





Working Scientifically in KS2 - Years 3 - 6

	What pupils should know and be able to do Lower KS2	Key vocabulary Lower KS2	What pupils should know and be able to do Upper KS2	Key vocabulary Upper KS2
	<p>Identifying means to recognise something. Pupils learn that living and non-living things can be sorted according to their differences (classifying) They can then group things according to similarities and differences. These are called criteria. Pupils record classifications using Venn and Carroll diagrams and tables.</p>	<p>differences, similarities, classify, diagram, chart, key, Carroll Diagram, Venn Diagram, behaviour, properties, criteria,</p>	<p>Identifying means to recognise something. Pupils learn that living and non-living things can be sorted according to their differences (classifying) They can then group things according to similarities and differences. These are called criteria. Pupils record classifications using Venn and Carroll diagrams and tables. Pupils use classification keys to group according to criteria.</p>	<p>differences, similarities, classify, diagram, chart, key, Carroll Diagram, Venn Diagram, behaviour, properties, criteria, classification key</p>
	<p>A systematic observation is a way scientists observe repeatedly with a clear purpose. Pupils need to know that they can use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements, using a range of equipment, including thermometers and data loggers. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings)</p>	<p>systematic, notice, patterns, observations, careful, accurate, evidence, increase, decrease, predict, conclude, relationships, appearance, unit measurements</p>	<p>Pupils must know how to select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value)</p>	<p>systematic, notice, patterns, observations, careful, accurate, evidence, increase, decrease, predict, conclude, relationships, appearance, unit measurements (force, mm, cm, mins, seconds)</p>
	<p>In a scientific test, scientists make predictions and hypotheses. A prediction is what they think the outcomes might be, and a hypothesis is an explanation of phenomena. In simple comparative tests children compare one event with another and identify different outcomes. A variable is something that can change. In order to demonstrate a causal relationship between two variables children carry out a fair test. For a fair test, they identify a variable that can be changed and measured while keeping the other variables the same.</p> <p>In investigations, conclusions summarize how your results support or contradict your original prediction and help to form a hypothesis.</p> <p>Pupils learn to recognise when a simple fair test is necessary and help to decide how to set it up. They learn to think of more than one variable factor. They recognise when a simple comparative test is necessary and help to decide how to set it up.</p>	<p>cause, effect, enquiry, fair test, comparative test, variable factor, record, measure, prediction, conclusion, evidence, hypothesis, phenomena.</p>	<p>The children show they know how to select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. During an enquiry, they assimilate other scientific processes into their learning. They make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). They evaluate their findings, suggest improvements to their methods and form hypotheses.</p>	<p>Control, relationships, reliability, accuracy, interpret, justify, prove, Question/Enquiry, Method, Variables, Prediction, Results, Conclusion, Evaluation</p>

	<p>Children begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them.</p> <p>With help, children can look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. Children can say what they found out, linking cause and effect.</p>	<p>patterns, relationships, cause, effect, data, changes, similarities, differences, predict, question, observations, conclude,</p>	<p>Pupils learn how to identify causal relationships and patterns in the natural world from their evidence; make simple conclusions, make predictions for new values, suggest improvements and raise further questions. They draw conclusions based on their evidence and current subject knowledge. They identify results that do not fit the overall pattern; and explain their findings using their subject knowledge (anomalies)</p>	<p>causal, interpret, data, graphs and charts, anomaly, atypical, typical, impact</p>
	<p>Begin to recognise when and how secondary sources might help to answer questions that cannot be answered through practical investigations</p>	<p>secondary source, reliability, fact, interpretation</p>	<p>Begin to recognise when and how secondary sources might help to answer questions that cannot be answered through practical investigations</p>	<p>secondary source, reliability, fact, interpretation</p>

