Year: One
Term: Spring 1

Science Knowledge Organiser
Plants

SUPER 6

- I can identify and name a variety of common wild and garden plants, including types of tree
- I can identify and describe the basic structure of a variety of common flowering plants, including trees
- I can use my observations to identify, compare and group
- With support, I can use observations to answer questions
- I am beginning to use scientific language
- I can have my questions answered by people around me

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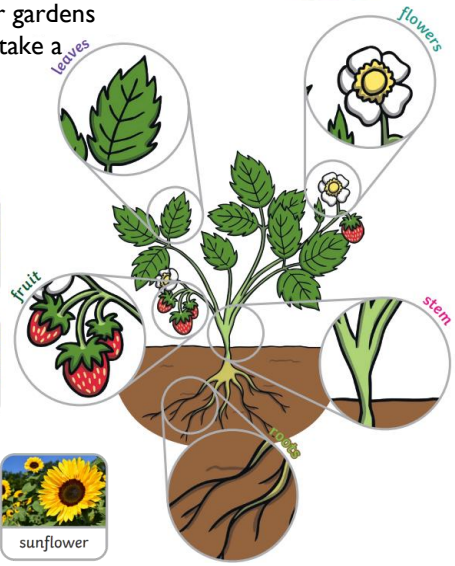
I can use common words and phrases relating to science

root		Roots help keep the plant in the ground; roots take in water and nutrients from the soil
stem		The stem holds the plant up and carries water and nutrients from the roots to the leaves and flowers
leaf leaves		Leaves absorb sunlight to help the plant make its own food
seeds		Seeds grow into new plants; seeds come in lots of different shapes and sizes

Other words or phrases I may use for talking about…

…working scientifically		up/down, near, close to, old(er), new(er), far, further, high(er), above, centre, low(er), underneath, below, equal to, more/less than, larger/smaller, most/least, half, whole, area, same/different, point, group, nearly, roughly, position, direction, clockwise, distant, pattern, research, non-fiction, event, question, answer
…skills		guess, explore, test, see/sight, smell, hear, touch, feel, senses
…presentation		list, tally, table, template, notes, sketch
…equipment		(egg) timer, clock, ruler, tape measure, metre stick/rule, beaker, scissors, magnifying glass, mirror
…plants		leaf/leaves, flower, blossom, trunk, branch, stem, stalk, petal, root, soil, fruit, berry, seed, bulb, food

Plants have different parts
Every part has a different job to do
Wild plants grow where their seeds fall; they do not have to be planted or cared for
People choose to have certain plants in their gardens; these are **garden plants**
People will take care of the plants in their gardens
Trees can be very large plants; they can take a very long time to grow

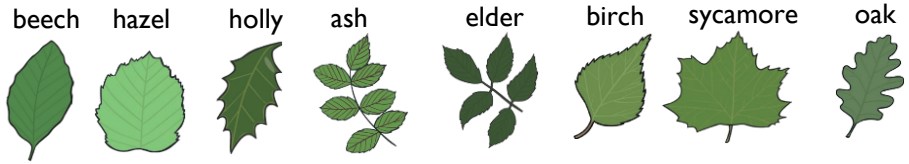


Wild Plants

Garden Plants

Trees

Can you identify any plants on the school site? We can look at the shapes of leaves to identify trees on our school site.



Year: One
Term: Spring 2

Science Knowledge Organiser
Animals, Including Humans

SUPER 6

- I can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- I can identify and name a variety of common animals that are carnivores, herbivores and omnivores
- I am beginning to use scientific language when talking about my results
- I can use my observations to identify, compare and group
- With support, I can use observations to answer questions
- I can make verbal predictions based on my observations with support

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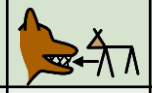
I can use common words and phrases relating to science

carnivore		An animal that mostly eats other animals (meat)
herbivore		An animal that only eats plants
omnivore		An animal that eats both meat and plants
mammal		Mammals are animals that breathe air, grow hair or fur and feed on their mother's milk as a baby

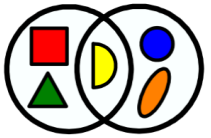
Other words or phrases I may use for talking about…

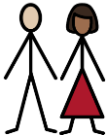
…working scientifically		up/down, near, close to, old(er), new(er), far, further, high(er), above, centre, low(er), underneath, below, equal to, more/less than, larger/smaller, most/least, half, whole, area, same/different, point, group, nearly, roughly, position, direction, clockwise, distant, pattern, research, non-fiction, event, question, answer
…skills		guess, explore, test, see/sight, smell, hear, touch, feel, senses
…presentation		list, tally, table, template, notes, sketch
…equipment		(egg) timer, clock, ruler, tape measure, metre stick/rule, beaker, scissors, magnifying glass, mirror
…animals, including humans		common animals, wild, tame, pets, fish, bird, reptile, baby, cub, pup, nest, family, eqq, mouth, neck, eyes, teeth, wing, claw, tail, beak, fur, feather, fin, scales

Can you think of any other animals that will fit into any of these groups?

