

## Science Long Term Overview – Broken Down into Small Steps

### Year 4

| Unit                           | Learning Objectives                                                                                                                                             | Disciplinary Knowledge                                                                                                                                                                     | Substantive Knowledge                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| Group & Classify Living Things | Recognise that living things can be grouped in a variety of ways.                                                                                               | Talk about criteria for grouping, sorting and classifying (non-statutory).                                                                                                                 | Animals with a spine are called vertebrates.<br>All mammals, birds, fish, amphibians and reptiles are vertebrates.<br>Each animal group has different physical features.                                                                                                                                                                                                                                                                                                           |
|                                | Recognise that living things can be grouped in a variety of ways.                                                                                               | Asking relevant questions and using different types of scientific enquiries to answer them.                                                                                                | Animals with a spine are called vertebrates.<br>Animals without a spine are called invertebrates.<br>Insects have three body sections, six legs and antennae.<br>Spiders have two body sections and eight legs.<br>Slugs and snails are soft bodied invertebrates.                                                                                                                                                                                                                 |
|                                | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                           | Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.                                                                                 | Classification keys are used to classify animals accurately.<br>Closed questions are used in classification keys.                                                                                                                                                                                                                                                                                                                                                                  |
|                                | Recognise that living things can be grouped in a variety of ways.                                                                                               | Talk about criteria for grouping, sorting and classifying (non-statutory).                                                                                                                 | Non-flowering plants include mosses and ferns.<br>Flowering plants can produce flowers and fruit.<br>Deciduous trees lose their leaves annually.<br>Evergreen trees keep their leaves all year round.                                                                                                                                                                                                                                                                              |
|                                | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                           | Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.                                                       | Classification keys are used to classify plants accurately.<br>Closed questions are used in classification keys.                                                                                                                                                                                                                                                                                                                                                                   |
| Data Collection (A)            | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                           | Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.                                                                                 | Deciduous trees lose their leaves annually.<br>Evergreen trees keep their leaves all year round.<br>Vertebrates are animals with a spine.<br>Invertebrates are animals without a spine.                                                                                                                                                                                                                                                                                            |
|                                | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                           | Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.                                                                             | Bar charts and pictograms are used to present data.<br>Presenting data in bar charts or pictograms helps to spot patterns or trends easily.<br>Data can be used to make conclusions and predictions for further investigations.                                                                                                                                                                                                                                                    |
| States of Matter               | Compare and group materials together, according to whether they are solids, liquids or gases                                                                    | Talk about criteria for grouping, sorting and classifying (non-statutory).                                                                                                                 | Solids have a defined shape and volume. A solid material will keep its shape if it is transferred from one container to another.<br>Liquids have no fixed shape and will take on the shape of the container they are transferred into. The volume will remain the same.<br>Gases have no fixed shape and no fixed volume. They will spread out and fill any available space.                                                                                                       |
|                                | Compare and group materials together, according to whether they are solids, liquids or gases.                                                                   | Identifying differences, similarities or changes related to simple scientific ideas.                                                                                                       | Some solids, such as sand, salt, flour and rice, can be poured but they are still classified as solid materials.<br>Liquids maintain the same volume if transferred to different containers.<br>Some liquids, like water, flow easily while other liquids, like treacle, do not flow as easily.                                                                                                                                                                                    |
|                                | Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). | Asking relevant questions and using different types of scientific enquiries to answer them.                                                                                                | Some materials can change states between solids, liquids and gases.<br>Water can be a solid (ice), liquid (water) or a gas (water vapour).<br>When heat is applied to ice, it melts and turns to water. When water is heated it turns into a gas. Water has a boiling point of 100°C.<br>To change water vapour (gas) back to water (liquid) it needs to be cooled down as it returns to its liquid state.<br>To change water to ice, it needs to be frozen. Water freezes at 0°C. |
|                                | Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). | Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. | A thermometer is a piece of equipment that is used to measure temperature.<br>Stopwatches are used to measure intervals of time.                                                                                                                                                                                                                                                                                                                                                   |
|                                | Observe that some materials change state when they are heated or cooled, and                                                                                    | Setting up simple practical enquiries, comparative and fair tests.                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

