

Year Four

During Year 4 children develop the skills of working scientifically through 3 units:

Year	Questioning & Enquiry	Observing and Measuring	Investigating	Recording & Reporting Findings	Identifying & classifying	Conclusions	Key Vocab
4	Raise their own questions about the world around us and make some decisions about which types of enquiry will be the best ways of answering these	Take systematic and accurate measurements using standard units and a range of equipment (thermometers, data loggers) Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.	Set up simple practical enquiries, comparative and fair tests Decide which variables to keep the same and which to change	Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.	Decide criteria/use keys for grouping, sorting and classifying including by behaviour or properties based on testing	Start to use scientific evidence to answer questions and support findings beginning to look for patterns, similarities and differences in the data	Gather/record data Present Key Bar chart Table Prediction Evidence Interpret Conclusion
Connections to Mathematics Units				Week 21 Statistics I can interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs I can solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs (using a greater range of scales)			

Unit 1 (Autumn Term): Sound

Connections to other science units:

This is the first unit the children encounter

<p>Sound Year Four</p>	<p>Identify how sounds are made >identify how sounds are made, associating some of them with something vibrating</p> <p>Structure of the ear and how sound travels >recognise that vibrations from sounds travel through a medium to the ear</p> <p>Pitch and volume of sound > find patterns between the pitch of a sound and features of the object that produced it >find patterns between the volume of a</p>	<p>I can use the vocabulary linked to sound.</p> <p>I can explain how sounds are made</p> <p>I can label the parts of the ear</p> <p>I can find patterns in sounds that are made by different objects</p> <p>I can explain how objects get fainter the further away they are</p>	<p>Sound Sound source</p> <p>Vibrate/Vibration</p> <p>Insulator/Insulate</p> <p>Volume Pitch</p> <p>Outer ear Middle ear Inner ear Ear canal Ear drum Cochlea Auditory nerve</p>	<p>Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.</p> <p>Pupils might work scientifically by:</p> <p>Finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.</p> <p>Examples of activities:</p> <p>>Children investigate how effective 5 different materials are at blocking sound. Recognising the difficulty at actually measuring the loudness of a sound, they make each measurement 3 times and take the median. Children use their results to create a bar chart and place the materials in order of effectiveness as sound insulators.</p> <p>>Children learn the difference between pitch and volume. They carry out an investigation where they place 5 different water containers in order, depending on the pitch made when air is gently blown across the top of each one. They attempt to find a pattern and explain their results.</p> <p>>Children explore how a string instrument makes sound. Using an ice cream tub, elastic bands and Lego blocks, they create a string instrument. They explore how adding more Lego blocks affects the pitch of each string (band).</p> <p>>Children learn that pitch and volume are two different properties of sound. They investigate the pitch and volume of the sound made when 5 different balls are dropped. Recognising the difficulty of measuring pitch and sound without equipment, children make 5 measurements and then choose the modal value. Children transfer the results to a scatter graph showing both pitch and volume.</p> <p>>Working on the school playground, children investigate the height a ball needs to be dropped from in order to be heard at different distances. Children predict and then measure the minimum height required, recording their results in a table. They create a</p>
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	<p>sound and the strength of the vibrations that produced it</p> <p>> recognise that sounds get fainter as the distance from the sound source increases.</p>			<p>line graph and explore the link between the distance and the minimum height (and therefore volume) required.</p> <p>Links to websites for additional activities:</p> <p>https://www.hamilton-trust.org.uk/science/year-4-science/sound-listen/?gclid=EAIaIQobChMI5I7KzuCZ6QIVU4BQBh00MwpAEAAYASAAEgIU2vD_BwE</p> <p>https://www.stem.org.uk/resources/community/collection/12746/year-4-sound</p>
<p>Common misconceptions:</p>				<p>Pitch and volume are frequently confused, as both can be described as high or low.</p> <p>Some children may think:</p> <p>Sound is only heard by the listener</p> <p>Sound only travels in one direction from the source.</p> <p>Sound can't travel through solids and liquids</p> <p>high sounds are loud and low sounds are quiet.</p>

Unit 2 (Spring Term): Plants

<p>Connections to other science units:</p>				
<p>This is the third time the children have encountered plants.</p>				
<p>This will build towards their learning for Year 5 (living things and their habitats)</p>				
<p>Plants Year Four</p>	<p>Water transportation Functions of parts of plants >identify and describe the functions of different parts of flowering</p>	<p>I know and can use key vocabulary to talk about plants</p> <p>I can label different parts of plants</p>	<p>Leaf Root</p> <p>Nutrient/nutrition Soil Air fertiliser</p>	<p>Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.</p> <p>Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.</p> <p>Pupils might work scientifically by:</p>