What type of diets do these animals have?

Can we group these animals in a different way?





Humans are **mammals**
They can eat plants and meat – they are **omnivores**

Rabbits are **mammals**
They only eat plants – they are **herbivores**

Cats are **mammals**
They only eat meat – they are **carnivores**

Robins are **birds**
They eat insects, berries and nuts – they are **omnivores**

Frogs are **amphibians**
Adult frogs eat insects – they are **carnivores**

Year: Two
Term: Spring 1

Science Knowledge Organiser
Plants

SUPER 6

- I can observe and describe how seeds and bulbs grow into mature plants
- I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy
- I can independently make predictions based on my observations
- I can observe and comment on patterns and relationships
- I can use my observations to answer questions
- With support, I can record data in different ways to answer questions

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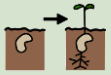
In this unit of learning, you will observe different plants at different points in their lifecycles

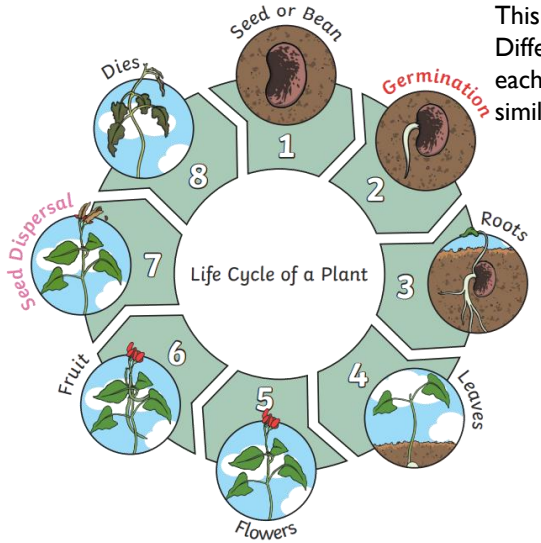
I can use a wide variety of everyday scientific terms

seed		Seeds grow into new plants; they are sometimes found in fruits; seeds can be moved by animals, wind, or in other ways
bulb		Bulbs grow into new plants; these plants start as a seed, then a bulb forms around the seed so the plant can grow again and again, year after year
germination		When the conditions are right, the seed's shell will crack and a tiny shoot will come out – this is germination
nutrition		Nutrition means food or nourishment; plants can make their own food by absorbing sunlight with their leaves

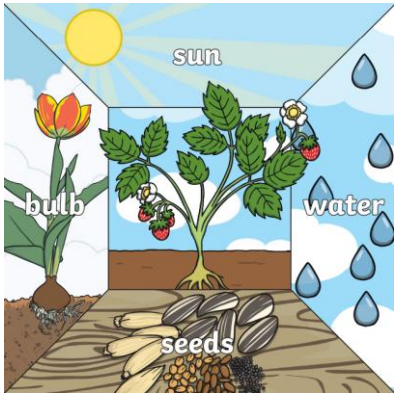
Other words or phrases I may use for talking about…

…working scientifically		left, right, beyond, represents, stands for, exact(ly), nearest, distance, contains, property, appearance, similarity, difference, symmetrical, fractions, amount, scale, fair test, document, strategy
…skills		gather, collect, notice, link, describe, predict, result, conclude, contrast, order, value, rank, sort
…presentation		record(ing), pictogram, tally chart, block diagram, Venn diagram, jottings plan
…equipment		equipment, stop-watch, pipette, beaker, syringe, weight, thermometer, measuring scales, tube, tweeze, net, set square, insect viewer, pooter
…plants		growth, seedling, shoot, mature, healthy, wither, earth, soil, nutrients, structure, function, germinate, pollination, seed dispersal names of locally-found and school-relevant plants, trees and vegetables

These are all **seeds**, event though they all look different! Have you seen any of these seeds before?



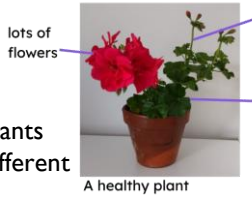
This is the lifecycle of a plant
Different plants will look different to each other, but they will all grow in similar ways



If you have the right conditions, a plant will grow
What other things do plants need that are not shown in the picture above?

This picture shows what will happen when a bean is planted in soil
What stages of the lifecycle can you see?