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|  | measure or research the temperature at which this happens in degrees Celsius (°C).                                                                              |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                           |
|  | Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). | Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.                                                                                 |                                                                                                                                                                                                                                                                                                                                                           |
|  | Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.                             | Identifying differences, similarities or changes related to simple scientific ideas and processes.                                                                                         | A large amount of planet Earth is covered in water.<br>Water is in constant movement through a process called the water cycle. As the water moves it can be in different states of matter.<br>Evaporation is one stage of the water cycle. Evaporation is where a liquid changes state to a gas.<br>Condensation is when a gas changes state to a liquid. |
|  | Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.                             | Asking relevant questions and using different types of scientific enquiries to answer them.                                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                       |
|  | Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.                             | Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. | N/A                                                                                                                                                                                                                                                                                                                                                       |
|  | Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.                             | Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.                                                               | N/A                                                                                                                                                                                                                                                                                                                                                       |

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| Sound               | Identify how sounds are made, associating some of them with something vibrating.                                                                                                | Asking relevant questions and using different types of scientific enquiries to answer them.                                                                                                | A vibration is a quick back-and-forth movement.<br>Sounds are made when objects vibrate.<br>The vibrations travel from the object to our ears.<br>Sounds can be heard when these vibrations reach our ears.                                                                                                                                                                                                                                 |
|                     | Recognise that vibrations from sounds travel through a medium to the ear.                                                                                                       | Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.                                                                             | Sound vibrations travel through the air.<br>The outer ear funnels the vibrations into the ear canal.<br>The vibrations move down the ear canal.<br>The vibrations are passed to the ear drum.<br>The vibrations from the ear drum are passed along the ear bones and into the cochlea.<br>Signals are then sent to the brain, where they are processed and interpreted as sounds we understand.                                             |
|                     | Identify how sounds are made, associating some of them with something vibrating.                                                                                                | Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. | Sound volume is measured in decibels (dB).<br>A decibel is a measure of the loudness of sounds.<br>A decibel meter can be used to measure the loudness of sounds.<br>If humans are exposed to loud sounds too often, their hearing can be damaged.                                                                                                                                                                                          |
|                     | Find patterns between the volume of a sound and the strength of the vibrations that produced it.                                                                                | Setting up simple practical enquiries, comparative and fair tests.                                                                                                                         | A vibration is a quick back-and-forth movement.<br>Sounds are made when objects vibrate.<br>The louder the sound, the bigger the vibration.<br>The quieter the sound, the smaller the vibration.                                                                                                                                                                                                                                            |
|                     | Find patterns between the pitch of a sound and features of the object that produced it.                                                                                         | Identifying differences, similarities or changes related to simple scientific ideas and processes.                                                                                         | Pitch means how high or low a sound is.<br>High-pitched sounds produce faster or more frequent vibrations.<br>Low-pitched sounds produce slower or less frequent vibrations.<br>There are different ways to change the pitch of an instrument.                                                                                                                                                                                              |
|                     | Recognise that sounds get fainter as the distance from the sound source increases.                                                                                              | Setting up simple practical enquiries, comparative and fair tests.                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                     | Recognise that sounds get fainter as the distance from the sound source increases.                                                                                              | Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                     | Recognise that sounds get fainter as the distance from the sound source increases.                                                                                              | Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Data Collection (B) | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                                           | Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.                                                                                 | In spring, plants start to grow due to the increase in temperature and the amount of sunlight received throughout the day.<br>In spring, animals that have hibernated come out of hibernation.<br>There are increased numbers of active insects and other invertebrates in the spring.                                                                                                                                                      |
|                     | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.                                           | Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.                                                                             | Bar charts and pictograms are used to present data.<br>Presenting data in bar charts or pictograms helps to spot patterns or trends easily.<br>Data can be used to make conclusions, comparisons and predictions for further investigations.                                                                                                                                                                                                |
| Electricity         | Identify common appliances that run on electricity.                                                                                                                             | Talk about criteria for grouping, sorting and classifying (non-statutory).                                                                                                                 | Many appliances use electricity and must be plugged into a socket for the electricity to pass through the circuit. Other appliances may need batteries to power the energy around a circuit.<br>Some appliances use electricity to heat things up (cooker hobs) and cool things down (fridges and freezers).<br>Electricity can be extremely harmful.<br>Liquids and wet hands should be kept away from electrical appliances and circuits. |
|                     | Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.                                      | Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.                                                                             | A circuit must have a closed path so that electrical energy can pass through.<br>Circuits can include bulbs, wires, switches, buzzers and cells connected in one loop.<br>If a circuit does not have a source of energy, such as a cell or battery, then electricity cannot flow around it.                                                                                                                                                 |
|                     | Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens | Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.                                                               | A bulb will not light in a circuit if it is not in a complete loop with the cell.<br>A bulb will not light in a circuit if a switch is open.                                                                                                                                                                                                                                                                                                |

