or fingers.</p> <p>Feel – to notice how something is by touching it, such as soft or hard.</p> <p>Smell – to use your nose to notice different scents.</p> <p>Listen – to use your ears to hear sounds carefully.</p> <p>Same – things that are alike or have no differences.</p> <p>Different – things that are not the same in some way.</p> <p>Write – to put ideas, words or symbols down so they can be remembered or shared.</p> <p>Sort – to put things into groups based on how they are alike.</p> <p>Group – a set of things that are similar in some way, like living things or objects.</p>	



Reception	
Knowledge and understanding of the World	
Disciplinary Knowledge	Substantive Knowledge
<p>Know how to express 'what if' questions during play.</p> <p>Know how to pronounce simple scientific vocabulary to discuss that I have found something out.</p> <p>Know how to comment on what can be seen.</p> <p>Know how to use non-standard units to measure and compare two things.</p> <p>Know how information can be organised and shown in a simple table.</p> <p>Know how to use prepared pictograms to record observations.</p> <p>Know how to suggest what might be 'best' or 'worst'.</p> <p>Know how to use a range of everyday items to investigate.</p> <p>Know how to notice and talk about things in the world that are related to science, such as plants, animals, materials and changes they observe.</p> <p>Know how to sort objects using familiar features, such as colour, size, shape or texture.</p> <p>Know how to suggest what might be 'best' or 'worst'.</p> <p>Know how to comment on changes that are observed during an investigation.</p>	<p>I can explore the natural world around me, making observations and drawing pictures of animals and plants.</p> <p>I can recognise some environments that are different to the one in which I live.</p> <p>I understand the key features of a life cycle.</p> <p>I know some similarities and differences between the natural world around me and contrasting environments, drawing on my experiences and what has been read in class.</p> <p>I can talk about Autumn.</p> <p>I can understand the effect of changing seasons on the natural world around me e.g. Summer changing to Autumn.</p> <p>I can identify different types of weather.</p> <p>I can describe different materials such as wood, plastic, metal, glass and the textures e.g. hard/soft, rough/smooth.</p> <p>I can talk about Autumn, Winter and Spring.</p> <p>I can understand the effect of changing seasons on the natural world around me e.g. Winter changing to Spring.</p> <p>I understand changing states of matter such as freezing and melting, heating and cooling.</p> <p>I can say if an object is floating or sinking.</p>
Vocabulary	
<p>Observe – look carefully at something using your senses or tools like a magnifying glass to notice details and gather information.</p> <p>Watch – to look at something over time to see what happens.</p> <p>Touch – to feel something with your hands or fingers.</p> <p>Feel – to notice how something is by touching it, such as soft or hard.</p> <p>Smell – to use your nose to notice different scents.</p> <p>Listen – to use your ears to hear sounds carefully.</p> <p>Same – things that are alike or have no differences.</p> <p>Different – things that are not the same in some way.</p> <p>Compare – to examine two or more things to find out what is the same and what is different about them.</p> <p>Record – a means of keeping a written account of something.</p> <p>Sort – to put things into groups based on how they are alike.</p> <p>Group – a set of things that are similar in some way, like living things or objects.</p>	



Year 1	
Animals including humans – body parts and senses	
Disciplinary Knowledge	Substantive Knowledge
Know how to name a range of things related to science.	Know that the human body has basic parts.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use simple scientific equipment.	Know that the eyes provide our sense of sight.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use a simple given table to record information.	Know that the ears provide our sense of hearing.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use a simple given table to record information.	Know that the hands provide our sense of touch.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use a simple given table to record information.	Know that the nose provides our sense of smell.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use a simple given table to record information.	Know that the mouth provides our sense of taste.
Disciplinary Vocabulary	Substantive Vocabulary
Questions – a way to find out information. Answers – the information needed solve a question. Observe – to look carefully at something using your senses or tools like a magnifying glass to notice details and gather information. Compare – to examine two or more things to find out what is the same and what is different about them.	Leg, arm, elbow, knee, back, chest, head, ear, nose, eyes, tongue, hands, fingers, touch, sight, smell, hearing, taste
Materials and their properties	
Disciplinary Knowledge	Substantive Knowledge
Know how to sort objects by identifying similarities and differences between them. Know how to construct a simple pictogram.	Know that some material objects are made from plastic/metal/wood/glass/stone/fabric.