Healthy and unhealthy plants look very different



A healthy plant

Unhealthy plants

Year: Two
Term: Spring 2

Science Knowledge Organiser
Uses of Everyday Materials

SUPER 6

- I can compare the suitability of everyday materials for particular uses
- I can find out how the shapes of objects made from the same materials can be changed
- I can use presentational talk to explain what I have found out and how I found it out
- I can use my observations to identify, describe, compare and group and explain my reasons
- I can use the equipment provided to perform simple tests
- I can independently make predictions based on my observations

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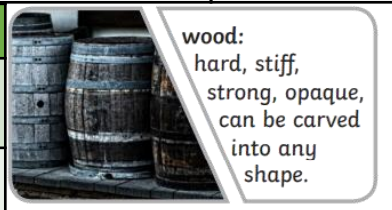
In this unit of learning, you will learn about different materials and decide what they can (and can't) be used for – this is **suitability**

I can use a wide variety of everyday scientific terms

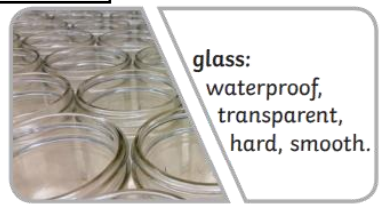
properties	This is what a material is like and how it behaves (soft, stretchy, waterproof, etc.)
suitability	Suitability means having the right properties for a specific purpose (example: a material for a coat being waterproof)
waterproof	Waterproof materials do not let water go through them
predict	Describe what you think will happen in an experiment

Other words or phrases I may use for talking about…

…working scientifically	left, right, beyond, represents, stands for, exact(ly), nearest, distance, contains, property, appearance, similarity, difference, symmetrical, fractions, amount, scale, fair test, document, strategy
…skills	gather, collect, notice, link, describe, predict, result, conclude, contrast, order, value, rank, sort
…presentation	record(ing), pictogram, tally chart, block diagram, Venn diagram, jottings plan
…equipment	equipment, stop-watch, pipette, beaker, syringe, weight, thermometer, measuring scales, tube, tweeze, net, set square, insect viewer, pooter
…materials	man-made, natural, suitable, useful, function, purpose, property, rust, transparent, reflection, rigid, flexible, solid, liquid, molten, gas, boiling point, heat, pressure



wood: hard, stiff, strong, opaque, can be carved into any shape.



glass: waterproof, transparent, hard, smooth.

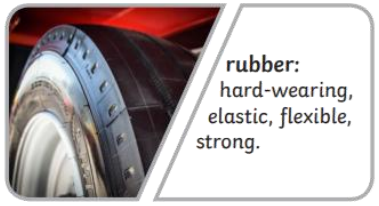
plastic: waterproof, strong, can be made to be flexible or stiff, smooth or rough.

metal: strong, hard, easy to wash.

paper: lightweight, flexible.

cardboard: strong, light, stiff.

fabric: soft, flexible, hard-wearing, can be stretchy, warm, absorbent.

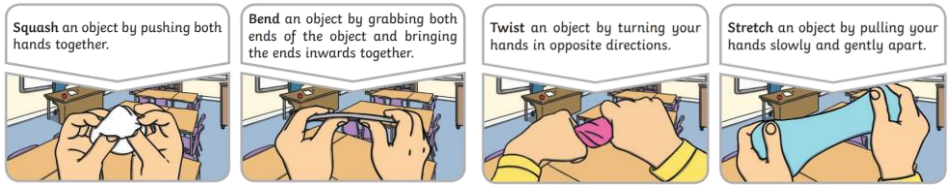


rubber: hard-wearing, elastic, flexible, strong.

Do you know any other purposes these materials can be used for?

Do you know any other materials that are not on this knowledge organiser?

You can use your hands to test the **properties** of materials in different ways



You will need to test a variety of different materials
Before each test, you will **predict** what will happen
Use your knowledge from prior learning to help you!

Year: Three
Term: Spring 1

Science Knowledge Organiser
Forces and Magnets

SUPER 6

- With support, and with the equipment provided, I can set up a simple fair test
- I can recognise what a fair test is with support
- I can compare how things move on different surfaces
- I can notice that some forces need contact between two objects, but magnetic forces can act at a distance
- I can observe how magnets can attract or repel each other, and how they interact with different materials
- I can make predictions if magnets will attract or repel, based on their poles

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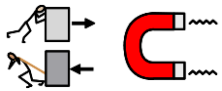
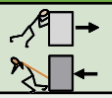
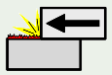
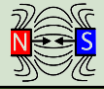
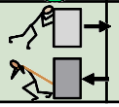
In this unit, you will learn about **forces**, **magnets** and **magnetism**