Scientific Knowledge Year 4

Topic Title (Concept)	Electricity (Electricity)	Sound (Sound and Hearing)	States of Matter (Substances and Properties)	Living things and their habitats (Living Things & Their Habitats)	Animals, including humans (Animals & Humans)
NC Reference	Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. 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 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.	Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produces it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sounds source increases.	Compare and group materials together, according to whether they are solids, liquids or gases. 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. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Recognise that living things can be groups in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things.	Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions. Construct and interpret a variety of food chains, identifying producers, predators and prey.
Prior learning	Not covered before	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	Describe and compare the structure of a variety of common animals (Y1 - Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)	Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)
	An electrical circuit consists of a cell or battery connected to a	A sound produces vibrations which travel through a medium	A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but	Living things can be grouped (classified) in different ways	Food enters the body through the mouth. Digestion starts when the

	<p>component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit.</p> <p>Non-metallic solids are insulators except for graphite (pencil lead).</p>	<p>from the source to our ears. Sound cannot travel through a vacuum. The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. A sound insulator is a material which blocks sound effectively. Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p>	<p>changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Melting and freezing are changes of state. The freezing point of water is 0oC. Boiling is a change of state from liquid to gas. Water boils when it is heated to 100oC. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling. Pupils need to explain the water cycle with reference to changes of state.</p>	<p>according to their features. Classification keys can be used to identify and name living things. Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year. There are 5 types of vertebrate (animals with backbone: mammals ,fish, reptiles, amphibians, birds)</p>	<p>teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down and other chemicals are added. The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus. Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing) Living things can be classified as producers, predators and prey according to their place in the food chain.</p>
<p>Working Scientifically</p> <p>(These are suggested WS areas that complement unit - also refer to and highlight WS milestones as cover and ensure all covered over year/phase)</p>	<p><u>Identify, classify and group</u> Classify materials as conductors and insulators.</p> <p><u>Pattern Seeking</u> Investigate how different types of switches operate.</p> <p><u>Comparative and fair testing</u> Compare different materials to replace wires in a circuit.</p>	<p><u>Identify, classify and group</u> Classify materials according to sound insulation.</p> <p><u>Pattern Seeking</u> Find patterns between volume and strength of vibration causing it</p> <p>Find patterns between pitch of a sound and features of the instrument producing it.</p> <p><u>Comparative and fair testing</u> Investigate how size of sound changes as distance from source increases</p>	<p><u>Identify, classify and group</u> Group materials as solid, liquid or gas.</p> <p><u>Observing over time</u> Observe how states of matter change over time, observe ice melting and evaporation.</p> <p>Observe the boiling of water, what happens at boiling point and change of state.</p> <p><u>Pattern Seeking</u> Describe the water cycle. Identify examples condensation and where they come from.</p> <p><u>Comparative and fair testing</u> Investigate the best places to dry washing.</p>	<p><u>Identify, classify and group</u> Use fieldwork to investigate types of human impact in the local area Use classification keys to identify unknown living things</p> <p><u>Observing over time</u> Observe local wildlife habitats</p> <p><u>Secondary sources</u> Find out about how environments may naturally change. Find out about human impact, both positive and negative, on environments.</p>	<p><u>Identify, classify and group</u> Classify types of teeth and their functions Classify animals as predators and prey, create food chains and webs Identify the organs and processes in the human digestive system</p> <p><u>Pattern Seeking</u> Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing). Identify patterns of energy in food chains</p>
<p>End of unit task</p>	<p>Investigate electrical circuits</p>	<p>Investigate sound and hearing</p>	<p>Investigate states of matter Summarise, using scientific</p>	<p>Classify living things Summarise the key</p>	<p>Explain food chains</p>

Make, draw and describe the components of an electric quiz board.

Suggest a way to prove the relationship between size of instrument and pitch.
True or false? Smaller instruments create higher pitched sounds

terminology, the relationship between temperature and states of matter. Explain the water cycle using the appropriate terminology.

similarities and differences of animals in different groups. Adapt a classification key to include different criteria.

Demonstrate and explain how food chains begin with sunlight
Explain how water is essential in a food chain.