Know how to name a range of things related to science.	Know that there are a variety of everyday materials (wood, plastic, metal, glass, rock, paper).
Know how to remember and use relevant scientific vocabulary to explain what I have found out.	Know that everyday materials can have properties such as hard, floppy, stretchy, stiff, waterproof, absorbent, breaks, tears, rough, smooth.
Know how to sort objects by identifying similarities and differences between them. Know how to use a simple given table to record information.	Know that everyday materials can be grouped based on their properties.
Disciplinary Vocabulary	Substantive Vocabulary
Groups – a set of things that are similar in some way, like living things or objects. Same – to describe objects or things that are identical or very similar in a certain way. Different – to describe objects or things that are not identical or very similar in a certain way. Properties – the words that describe what a material is like, such as its texture, hardness, flexibility, and colour.	Hard, floppy, stretchy, stiff, waterproof, absorbent, breaks, tears, rough, smooth
Living things and their habitats	
Disciplinary Knowledge	Substantive Knowledge
Know how to name a range of things related to science.	Know that there are a variety of animals including fish, birds, reptiles, amphibians and mammals.
Know how to name a range of things related to science. Know how to construct a simple pictogram.	Know that animals can be carnivores, herbivores and omnivores.
Know how to use a simple given table to record information.	Know that there are a variety of animals including humans (fish, amphibians, reptiles, birds and mammals, including pets).
Disciplinary Vocabulary	Substantive Vocabulary
Groups – a set of things that are similar in some way, like living things or objects.	Carnivores, herbivores, omnivores, mammal, reptile, amphibian



Compare – to examine two or more things to find out what is the same and what is different about them. Identify – to figure out what it is or who someone is by looking for clues.	
Seasonal changes	
Disciplinary Knowledge	Substantive Knowledge
Know how to ask 'why' questions. Know how to describe the changes that are happening.	Know that there are changes in the four seasons.
Know how to suggest what might happen before an investigation. Know how to comment on what can be seen during an investigation.	Know that there is weather associated with the four seasons.
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use non-standard units to measure and compare.	Know that the length of a day varies.
Disciplinary Vocabulary	Substantive Vocabulary
Observe – to look carefully at something using your senses or tools like a magnifying glass to notice details and gather information. Changes – differences to something that weren't there before; it is now different in some way.	Winter, summer, spring, autumn, Rain, snow, wind, sun, warm, cold
Living things – plants and flowers	
Disciplinary Knowledge	Substantive Knowledge
Know how to remember and use relevant scientific vocabulary to explain what I have found out.	Know that there are a variety of plants: <ul style="list-style-type: none"> • Garden: tulip/sunflower/pansy/rose/daffodil • Wild: poppy/dandelion/bluebell/clover/daisy/nettle
Know how to remember and use relevant scientific vocabulary to explain what I have found out. Know how to use non-standard units to measure and compare objects.	Know that there are evergreen and deciduous trees: <ul style="list-style-type: none"> • Deciduous trees: oak, sycamore, horse chestnut • Evergreen trees: holly, pine
Know how to name a range of things related to science. Know how to suggest an idea to investigate and ask questions.	Know that flowering plants have a structure (roots, petals, leaves, stem).
Know how to remember and use relevant scientific vocabulary to explain what I have found out.	Know that trees have a basic structure (roots, trunk, branches, leaves).
Disciplinary Vocabulary	Substantive Vocabulary
Groups – a set of things that are similar in some way, like living things or objects. Identify – to figure out what it is or who someone is by looking for clues.	Roots, petals, leaves, stem



Year 2	
Animals including humans – survival, eating and hygiene	
Disciplinary Knowledge	Substantive Knowledge
Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out. Know how to suggest what might happen in an investigation using the causal conjunction 'because'.	Know that animals including humans have basic needs for survival (oxygen, food and water).
Know how to identify changes during an investigation. Know how to demonstrate how something might be investigated. Know how to construct simple block charts.	Know that to help keep humans healthy they need to exercise.
Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out. Know how to recall and describe the changes that are happening.	Know that good hygiene is needed for preventing infections and illness.
Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out. Know how to measure length, mass and capacity using standard units, including centimetres (cm), metres (m), grams (g), kilograms (kg) millilitres (ml) and litres (l).	Know that animals, including humans, have offspring which grow into adults.