I can start using specialist vocabulary and scientific terms

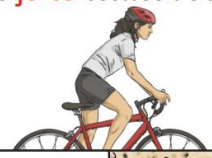
forces		Pushes or pulls
friction		A force that acts between two surfaces or objects that are moving, or trying to move, across each other
magnet		An object that produces a magnetic force that pulls certain other objects towards it
repel		When two things repel, they push each other away; when the north pole of a magnet is placed near a north pole of another magnet, they will push each other away
attract		When two things attract, they pull each other together; when the north pole of a magnet is place near the south pole of another magnet, they will pull each other together

Other words or phrases I may use for talking about…

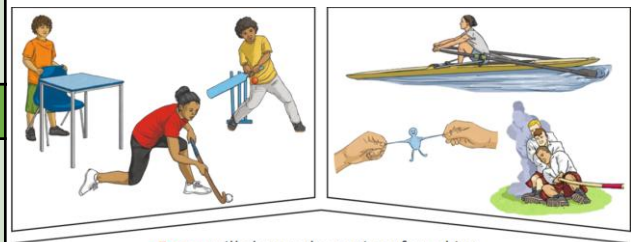
…working scientifically		corresponding, equivalent, group, positive/negative, area (maths meaning), parallel, degrees, acute, obtuse, quantity, round, up/down, approximate(ly), remainder, data logger, obstacle, outcome, impact, relationship, necessary, evidence, fact/opinion, data, hypothesis, theory, case study, primary/secondary source
…skills		estimate, observe, organise, identify, assume, compare, interpret, disprove, infer, clarify, introduce
…presentation		present findings, abbreviations, frequency table, bar charts, Carroll diagram, flow chart, grid, database, row, column, subdivisions
…equipment		apparatus, hand lens, hour-glass, microscope, measuring cylinder, test-tube, cork stopper, petri dish, gauze, protractor, compass
…forces		force, gravity, friction, spring, air resistance, streamlined, Newton meter, force meter, magnet(ic), attract, repel, compress, North/South pole, bar/ring/button/horse-shoe magnet

Different **surfaces** create different amounts of **friction**. The amount of **friction** created by an object moving over a **surface** depends on the roughness of the **surface** and the object, and the **force** between them.

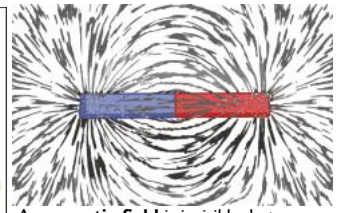
The driving **force** pushes the bicycle, making it move.



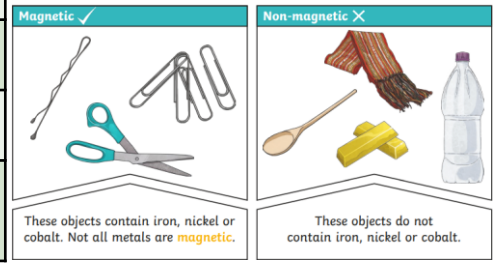
Friction pushes on the bicycle, slowing it down.

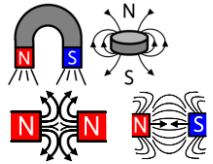


Forces will change the motion of an object.
They will either make it start to move, speed up, slow it down or even make it stop.



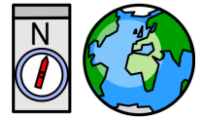
A **magnetic field** is invisible, but you can see the magnetic field that a magnet creates using iron filings on top of a piece of paper and a magnet underneath the paper





Magnets have two **poles** – a **north pole** and a **south pole**
Opposite poles **attract** (stick together); like poles **repel** (push each other away)

Planet Earth has a magnetic field; the needle in a compass is a magnet as well: this is why a compass needle always points towards north



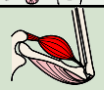
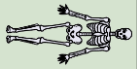
Year: Three
Term: Spring 2

Science Knowledge Organiser
Animals, Including Humans

SUPER 6

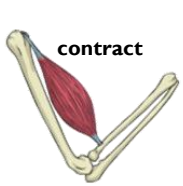
• I can use my observations to help identify, classify, find similarities and differences, and identify changes	Red / Orange / Green
• I am beginning to use relevant scientific language to discuss my ideas and communicate my findings	Red / Orange / Green
• I can use a variety of secondary sources to answer questions	Red / Orange / Green
• I can ask questions and use my observations to answer them	Red / Orange / Green
• I can discover that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food	Red / Orange / Green
• I can explain that humans and some other animals have skeletons and muscles for support, protection and movement	Red / Orange / Green