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|        | and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. |                                                                                                                             |                                                                                                                                                                                                                                                                                                              |
|        | Recognise some common conductors and insulators, and associate metals with being good conductors.     | Asking relevant questions and using different types of scientific enquiries to answer them.                                 | A conductor is a material which allows energy to flow through it.<br>Metals are good conductors.<br>An insulator does not allow energy to flow through it.<br>Materials which are insulators are rubber, plastic and wood.                                                                                   |
|        | Recognise some common conductors and insulators, and associate metals with being good conductors.     | Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions | A conductor is a material which allows energy to pass through it.<br>An insulator does not allow energy to pass through it.<br>Some materials can be used to connect a gap in a circuit, others cannot.                                                                                                      |
| Energy | N/A                                                                                                   | Using straightforward scientific evidence to answer questions or to support their findings.                                 | Electricity is energy that flows in wires.<br>We use electricity to power our homes and schools.<br>Electricity can be made from burning oil, coal and natural gas which is harmful for planet Earth.                                                                                                        |
|        | N/A                                                                                                   | Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.                  | There are different ways to reduce our energy usage.<br>It is important to reduce our energy usage as this means we burn less oil, coal and natural gas.<br>Turning off lights and appliances, unplugging electronic equipment and using natural light as much as possible helps to reduce our energy usage. |