Know how to sort objects into more than two groups based on different observable features. Know how to draw and use a simple table to tally and record totals. Know how to use simple scientific equipment such as rulers and cylinders.	Know that there are different food groups and explain their importance.
Disciplinary Vocabulary	Substantive Vocabulary
Measure – finding out the size, weight, or amount of something by using a tool like a ruler or scale Table – a way to organise information in rows and columns Chart – a way to show information, like numbers and data, using pictures, graphs, or tables so it's easier to understand.	Survival, water, air, food, exercise, hygiene, germs, infection, illness.
Materials	
Disciplinary Knowledge	Substantive Knowledge
Know how to sort objects into more than two groups based on different observable features. Know how to draw and use a simple table to tally and record totals. Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out.	Know that all materials have different properties.
Know how to draw and use a simple table to tally and record totals.	Know that all objects are made of one or more materials that are chosen specifically because they have specific properties.
Know how to sort objects into more than two groups based on different observable features. Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out.	Know that all objects are made of one or more materials that are chosen specifically because they have specific properties.
Know how to sort objects into more than two groups based on different observable features. Know how to draw and use a table to tally and record totals.	Know that an object can be made of different materials.
Know how to identify simple scientific things and processes. Know how to demonstrate how something might be investigated.	Know that shapes of objects can change by squashing, bending, twisting and stretching.
Disciplinary Vocabulary	Substantive Vocabulary
Sort – to put things into groups based on how they are alike. Classify – putting things into groups based on how they are alike. Explore – thinking or learning about it more.	Hard, fragile, flexible, rigid, twist, squash
Biology – living and dead	
Disciplinary Knowledge	Substantive Knowledge
Know how to sort objects into more than two groups based on different observable features. Know how to draw and use a table to tally and record totals.	Know that all objects are either living, dead and never been alive.
Know how to identify simple scientific things and processes.	Know that there are a variety of plants and animals in their habitats.
Know how to identify simple scientific things and processes. Know how to draw and use a table to record data	Know that plants and animals live in habitats suited to them.
Know how to identify simple scientific things and processes. Know how to construct an oral sentence using scientific vocabulary to explain what I and others have found out.	Know that habitats provide the basic needs for plants and animals and that they depend on one another.



Know how to identify simple scientific things and processes.	Know that animals use plants and other animals for food linked to simple food chains.
Disciplinary Vocabulary	Substantive Vocabulary
Enquiry – a question you ask or a test you carry out to get information or to learn something new. Classify – putting things into groups based on how they are alike.	Living, dead, never been alive, food, habitats, shelter, food chains
Plants – seeds	
Disciplinary Knowledge	Substantive Knowledge
Know how to identify simple scientific things and processes. Know how to ask 'why' and 'what if' questions. Know how to recall and describe the changes that are happening.	Know that plants may grow from bulbs or seeds.
Know how to recall and describe changes that are happening.	Know that a plant needs certain conditions to grow.
Know how to suggest what might happen in an investigation using the causal conjunction 'because'. Know how to demonstrate how something might be investigated.	Know that plants need water, light and a suitable temperature to grow.
Disciplinary Vocabulary	Substantive Vocabulary
Record – a means of keeping a written account of something. Questions – something you say or write to ask for information. Sort – to put things into groups based on how they are alike.	Seeds, bulbs, water, sunlight, soil, temperature



Year 3	
Rocks and soils	
Disciplinary Knowledge	Substantive Knowledge
Know how to create a simple criterion for sorting objects based on their characteristics.	Know that rocks can be compare and grouped into three different types (sedimentary, igneous and metamorphic). Know that rocks have different physical properties and are created in different ways (permeable, durable, density and hard / soft).
Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.	Know that fossils need certain condition to form.
Know how to name a range of science things, ideas and processes.	Know that soils are made from rocks and organic matter (observing what is in soil).
Know how to name a range of science things, ideas and processes. Know how to demonstrate and explain how something might be investigated.	Know that soils are made from rocks and organic matter (investigating different types of soils).
Disciplinary Vocabulary	Substantive Vocabulary
Groups – how scientists organise living things (like plants and animals) into families based on what they have in common. Classify – how scientists organise living things into groups based on shared features. Investigation – a step-by-step process for finding the answer to a question about the world.	Rock, fossil, marble, chalk, granite, slate, soil, organic matter, sedimentary, igneous, metamorphic.