I can start using specialist vocabulary and scientific terms

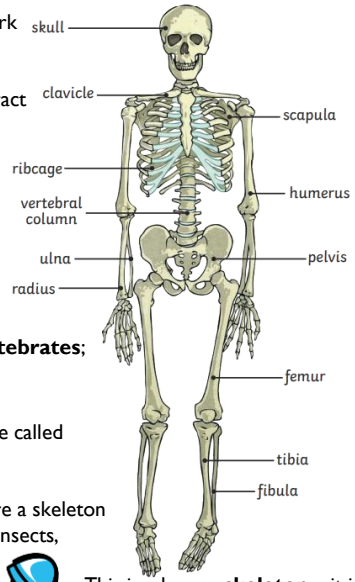
vertebrate		Animals that have a backbone, including mammals, birds reptiles, amphibians and fishes
invertebrate		Animals that do not have a backbone, including insects, molluscs, arachnids and annelids
muscles		Soft tissues in the body and contract and relax to create movement
joints		Areas where two or more bones are fitted together
endoskeleton		A skeleton on the inside of the body that provides protection for internal organs and support

Other words or phrases I may use for talking about…

…working scientifically		corresponding, equivalent, group, positive/negative, area (maths meaning), parallel, degrees, acute, obtuse, quantity, round, up/down, approximate(ly), remainder, data logger, obstacle, outcome, impact, relationship, necessary, evidence, fact/opinion, data, hypothesis, theory, case study, primary/secondary source
…skills		estimate, observe, organise, identify, assume, compare, interpret, disprove, infer, clarify, introduce
…presentation		present findings, abbreviations, frequency table, bar charts, Carroll diagram, flow chart, grid, database, row, column, subdivisions
…equipment		apparatus, hand lens, hour-glass, microscope, measuring cylinder, test-tube, cork stopper, petri dish, gauze, protractor, compass
…animals, including humans		(in)vertebrates, offspring, survival, childhood/babyhood/adulthood, brain, heart, vein, artery, skull, ribs, spine/backbone, joints, sockets, bones, muscles, contraction, tendons, windpipe
…health and nutrition		dietary, nutrition, food groups, protein, fibre, carbohydrate, starches, minerals, protection, x-ray, hygiene, infection, bacteria, virus



Skeletal muscles work in pairs to move the bones that they are attached to; they contract (get shorter) and relax (get longer)



Skeletons do three important jobs:
1. Protect organs inside the body
2. Allow the body to move (with the muscles)
3. Support the body and stop it from falling on the floor

Animals with **endoskeletons** are called **vertebrates**; humans and other mammals are vertebrates

Not all animals have endoskeletons; these are called **invertebrates**

Some animals have **exoskeletons** – these are a skeleton on the outside of the body that supports it (insects, arachnids, etc.)

Some animals have a **hydrostatic skeleton** – these are a fluid-filled compartment in the body called a coelom, mainly found in soft-bodied animals like jellyfish

This is a human **skeleton** – it is a type of **endoskeleton**

Key facts for this unit of learning
1. Living things need food to grow and to be strong and healthy
2. Plants can make their own food, but animals cannot
3. To stay healthy, humans need to exercise, eat a healthy diet and be hygienic
4. Animals, including humans, need food, water and air to stay alive

Humans need different types of **nutrition** stay healthy

Carbohydrates provide **energy**

Protein helps **growth** and **repair**

Fibre helps you **digest** the food you have eaten

Fats provide **energy**

Vitamins keep you **healthy**

Minerals keep you **healthy**

Water moves **nutrients** around the body and helps get rid of **waste**

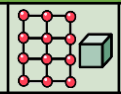
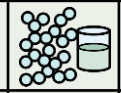
Year: Four
Term: Spring 1

Science Knowledge Organiser
States of Matter

SUPER 6

• I can make careful and systematic observations using a range of equipment	Red / Orange / Green
• I can use my observations identify differences, similarities and changes related to simple scientific ideas and processes	Red / Orange / Green
• I can compare and group materials together according to whether they are solids, liquids or gases	Red / Orange / Green
• I can observe that some materials change state when they are heated or cooled	Red / Orange / Green
• I can research or measure the temperature at which some changes of state happen	Red / Orange / Green
• I can identify the parts played by evaporation and condensation in the water cycle and link this to temperature	Red / Orange / Green

I can use specialist vocabulary and scientific terms

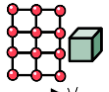
solid		Solids keep their shape unless a force is applied; they always take up the same amount of space
liquid		Liquids take the shape of the container they are in; they change shape, but do not change the amount of space they take up; they can flow or be poured
gas		Gases can spread out (diffuse) to fill a room or container; they do not have a fixed shape, but they do have mass
water cycle		The series of processes where the world's water circulates between oceans, atmosphere, and land
precipitation		The collective term for rain, snow, sleet, hail, and any other way water gets from the sky to the ground

