



Science Knowledge Progression: Year 3

Topic: Plants

Scientist Dr Kelsey Byers (how plants attract insects)

<p>Key knowledge and learning for this topic: <i>What pupils need to know or do to be secure</i></p> <p>Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers. 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. Investigate the way in which water is transported within plants. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Key Learning: Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.</p> <p>Key Vocabulary: Structure – flowering plants, requirements for life and growth – air, life cycle flowers, roots, stem/trunk, leaves, light, water, nutrients from the soil, pollination, seed, flowers, room to grow, formation, seed, dispersal, function, nutrition, support, needs, vary, reproduction, fertiliser, makes its own food</p>

Prior learning in previous year groups:	Where is our learning going? <i>Future objectives in later year groups and key stages.</i>
<p>Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants) Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)</p>	<p>Describe the life process of reproduction in some plants and animals. (Y5 -Living things and their habitats) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)</p>

<p>Application and Synthesis <i>Applying knowledge in familiar and new contexts, including a range of enquires</i></p> <p>Activities</p> <ul style="list-style-type: none"> • Observe what happens to plants over time when the leaves or roots are removed. • Observe the effect of putting cut white carnations or celery in coloured water. • Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space. • Spot flowers, seeds, berries and fruits outside throughout the year. • Observe flowers carefully to identify the pollen. • Observe flowers being visited by pollinators e.g. bees and butterflies in the summer. • Observe seeds being blown from the trees e.g. sycamore seeds. • Research different types of seed dispersal. • Classify seeds in a range of ways, including by how they are dispersed. • Create a new species of flowering plant. <p>Evidence of knowledge being applied and synthesised:</p> <ul style="list-style-type: none"> • Can explain observations made during investigations • Can look at the features of seeds to decide on their method of dispersal • Can draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal



Possible evidence to assess knowledge:	Common misconceptions:
Can explain the function of the parts of a flowering plant Can describe the life cycle of flowering plants, including pollination, seed formation, seed dispersal, and germination Can give different methods of pollination and seed dispersal, including examples	Some children may think: 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.



Science Knowledge Progression: Year 3

Topic: Animals Including Humans



<p>Key knowledge and learning for this topic: <i>What pupils need to know or do to be secure</i></p> <p>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. Identify that humans and some other animals have skeletons and muscles for support, protection and movement</p> <p>Key Learning: Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients. Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.</p> <p>Key Vocabulary: Nutrition, vitamins, minerals, fat, protein, carbohydrates, fibre, water, skeletons – support, protection, skull – brain, ribs – heart, lungs, movement, joint, muscles – movement, pull, contract, relax, diet</p>
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Prior learning in previous year groups:	Where is our learning going? <i>Future objectives in later year groups and key stages.</i>
<p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans)</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)</p> <p>Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)</p> <p>Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)</p>

<p>Application and Synthesis <i>Applying knowledge in familiar and new contexts, including a range of enquires</i></p> <p>Activities</p> <ul style="list-style-type: none"> Classify food in a range of ways. Use food labels to explore the nutritional content of a range of food items. Use secondary sources to find out the types of food that contain the different nutrients. Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? Plan a daily diet to contain a good balance of nutrients. Explore the nutrients contained in fast food. Use secondary sources to research the parts and functions of the skeleton. Investigate patterns asking questions such as: <ul style="list-style-type: none"> Can people with longer legs run faster? Can people with bigger hands catch a ball better? Compare, contrast and classify skeletons of different animals.



Evidence of knowledge being applied and synthesised:

- Can classify food into those that are high or low in particular nutrients
- Can answer their questions about nutrients in food, based on their gathered evidence
- Can talk about the nutrient content of their daily plan
- Use their data to look for patterns (or lack of them) when answering their enquiry question
- Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons

Possible evidence to assess knowledge:	Common misconceptions:
Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection Can describe how muscles and joints help them to move	Some children may think: certain whole food groups like fats are 'bad' for you certain specific foods, like cheese are also 'bad' for you diet and fruit drinks are 'good' for you snakes are similar to worms, so they must also be invertebrates invertebrates have no form of skeleton.



Science Knowledge Progression: Year 3

Topic: Rocks

Scientist – William Smith (Geologist)



<p>Key knowledge and learning for this topic: <i>What pupils need to know or do to be secure</i></p> <p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter.</p> <p>Key Learning: Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil. Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p> <p>Key Vocabulary: Appearance, physical properties -hard/soft, shiny/dull, rough/smooth, absorbent/not absorbent, fossils – sedimentary rock, soils – rock, organic pattern, uses – buildings, grave, stones, grains, crystals</p>

Prior learning in previous year groups:	Where is our learning going? <i>Future objectives in later year groups and key stages.</i>
<p>Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) Describe the simple physical properties of a variety of everyday materials. (Y1 - 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)</p>	<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) The composition of the Earth. (KS3) The structure of the Earth. (KS3) The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)</p>