Forces and materials	
Disciplinary Knowledge	Substantive Knowledge
Know how to use knowledge and understanding to ask ‘why’ and ‘what if’ questions.	Know that some forces need contact between two objects. Know that magnets have two poles and that they attract or repel each other.
Know how to describe the results linking cause and effect.	Know that things move differently on different surfaces.
Know how to select suitable equipment for a given task. Know how to draw and record a table of results.	Know that magnets attract some materials and not others.
Know how to predict cause and effect using ‘because’ and wider evidence. Know how to draw and record a table of results.	Know that magnets can be compared.
Disciplinary Vocabulary	Substantive Vocabulary
Reason – an explanation based on what you can observe, test, and prove using the steps of the scientific method. Fair test – a scientific experiment where you change only one thing to see what happens, while keeping everything else the same. Findings – the answer a scientist discovers after asking a question and doing a careful investigation or experiment.	Force, pull, push, repel, attract, magnetic, non-contact force, contact force, north and south pole, friction
Light and shadows	
Disciplinary Knowledge	Substantive Knowledge
Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.	Know that I need light to see.
Know how to explain changes during an investigation.	Know that light is reflected from a surface.
Know how to explain changes during an investigation.	Know that shadows are formed when light from a light source is blocked by a solid object.
Know how to measure and compare time using seconds, minutes and hours.	Know that shadows change over time as the position of the sun changes.
Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.	Know that sunlight is dangerous and that there are ways to protect our eyes.
Disciplinary Vocabulary	Substantive Vocabulary
Evidence – information from experiments and observations that helps support an idea or shows if it is wrong. Conclusion – a summary of what was learned from a science experiment.	Light source, dark, absence of light, transparent, translucent, opaque, shadow, reflect.
Functions of plant parts	
Disciplinary Knowledge	Substantive Knowledge
Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.	Know that flowering plant parts have functions. Know that flowering plants have a life cycle Know that the parts of a flower play a role in the life cycle of the flowering plants, including pollination, seed formation and seed dispersal.



<p>Know how to predict cause and effect using 'because' and wider evidence. Know how to draw and record a table of results. Know how to demonstrate and explain how something might be investigated.</p>	<p>Know that plants have requirements for life and growth and how they vary from plant to plant. (Armenian grape hyacinth investigation: no light, no soil, no water, no air, no warmth).</p>
<p>Know how to predict cause and effect using the causal conjunction 'because' and wider evidence. Know how to draw and record a table of results. Know how to demonstrate and explain how something might be investigated.</p>	<p>Know that water is transported within plants.</p>
Disciplinary Vocabulary	Substantive Vocabulary
<p>Chart – a visual tool that scientists use to explain and present information in a clear and organised way. Observation – using your five senses—sight, sound, smell, touch, and taste—to carefully watch something and learn about it. Prediction – a smart guess about what will happen in an experiment based on what you already know.</p>	<p>Function, absorbed, transported, pollination, seed, seed dispersal, seed production</p>
Human skeleton, muscles and food	
Disciplinary Knowledge	Substantive Knowledge
<p>Know how to use simple scientific vocabulary in a written sentence to recall relevant scientific facts and vocabulary.</p>	<p>Know that animals, including humans need the right types of nutrition and they cannot make their own food (food types and food plate).</p>
<p>Know how to predict cause and effect using 'because' and wider evidence. Know how to draw and record a table of results.</p>	<p>Know that animals, including humans get nutrients from what they eat (investigating foods, designing a balanced meal).</p>
<p>Know how to construct axes to construct a bar chart. Know how to use knowledge and understanding to ask 'why' and 'what if' questions.</p>	<p>Know that the nutritional content of packaged foods can be found on the packaging.</p>
<p>Know how to name a range of science things, ideas and processes. Know how to use knowledge and understanding to ask 'why' and 'what if' questions.</p>	<p>Know how to describe that animals, including humans, have skeleton for support, protection and movement:</p> <ul style="list-style-type: none"> • Purpose of a skeleton and learning names of key bones. • Different joints with different movements and how muscles are needed for bones to move. • Different types of skeletons – exoskeletons, endoskeletons, hydrostatic skeletons.