Other words or phrases I may use for talking about…

…working scientifically		increase/decrease, factor, negative numbers, base, spherical, cylindrical, etc. (3D shape terminology for description), concave, convex, translation, rotation, origin, statistics, typical, exception, unique, intricate, trend, precise, accurate, comparative, systematic, convention, reliability
…skills		classify, categorise, hypothesise, critique, summarise
…presentation		communicate, time graph, quantitative/qualitative, plot, continuous data, grouped data, discrete data, format
…equipment		aquarium, Pasteur, pipette, forceps
…materials		manufactured, oxygen, change of state, solidify, gaseous, water vapour, water cycle, precipitation, evaporation, condensation, degree, Celsius, waste, sewage

Did you know?
Because of the **water cycle**, the water you drink could have also been drunk by a dinosaur!

There are four **natural states of matter**: **solids**, **liquids**, **gases** and **plasma**
There are also **man-made** states of matter, such as **time crystals** and **Bose-Einstein condensates**
You will learn about **solids**, **liquids** and **gases** in this unit of learning



Particles in a **solid** are close together and cannot move; they can only vibrate

Particles in a **liquid** are close together but can move around each other easily

Particles in a **gas** are spread out and can move around very quickly in all directions

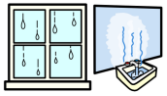
When water and other liquids reach a certain temperature, they change **state** into a solid or a gas
These changes can work the other way as well (so a solid can change into a liquid)
The temperatures that these changes happen at are called the **boiling**, **melting** or **freezing points**
Each material (or substance, or chemical) will have its own boiling, melting and freezing point

If a **solid** is heated to its **melting point**, it melts and changes into a **liquid**; this is because the particles start to move faster and faster until they are able to move over and around each other

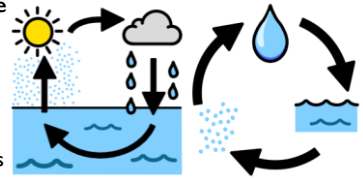
If a **liquid** is cooled enough, **freezing** will occur; the particles in the liquid will slow down as they get colder, and they will only be able to move gently on the spot which gives then a **solid** structure

Evaporation occurs when a **liquid** turns into a **gas**; this can happen quickly (such as when water is boiled in a kettle) or slowly (such as when a puddle evaporates in warm air)

Condensation is when a **gas** is cooled down and turns into a **liquid**; you can see condensation when water droplets form on a window – the water vapour in the air cools when it touches the cold surface



Condensation and **evaporation** occur during the **water cycle**



1. Water from lakes, puddles, rivers and sees is **evaporated** by the sun's heat, turning it into water vapour
2. This water vapour rises, then cools down to form water droplets in clouds (**condensation**)
3. When the droplets get too heavy, they fall back to the earth as rain, sleet, hail, or snow (**precipitation**)

Year: Four
Term: Spring 2

Science Knowledge Organiser
Living Things and Their Habitats

SUPER 6

- I can report my results using detailed written or oral explanations
- I know that living things can be grouped in a variety of ways
- I can explore and use classification leys to name living things in the local, and wider, environment
- I recognise that environments can change and the dangers this can pose to living things
- I can identify and sort animals into mammals, amphibians, insects and birds
- I can explain how some animals have adapted to their environments

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In this unit of learning, you will learn how to sort animals using their **characteristics**

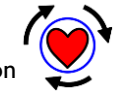
I can use specialist vocabulary and scientific terms

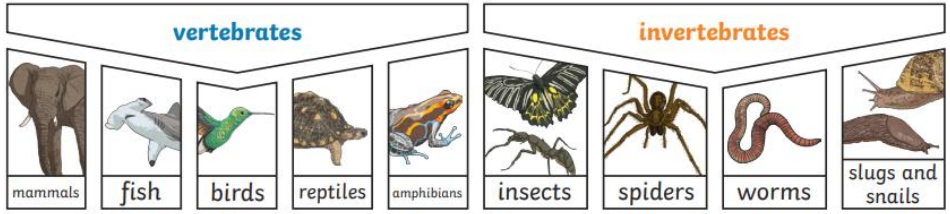
classification		Where living organisms are sorted into groups based on their common features and similarities
characteristic		The distinguishing features or qualities that are unique to a species
environment		An environment contains many habitats, and these include areas with both living and non-living things
adapt		Become adjusted to new conditions; when animals change to be able to survive better
extinct		When a species has no more members alive, it is extinct