<p>plants: roots, stem/trunk, leaves and flowers</p> <p>>explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</p> <p>>investigate the way in which water is transported within plants</p> <p>Life cycle (pollination, seed formation, seed dispersal)</p> <p>>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	<p>I can explain the different functions of parts of a plant</p> <p>I know what plants need to grow, and how this can be different for different plants</p> <p>I can explain how water is transported in plants</p> <p>I can describe the lifecycle of plants and use diagrams to explain this</p>	<p>Life cycle</p> <p>Pollination</p> <p>Seed formation</p> <p>Seed dispersal</p> <p>reproduction</p>	<p>Comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.</p> <p>Examples of activities:</p> <p>>Children grow 1, 4, 9 and 16 onion sets in 4 different pots. They make observational drawings and measure the height of the plants over 4 weeks. They use their measurements to complete a line graph showing the growth of all plants (this activity could be started before Science Week).</p> <p>>Children look at images of food plants. They identify the different parts, including roots, tuber, stem, bulb, trunk, branch, leaf, flower, and fruit. They discuss which part of the plant we normally eat.</p> <p>>Children label a diagram of a flowering plant. They explain the function of the flower, stem, leaves and roots. Children can cut and paste descriptions or write their own.</p> <p>>Children predict and measure how long it takes for coloured liquid takes to rise up the stem of a carnation flower and colour its petals. They make a drawing of the flower at the start and end of the investigation and predict what would happen if the flower had a shorter stem.</p> <p>>Children read about the 4 stages in the life cycle of a flowering plant - germination, growth, flowering, and fertilisation/seed production. They create a life cycle diagram, cutting and pasting descriptions and pictures or writing and drawing their own.</p> <p>>Children learn how pollination is vital to flowering plant reproduction. They read about insect pollination and create their own process description by either cutting and pasting descriptions or writing in their own words.</p> <p>Children learn about different seed dispersal methods evolved by plants including dispersal by gravity, by wind, by water, and by animals. They examine 6 different images of fruits and seeds and try to explain how they might be dispersed.</p> <p>Links to websites:</p>
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Common misconceptions:				<p>Some children may think:</p> <ul style="list-style-type: none"> • plants eat food • food comes from the soil via the roots • flowers are merely decorative rather than a vital part of the life cycle in reproduction • plants only need sunlight to keep them warm • roots suck in water which is then sucked up the stem.

Unit 3 (Summer Term): States of Matter

Connections to other science units:				
This is the second time children have encountered materials (Year 1 every day materials)				
This will build towards their learning for Year 5 (Properties and changes in materials)				
States of matter Year Four	Compare and group materials > compare and group materials together, according to whether they are solids, liquids or gases	I can use key vocabulary related to states of matter I can group materials according to whether they are solid, liquid or gas I know (and can name) some	Solid Liquid Gas Particles Change State Matter Group Classify	<p>Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.</p> <p>Pupils might work scientifically by:</p> <p>grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which</p>

<p>Materials change state when heated/cooled and the effect of evaporation/condensation</p> <p>> 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)</p> <p>> identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.</p>	<p>materials that can change state</p> <p>I can explain how heating/cooling affects different materials</p> <p>I can offer a simple explanation of the water cycle using key vocabulary and diagrams</p>	<p>Temperature</p> <p>Oxygen</p> <p>Evaporation</p> <p>Condensation</p> <p>Water Cycle</p>	<p>materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.</p> <p>Examples of activities:</p> <p>>Children investigate the melting point of 3 familiar materials: ice, chocolate and butter. They use a thermometer to measure the temperature and record their results in a table. They discuss how accurate their predictions were and whether melting is a reversible change.</p> <p>>Children investigate how effective different materials are at insulating a cold drink and slowing its increase in temperature. They use thermometers to measure the temperature of each cup every 15 minutes over the course of 2 hours. Children record their information in a table and create a line graph showing the temperature of all 4 cups over a 2-hour period.</p> <p>>Children investigate how rapidly water placed in different locations evaporates overtime. Using a table, they record the capacity of different measuring containers overtime. They complete a line graph showing the change in capacity. They learn how a line graph can be used to infer missing information e.g. evening.</p> <p>Links to websites for additional activities:</p> <p>https://www.hamilton-trust.org.uk/science/year-4-science/states-matter-states-matter-scientists/</p> <p>https://www.stem.org.uk/resources/community/collection/12345/year-4-states-matter</p>
<p>Common misconceptions</p>			<p>Some children may think:</p> <ul style="list-style-type: none"> • 'solid' is another word for hard or opaque. • Solids are hard and cannot break or change shape easily and are often in one piece.

- Substances made of very small particles like sugar or sand cannot be solids.
- Particles in liquids are further apart than in solids and they take up more space.
- When air is pumped into balloons, they become lighter.
- Water in different forms – steam, water, ice – are all different substances.
- All liquids boil at the same temperature as water (100 degrees)
- Melting, as a change of state, is the same as dissolving.
- Steam is visible water vapour (only the condensing water droplets can be seen)
- clouds are made of water vapour or steam • the substance on windows etc. is condensation rather than water
- the changing states of water (illustrated by the water cycle) are irreversible
- evaporating or boiling water makes it vanish

evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material. Apply knowledge in familiar related contexts