Disciplinary Vocabulary	Substantive Vocabulary
<p>Characteristics – a special quality or feature of something that scientists use to learn about the world. Diagram – clear picture that shows how something works, like an experiment set up, or the parts of an object, such as a plant or a machine. Classify – how scientists organise living things into groups based on shared features.</p>	<p>Fat, water, skeleton, bones, muscles, support, protection, skull, ribs, spine, joints, carbohydrates, protein, vitamins and minerals, fibre</p>



Year 4	
Classification of living things	
Disciplinary Knowledge	Substantive Knowledge
Know how to create and explain criteria for sorting.	Know that living things can be grouped (vertebrates: animals with a backbone, invertebrates: animals without a backbone). Know that vertebrates are further classified into mammals, birds, reptiles, amphibians and fish. Know that invertebrates can be grouped by body structure, such as soft-bodied (e.g., jellyfish, worms) or hard-bodied (e.g., insects, crustaceans).
Know how to create and explain criteria for sorting.	Know that a classification key can be used to identify characteristics of plants and animals
Know how to use knowledge and understanding to develop scientific questions.	Know that there are living things in the local environment.
Know how to use scientific vocabulary during oral and written explanations using scientific ideas, vocabulary and facts to describe and explain.	Know that environments change through human activities.
Know how to describe trends and use scientific observations to explain.	Know that living things are at risk to dangers. Know that animals have to adapted to changing environment (polar bears).
Disciplinary Vocabulary	Substantive Vocabulary
Sort/classification – the way scientists group things together based on their shared features. Classification keys – a tool with a series of yes/no questions to help you figure out what a living thing is. Group – set of things scientists put together to compare or study.	Classification, environment, environmental change, deforestation Insects, birds, amphibians, fish, mammals, reptiles
Digestive system – teeth and eating	
Disciplinary Knowledge	Substantive Knowledge
Know how to use scientific vocabulary during oral and written explanations using scientific ideas, vocabulary and facts to describe and explain.	Know that human have different types of teeth. Know that the human digestive system includes organs such as the mouth, stomach and intestines, which work together to digest food and absorb nutrients.
Know how to plan a fair test by selecting variables to change and measure. Know how to use knowledge and understanding to explain changes during an investigation. Know how to construct a simple table with headings to compare cause and effect.	Know that various liquids have an effect on enamel (egg shell experiment).
Know how to create and explain criteria for sorting.	Know that animals can be categorized into producers, predators and prey are. Know that a food chain shows how energy is transferred from one living thing to another, starting with a producer and moving through consumers.
Disciplinary Vocabulary	Substantive Vocabulary
Fair test – a scientific experiment where you change only one thing to see what happens, while keeping everything else the same. Criteria – the rules or standards used to make a decision, judgment, or to evaluate something. Cause and effect – why something happens and what happens because of it.	Digestive system, premolars, molars, incisors, canines, esophagus, stomach, small intestine, large intestine, producer, consumer, predator, prey
Sound and vibration	
Disciplinary Knowledge	Substantive Knowledge
Know to describe trends and use scientific observations to explain Know how to use knowledge and understanding to explain changes during an investigation.	Know that a sound can be described. Know that sound vibrations travel through various medium to ears. Know that there is a pattern between pitch and volume of a sound and the object that produces it.
Know how to use scientific vocabulary during oral and written explanations using scientific ideas, vocabulary and facts to describe and explain.	Know that sounds are made when objects vibrate and these vibrations can travel through different materials to reach our ears.
Know how to plan a fair test by selecting variables to change and measure. Know how to describe trends and use scientific observations to explain.	Know that a sound gets fainter as the distance from the source increases.
Disciplinary Vocabulary	Substantive Vocabulary



Variables – something that can be changed or measured in an experiment. Prediction – a smart guess about what will happen in an experiment based on what you already know. Observe – using your five senses—sight, sound, smell, touch, and taste—to carefully watch something and learn about it.	Vibration, pitch, volume, sound, source
Electricity – circuits and components	
Disciplinary Knowledge	Substantive Knowledge
Know how use knowledge and understanding to develop scientific questions.	Know that there are common appliances that run on electricity using either a plug (mains) or battery cell.
Know how to select suitable equipment for a given task including electrical equipment and thermometers. Know how to construct a simple table with headings to compare cause and effect.	Know that a simple series electrical circuit requires a complete loop including a power source, wires and a component for it to work. Know that some circuits will allow electricity to travel around it or not (lamp circuit). Know that a switch opens or closes a circuit. Know that some common materials that are conductors or insulators including some metals.