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| Data Collection (C)  | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | Gathering, recording, classifying and presenting data in a variety of ways, to help in answering questions.                                            | In summer, flowers are pollinated and change into fruits.<br>There is typically more active plant and animal life in summer.<br>In summer, there are more insects and other invertebrates than in the other three seasons                                                                                                                                                                                                                                        |
|                      | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.                                         | Bar charts and pictograms are used to present data.<br>Presenting data in bar charts or pictograms helps to spot patterns or trends easily.                                                                                                                                                                                                                                                                                                                      |
|                      | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.                   | Data can be used to make conclusions and suggest further questions.<br>Data can be used to observe how something changes over time.<br>The number of some living things varies through the year, because of the changes in the seasons.                                                                                                                                                                                                                          |
| Habitats             | Recognise that living things can be grouped in a variety of ways.                                                                     | Asking relevant questions and using different types of scientific enquiries to answer them.                                                            | Habitats usually provide everything an animal or plant needs.<br>There are lots of different types of habitat, including fields, woodland, urban areas and aquatic habitats.<br>Rural and urban habitats can both be biodiverse but are not suitable for every animal.                                                                                                                                                                                           |
|                      | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | Gathering, recording, classifying and presenting data in a variety of ways, to help in answering questions.                                            | Animals can be sorted and classified in many ways.<br>Classification keys can be used to classify animals.<br>Closed questions are used in classification keys.<br>Animals live within different habitats, depending on what they need to survive.                                                                                                                                                                                                               |
|                      | Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. | Gathering, recording, classifying and presenting data in a variety of ways, to help in answering questions.                                            | Plants can be sorted and classified in many ways.<br>Classification keys can be used to classify plants.<br>Closed questions are used in classification keys.<br>Plants live within different habitats depending on what they need to survive.                                                                                                                                                                                                                   |
|                      | Recognise that environments can change, and that this can sometimes pose dangers to living things.                                    | Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.                   | Humans can have both positive and negative effects on the natural environment.<br>Rewilding increases biodiversity by providing a greater range of habitats by returning a damaged habitat to how it used to be.<br>Nature reserves offer a protected space for plants and animals to live and grow.<br>Natural resources can be limited, and over-using them can damage the environment.                                                                        |
| Deforestation        | N/A                                                                                                                                   | Asking relevant questions and using different types of scientific enquiries to answer them.                                                            | Humans clear large areas of forest for natural resources or space for farming and construction.<br>Deforestation impacts animals and plants by destroying their habitats and reducing the biodiversity of an area.                                                                                                                                                                                                                                               |
|                      | N/A                                                                                                                                   | Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.                   | Humans are responsible for the destruction of habitats through deforestation.<br>When habitats are destroyed, the plants and animals that live there become at risk of becoming endangered or extinct.<br>Palm oil is used in lots of products, such as food and cosmetics.<br>Palm oil can come from sustainable sources which reduces the impact of deforestation.                                                                                             |
| The Digestive System | Comparing the teeth of carnivores and herbivores and suggesting reasons for differences (non-statutory).                              | Identifying differences, similarities or changes related to simple scientific ideas and processes.                                                     | Carnivores have long, sharp teeth to help them with ripping and tearing through meat.<br>Herbivores have large, flat teeth to grind and chew through grasses and plants.<br>Omnivores have a combination of sharp and flat teeth, allowing them to tear through meat and grind plants.                                                                                                                                                                           |
|                      | Identify the different types of teeth in humans and their simple functions.                                                           | Asking relevant questions and using different types of scientific enquiries to answer them.                                                            | Humans have four different types of teeth – incisors, canines, premolars and molars.<br>The incisors are used for biting into food.<br>The canine teeth are sharp and pointed to help with ripping and tearing.<br>The premolars are teeth between the canines and molars.<br>They are used for guiding food towards the molars at the back of the mouth.<br>The molars are the large teeth at the back of the jaw. They are used for grinding and chewing food. |
|                      | Identify the different types of teeth in humans and their simple functions.                                                           | Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations (non-statutory). | Human teeth have layers which include enamel, pulp and roots.<br>Enamel protects the sensitive parts of the tooth underneath.<br>The human mouth is full of different germs which feed on sugar in the mouth and can cause plaque to build up.<br>If plaque is not removed from the teeth, it can cause the enamel layer to rot away, exposing the sensitive layers underneath.                                                                                  |
|                      | Identify the different types of teeth in humans and their simple functions.                                                           | Setting up simple practical enquiries, comparative and fair tests.                                                                                     | Human teeth have layers.<br>Enamel acts as a protective layer for the sensitive parts of the tooth underneath.<br>Germs in the mouth feed on sugars and produce acid which can break down the enamel on the teeth.                                                                                                                                                                                                                                               |
|                      | Describe the simple functions of the basic parts of the digestive system in humans.                                                   | Recognise when and how secondary sources might help them to answer                                                                                     | Digestion is the breaking down of larger pieces of food into smaller pieces so the body can use it for energy. The digestion process begins when food is bitten by the teeth.                                                                                                                                                                                                                                                                                    |

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|  |                                                                                     | questions that cannot be answered through practical investigations (non-statutory).                                                  | Saliva turns smaller pieces of food into a more liquid substance so it travels smoothly down the oesophagus to the stomach.<br>The stomach churns the food, and adds acid to break it down further before the partially digested food passes to the small intestine.<br>The small intestine absorbs nutrients from the food and passes the remaining food to the large intestine.<br>The large intestine absorbs water from the remaining food, and then passes the remaining waste to the rectum. |
|  | Describe the simple functions of the basic parts of the digestive system in humans. | Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. | The digestive system allows the body to take in nutrients from food as it passes through the body.<br>Each organ within the digestive system has a function to help the body break down food.                                                                                                                                                                                                                                                                                                      |
|  | Identify the different types of teeth in humans and their simple functions.         | Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.         | Germes in the mouth feed on sugars and produce acid which can break down the enamel on the teeth.<br>Enamel acts as a protective layer for the sensitive parts of the tooth underneath.<br>We can look after our teeth by brushing them twice a day, reducing our sugar intake and visiting the dentist regularly                                                                                                                                                                                  |