Other words or phrases I may use for talking about…

…working scientifically		increase/decrease, factor, negative numbers, base, spherical, cylindrical, etc. (3D shape terminology for description), concave, convex, translation, rotation, origin, statistics, typical, exception, unique, intricate, trend, precise, accurate, comparative, systematic, convention, reliability
…skills		classify, categorise, hypothesise, critique, summarise
…presentation		communicate, time graph, quantitative/qualitative, plot, continuous data, grouped data, discrete data, format
…equipment		aquarium, Pasteur, pipette, forceps
…habitats		classification, key, (in)vertebrates, mould, fungus, organism, population, deforestation, pollution, positive/negative human impact, variation, biome, vegetation, region, dominant, environmental, anemometer, barometer

All living things have seven characteristics ; these are called **life processes**
Movement, **R**espiration, **S**ensitivity, **G**rowth, **R**eproduction, **E**xcretion, **N**utrition



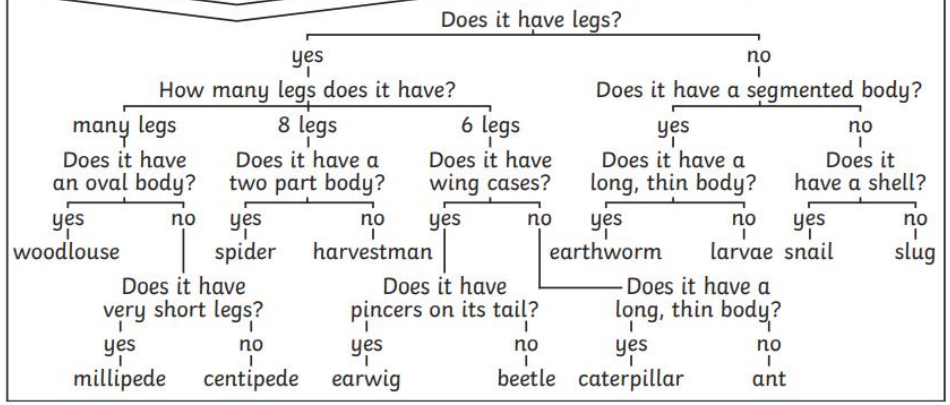


Vertebrates can be separated into five broad groups.

You could sort **invertebrates** you might see around school in different ways, such as in this example. The vast majority of living things on the planet are **invertebrates**.

You can use **classification** keys to help group, identify and name a variety of living things. Here is an example of a **classification** key:

Invertebrate Classification Key



Changes to an **environment** can be natural or caused by humans. Changes to an **environment** can have positive as well as negative effects. Here are some examples of things that can change an **environment**.

Natural
- earthquakes
- storms
- floods
- droughts
- wildfires
- the seasons

Human-Made
- deforestation
- pollution
- urbanisation
- the introduction of new animal or plant species to an **environment**
- creating new nature reserves

Plants and animals rely on the **environment** to give them everything they need. Therefore, when **habitats** change, it can be very dangerous to the plants and animals that live there.

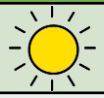
Year: Five
Term: Spring 1

Science Knowledge Organiser
Earth and Space

SUPER6

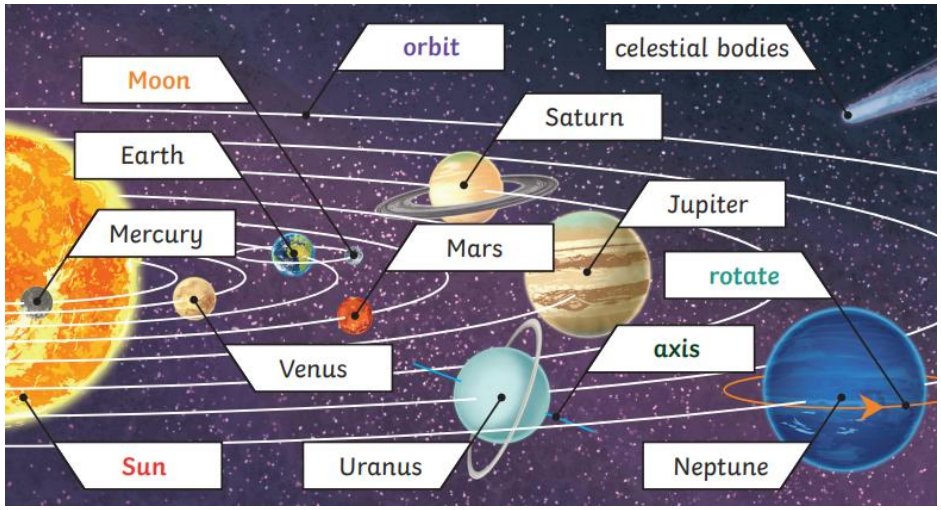
• I can examine familiar modelled options of recorded data and analyse these	Red / Orange / Green
• I can report and present my findings and discuss conclusions and causal relationships orally and in writing	Red / Orange / Green
• I can describe the movements of the Earth, and other planets, relative to the Sun	Red / Orange / Green
• I can describe the movement of the Moon relative to the Earth	Red / Orange / Green
• I can describe the shapes of the Earth, Sun and Moon	Red / Orange / Green
• I can use the Earth's movement to explain why we have night and day, and why the Sun appears to move in the sky	Red / Orange / Green