Disciplinary Vocabulary	Substantive Vocabulary
Reason – being a detective for how the world works, using evidence to figure things out instead of just guessing. Evaluate – to judge its quality, usefulness, or worth by using science to check how well it works. Improve – carefully looking at an experiment to see if it was done right and what could be improved next time. Conduct – carry out a test to find information and answer a question.	Appliances, series circuits, cells, wire, bulbs, switches, buzzer, conductor, insulator
Materials – changes of state	
Disciplinary Knowledge	Substantive Knowledge
Know how to name and describe changes in scientific processes. Know how to create and explain clear criteria for sorting and grouping objects or living things based on their observable characteristics. Know how to accurately and independently construct a bar chart.	Know that some materials change state when they are heated or cooled. Know that materials can exist in different states, including solid, liquid and gas. Know that materials can be grouped by their state of matter.
Know how to use knowledge and understanding to justify a prediction. Know how to plan a fair test by selecting variables to change and measure. Know how to use knowledge and understanding to explain changes during an investigation. Know how to select suitable equipment for a given task including electrical equipment and thermometers. Know how to measure and compare temperature using degrees Celsius.	Know that some materials change state when they are heated or cooled. Know that temperatures change when materials change state.
Know how to name and describe changes in scientific processes. Know how to use scientific vocabulary during oral and written explanations using scientific ideas, vocabulary and facts to describe and explain.	Know that evaporation and condensation processes are part of the water cycle.
Disciplinary Vocabulary	Substantive Vocabulary
Relationships – lets you explain that there is a connection and interaction between two or more things. Data – a collection of facts and information, like numbers, observations, or descriptions, that scientists gather to learn about the world and answer questions. Bar chart – a visual tool that uses bars of different heights or lengths to show and compare information, or data, from an experiment or a survey. Prediction – a smart guess about what will happen in an experiment based on what you already know.	Solids, gases, liquids condensation, evaporation, water cycle, materials, states



Year 5	
Forces – friction	
Disciplinary Knowledge	Substantive Knowledge
Know how to measure, convert and compare using standards of units of measure.	Know that gravity is an invisible force that pulls unsupported objects towards the Earth, and that the strength of this force can be measured in Newtons (N).
Know how to plan a fair test and ensure controlled variables are kept the same. Know how to use data and science to explain a conclusion. Know how to predict a trend using a relationship prediction.	Know that a force causes objects to move and stop and that friction will have an effect on movement.
Know how to plan a fair test and ensure controlled variable are kept the same. Know how to use data and science to explain a conclusion. Know how to predict a trend using a relationship prediction.	Know that friction known as air resistance will reduce the effect of an objects gravitational pull: <ul style="list-style-type: none"> Parachute test – various sized parachutes Water resistance test – various shapes of playdough falling in water.
Know how to construct a complex table, with multiple headings, of results to show data.	Know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect (creating a catapult).
Disciplinary Vocabulary	Substantive Vocabulary
Evidence – information from experiments and observations that helps support an idea or shows if it is wrong. Plan – a step-by-step guide that scientists use to solve a problem or answer a question about the world. Variables – something that can be changed or measured in an experiment. Measurements – using tools like rulers, scales, and thermometers to find a number that describes something’s size, quantity, or amount, like length, weight, or temperature. Repeated readings – doing the same thing over and over again. Fair test – a scientific experiment where you change only one thing to see what happens, while keeping everything else the same.	Gravity, air resistance, water resistance, friction, lever, pulley, gears, effect
Growing older	
Disciplinary Knowledge	Substantive Knowledge
Know how to use knowledge and understanding to ask questions about observations. Know how to use axes to construct a line graph.	Know that a human life can be shown on a timeline with stages including infancy, childhood, adolescence, adulthood and old age.
Know how to predict a trend using a relationship prediction.	Know that different animals have different gestation periods and that these vary depending on species.
Know how to use data and science to explain a conclusion.	Know that a human foetus develops in stages over approximately 9 months and that this gestation period is needed for organs and body systems to develop safely.
Know how to use knowledge and understanding to identify trends during an investigation.	Know that humans experience physical changes as they grow older, including changes that occur during puberty and adolescence.
Know how to select the most appropriate equipment for an independently designed task.	Know that average height changes as humans grow and that data can be collected and compared to identify patterns of growth over time.