<p>Application and Synthesis <i>Applying knowledge in familiar and new contexts, including a range of enquires</i></p> <p>Activities</p> <ul style="list-style-type: none"> • Observe rocks closely. • Classify rocks in a range of ways, based on their appearance. • Devise a test to investigate the hardness of a range of rocks. • Devise a test to investigate how much water different rocks absorb. • Observe how rocks change over time e.g. gravestones or old building. • Research using secondary sources how fossils are formed. • Observe soils closely. • Classify soils in a range of ways based on their appearance. • Devise a test to investigate the water retention of soils. • Observe how soil can be separated through sedimentation. • Revise the work of Mary Anning (Link to Y1 dinosaur topic)



Evidence of knowledge being applied and synthesised:

- Can classify rocks in a range of different ways, using appropriate vocabulary
- Can devise tests to explore the properties of rocks and use data to rank the rocks
- Can link rocks changing over time with their properties e.g. soft rocks get worn away more easily
- Can present in different ways their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc.
- Can identify plant/animal matter and rocks in samples of soil
- Can devise a test to explore the water retention of soils

Possible evidence to assess knowledge:	Common misconceptions:
Can name some types of rock and give physical features of each Can explain how a fossil is formed Can explain that soils are made from rocks and also contain living/dead matter	Some children may think: rocks are all hard in nature rock-like, man-made substances such as concrete or brick are rocks materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' certain found artefacts, like old bits of pottery or coins, are fossils a fossil is an actual piece of the extinct animal or plant soil and compost are the same thing.



Science Knowledge Progression: Year 3

Topic: Light



<p>Key knowledge and learning for this topic: <i>What pupils need to know or do to be secure</i></p> <p>Recognise that they need light in order to see things, and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change.</p> <p>Key Learning: We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.</p> <p>Key Vocabulary: Light, see, dark, reflect, surface, natural – star, Sun, Moon, artificial – torch, candle, lamp, shadow, blocked, solid, sunlight, dangerous, protect eyes, mirror</p>
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Prior learning in previous year groups:	Where is our learning going? <i>Future objectives in later year groups and key stages.</i>
<p>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) Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)</p>	<p>Recognise that light appears to travel in straight lines. (Y6 - Light) Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. (Y6 - Light) Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. (Y6 - Light) Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)</p>

<p>Application and Synthesis <i>Applying knowledge in familiar and new contexts, including a range of enquires</i></p> <p>Activities</p> <ul style="list-style-type: none"> • Explore how different objects are more or less visible in different levels of lighting. • Explore how objects with different surfaces, e.g. shiny vs matt, are more or less visible. • Explore how shadows vary as the distance between a light source and an object or surface is changed. • Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground. • Choose suitable materials to make shadow puppets. • Create artwork using shadows. <p>Evidence of knowledge being applied and synthesised:</p> <ul style="list-style-type: none"> • Can describe patterns in visibility of different objects in different lighting conditions and predict which will be more or less visible as conditions change • Can clearly explain, giving examples, that objects are not visible in complete darkness • Can describe and demonstrate how shadows are formed by blocking light • Can describe, demonstrate and make predictions about patterns in how shadows vary
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Possible evidence to assess knowledge:	Common misconceptions:
Can describe how we see objects in light and can describe dark as the absence of light Can state that it is dangerous to view the sun directly and state precautions used to view the sun, for example in eclipses Can define transparent, translucent and opaque Can describe how shadows are formed	Some children may think: we can still see even where there is an absence of any light our eyes 'get used to' the dark the moon and reflective surfaces are light sources a transparent object is a light source shadows contain details of the object, such as facial features on their own shadow shadows result from objects giving off darkness.



Science Knowledge Progression: Year 3

Topic: Forces and Magnets



<p>Key knowledge and learning for this topic: <i>What pupils need to know or do to be secure</i></p> <p>Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p>Key Learning: A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better, or it may hinder its movement e.g. Ice skater compared to walking on ice in normal shoes. A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract. For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.</p> <p>Key Vocabulary: Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole</p>
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<p>Prior learning in previous year groups:</p> <p>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)</p>	<p>Where is our learning going? <i>Future objectives in later year groups and key stages.</i></p> <p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces) Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces) Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces) Magnetic fields by plotting with compass, representation by field lines. (KS3) Earth's magnetism, compass and navigation. (KS3)</p>
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<p>Application and Synthesis <i>Applying knowledge in familiar and new contexts, including a range of enquires</i></p> <p>Activities</p> <ul style="list-style-type: none"> • Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc. • Explore what materials are attracted to a magnet. • Classify materials according to whether they are magnetic. • Explore the way that magnets behave in relation to each other. • Use a marked magnet to find the unmarked poles on other types of magnets. • Explore how magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table. • Devise an investigation to test the strength of magnets.



Evidence of knowledge being applied and synthesised:

- Can use their results to describe how objects move on different surfaces
- Can use their results to make predictions for further tests e.g. it will spin for longer on this surface than that, but not as long as it spun on that surface
- Can use classification evidence to identify that some metals, but not all, are magnetic
- Through their exploration, they can show how like poles repel and unlike poles attract, and name unmarked poles
- Can use test data to rank magnets

Possible evidence to assess knowledge:	Common misconceptions:
Can give examples of forces in everyday life Can give examples of objects moving differently on different surfaces Can name a range of types of magnets and show how the poles attract and repel Can draw diagrams using arrows to show the attraction and repulsion between the poles of magnets	Some children may think: the bigger the magnet the stronger it is all metals are magnetic.