Disciplinary Vocabulary	Substantive Vocabulary
Explanation – a way of explaining why something happens in the natural world by using observations, measurements, and evidence. Line graph – a picture that shows how something changes over time, like temperature or height. Causal relationship – when one event or action makes another event happen.	Evolution, puberty, gestation period, fetus, embryo,
Solar system	
Disciplinary Knowledge	Substantive Knowledge
Know how to accurately use a range of scientific vocabulary during oral and written explanations.	Know that our solar system consists of planets, moons, stars and meteorites and that these objects are spherical.
Know how to use knowledge and understanding to help identify unknown scientific things, ideas and processes.	Know that the planets orbit the sun.
Know how to predict a trend using a relationship prediction.	Know that we have night and day due to the rotation of the Earth (model of what creates night and day).
Know how to use knowledge and understanding to identify unknown scientific things, ideas and processes.	Know that the Earth travels round the sun in a fixed orbit (sun dial). Know that the Moon orbits the Earth.
Disciplinary Vocabulary	Substantive Vocabulary



<p>Explanation – a way of explaining why something happens in the natural world by using observations, measurements, and evidence.</p> <p>Evidence – information from experiments and observations that helps support an idea or shows if it is wrong.</p> <p>Annotate – the practice of adding your own notes and comments to a scientific text, diagram, or data to help you understand it better.</p> <p>Diagram – a clear picture that shows how something works, like an experiment set up, or the parts of an object, such as a plant or a piece of equipment.</p>	Heliocentric, geocentric, spherical, solar system, Earth, planets, sun, moon
Materials – reversible and irreversible changes	
Disciplinary Knowledge	Substantive Knowledge
Know how to accurately use a range of scientific vocabulary during oral and written explanations.	Know that materials can exist in three common states: solid, liquid, gas.
Know how to select the most appropriate equipment for an independently designed task.	Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Know that some changes to materials are reversible and some are irreversible (filtering, sieving and evaporating).
Know how to use knowledge and understanding to identify trends during an investigation.	Know that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
Disciplinary Vocabulary	Substantive Vocabulary
<p>Investigate – how a person finds the answer to a question about the world by using a special, organised way of thinking.</p> <p>Observe – using your five senses—sight, sound, smell, touch, and taste—to carefully watch something and learn about it.</p> <p>Explanation – a way of explaining why something happens in the natural world by using observations, measurements, and evidence.</p>	Properties, substance, liquid, solid, gas dissolving, solution, suspension, filtration, separation, sieving, evaporating, conductor, insulator
Life cycles	
Disciplinary Knowledge	Substantive Knowledge
Know how to accurately use a range of scientific vocabulary during oral and written explanations.	Know that there are various processes of seed dispersal, germination, growth and photosynthesis.
Know how to select the most appropriate equipment for an independently designed task.	Know that flowering plants have reproductive parts, including the stamen (anther and filament) and carpel (stigma, style and ovary) and these parts have specific functions (flower dissection).
<p>Know how to create a criterion for sorting including sub-groups based on shared characteristics.</p> <p>Know how to accurately use a range of scientific vocabulary during oral and written explanations.</p>	<p>Know that animal life cycles have various stages:</p> <ul style="list-style-type: none"> • Mammals • Reptiles • Birds • Insects • Fish • Amphibians
Disciplinary Vocabulary	Substantive Vocabulary
<p>Comparative – comparing two or more things in a fair and organised way to see how they are alike and how they are different.</p> <p>Justify – how we prove our ideas are correct by using evidence from observations and experiments, rather than just guessing.</p> <p>Diagram – a clear picture that shows how something works, like an experiment set up, or the parts of an object, such as a plant or a machine.</p> <p>Classify – how scientists sort living things into groups based on what they have in common.</p>	Mammals, reptiles, insects, birds, fish, amphibians, life cycles, sexual reproduction, asexual reproduction, pollination, seed dispersal



Year 6	
Animals including humans – circulation system, diet and health	
Disciplinary Knowledge	Substantive Knowledge
Know how to use a range of complex scientific vocabulary accurately in written reports, explanations and diagrams to show secure understanding of scientific ideas and concepts. Know how to use a range of complex scientific vocabulary in a written report or diagram.	Know that the human circulator system includes named parts such as the heart, blood vessels (arteries, veins and capillaries) and blood, each with a specific role.
Know how to plan scientific enquires to answer questions including controlling variables.	Know that the heart, blood vessels and blood have various functions (heart dissection).
Know how to calculate an average from repeated measures. Know how to accurately and independently construct and scale a line graph.	Know that the lifestyle choices have an impact on the human body.
Know how to use a range of complex scientific vocabulary in a written report or diagram. Know how to construct a complex table of results to show repeated data.	Know that nutrients and water is transported within animals, including humans.
Disciplinary Vocabulary	Substantive Vocabulary
Fair test – a scientific experiment where you change only one thing to see what happens, while keeping everything else the same. Dissection – carefully cutting open a plant or animal to see its inside parts and learn how it works. Measuring – using numbers and standard units to find out the size, amount, or degree of something.	Circulating system, vessels, arteries, veins, capillaries, atrium ventricle, blood, lifestyle, heart, lung.
Light and shadows	
Disciplinary Knowledge	Substantive Knowledge
Know how to justify reasons for selecting specific equipment. Know how to use knowledge and understanding to generate a testable hypothesis.	Know that light travels in straight lines. Know that objects can be seen because they reflect light into the eye or give out light. Know that shadows have the same shape as the object because the object blocks light travelling in straight lines from a light source.
Know how to use a range of complex scientific vocabulary in a written report or diagram.	Know that we see things because light travels into our eyes.
Disciplinary Vocabulary	Substantive Vocabulary
Causal relationship – when one event or action makes another event happen. Variables – something that can be changed or measured in an experiment. Hypothesis – a scientific idea or prediction about what might happen in an investigation, based on what we already know, which can be tested.	Periscope, straight lines
Evolution	
Disciplinary Knowledge	Substantive Knowledge
Know how to use knowledge, understanding and secondary resources to identify unknown scientific things, ideas and processes.	Know that fossils provide information about living things that lived millions of years ago.
Know how to use primary and secondary data and ideas when concluding.	Know that living things change over time and this is known as evolution which takes a long time.
Know how to use knowledge and understanding to challenge scientific ideas and concepts.	Know that living things produce offspring.
Know how to create and apply sorting criteria that include multiple sub-groups to classify in more detail.	Know that animals and plants adapt to their environment in different ways.
Know how to use a range of complex scientific vocabulary in a written report or diagram.	Know that adaptations may lead to evolution.
Disciplinary Vocabulary	Substantive Vocabulary
Sub groups – a smaller group or category within a larger, more general group. Primary data – information that you collect yourself for the first time. Secondary data – information that has already been collected and published by other scientists, and you use it for your own research.	Adaptation, fossils, evolution, offspring, inheritance, variation, natural selection
Living things and their habitats Classification	
Disciplinary Knowledge	Substantive Knowledge
Know how to use knowledge, understanding and secondary resources to identify unknown scientific things, ideas and processes.	Know that living things can be grouped according to their characteristics, including sub-groups of invertebrates such as crustaceans (shrimps, crabs, woodlice and lobsters) and molluscs (slugs, snails, octopuses and oysters).



Know how to create and apply sorting criteria that include multiple sub-groups to classify in more detail. Know how to construct a complex table of results to show repeated data.	Know that animals and microorganisms are classed based on shared characteristics to help scientists identify them and understand similarities and differences between living things
Know how to create and apply sorting criteria that include multiple sub-groups to classify in more detail.	Know that plants can be classified into flowering and non-flowering groups based on their characteristics.
Disciplinary Vocabulary	Substantive Vocabulary
Classification keys – a tool with a series of yes/no questions to help you figure out what a living thing is.	Vertebrates, non-vertebrate, microorganisms, bacteria, fungi
Electricity – voltage, symbols and complex circuits	
Disciplinary Knowledge	Substantive Knowledge
Know how to identify trends during an investigation and make justified predictions for the rest of an investigation.	Know that the number of cells in a circuit affects how components work, such as making bulbs brighter or motors spin faster.
Know how to use a range of complex scientific vocabulary in a written report or diagram.	Know that a simple electrical circuit can include components such as cells, wires, bulbs, buzzers, switches and motors.
Know how to construct a complex table of results to show repeated data.	Know that different components have different effects on a circuit, depending on how they are used.
Know how to use a range of complex scientific vocabulary in a written report or diagram.	Know that standard symbols are used to represent components when drawing simple circuit diagrams.
Disciplinary Vocabulary	Substantive Vocabulary
Conclusions – a summary of what was learned from a science experiment. Trends – a general shift or change in a field of science over a period of time.	Circuit diagram, symbols, voltage, cells, components