I can use specialist vocabulary and scientific terms in appropriate ways

star		A giant ball of burning gas held together by its own gravity; the Sun is one of many stars in our galaxy
orbit		To move in a curved, regular pattern around another object; the Earth orbits the Sun
rotate		To spin around; the Earth rotates on its own axis
heliocentric model		The structure of the solar system where planets orbit around the Sun
planet		A large, (usually) round object that orbits a star; some are made of mostly rock, others might be mostly gas
satellite		Any object that orbits another object; the Moon is a satellite of Earth; humans have launched many satellites

Other words or phrases I may use for talking about…

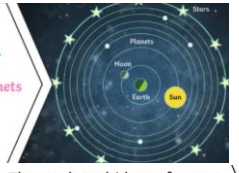
…working scientifically		percentage, distribution, causal, correlate, dependent, variable, control, cancel out, imperial units, maximum, minimum, million, diagonal, reflex angle, rotation, sparse, abundant, capacity, phenomenon, exceptional, crucial, complex, sustain, perspective, rigorous
…skills		refute, inform, generalise, verify
…presentation		line graph, scatter graph, average, mode, range, sieve
…equipment		funnel, filter, paper
…sound, light, Earth and space		axis, axes, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, celestial body, spin, sphere, spherical, rotation, elliptical orbit, revolve, asteroid, meteor(ite), comet, galaxy, light year, latitude, longitude, equator, hemisphere, prime/Greenwich meridian, time zone

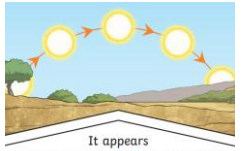


Mercury, **Venus**, **Earth** and **Mars** are rocky planets; they are mostly made of rock and metals

Jupiter, **Saturn**, **Uranus** and **Neptune** are gas giants; they are mostly made of gases (like helium and hydrogen); some scientists think they may have solid cores beneath the gases

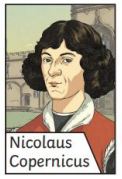
Geocentric model
Years ago people believed that planets moved around the Earth.



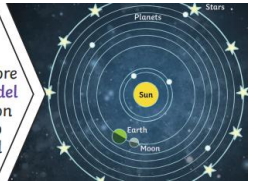


It appears to us that the Sun moves across the sky during the day but the Sun does not move at all. It seems to us that the Sun moves because of the movements of Earth.

Earth rotates (spins) on its **axis**. It does a full rotation once in every 24 hours. At the same time that Earth is rotating, it is also orbiting (revolving) around the Sun. It takes a little more than 365 days to orbit the Sun. Daytime occurs when the side of Earth is facing towards the Sun. Night occurs when the side of Earth is facing away from the Sun.


Nicolaus Copernicus

The work and ideas of many astronomers (such as Copernicus and Kepler) combined over many years before the idea of the heliocentric model was developed. Galileo's work on gravity allowed astronomers to understand how planets stayed in orbit.



Year: Five
Term: Spring 2

Science Knowledge Organiser
Forces

SUPER 6

- I can choose my own equipment to use
- I can recognise variables and, with support, decide how to control these variables
- I can take measurements using a wide range of scientific equipment with accuracy and precision
- I can explain how gravity causes objects to fall towards the Earth
- I can identify the effects of air resistance, water resistance, and friction that act between moving surfaces
- I can recognise that some mechanisms allow a smaller force to have a greater effect

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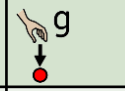
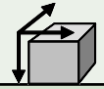
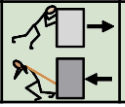
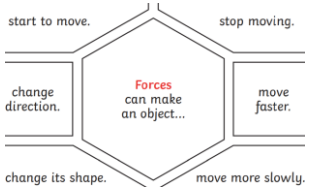
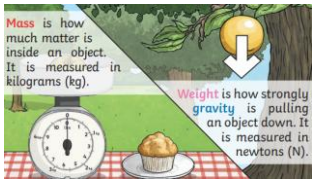
I can use specialist vocabulary and scientific terms in appropriate ways

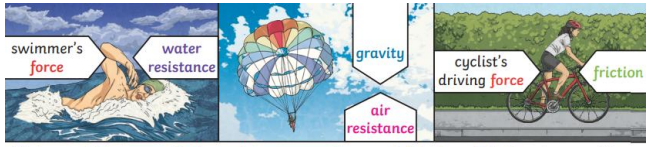
gravity		A pulling force that is exerted by anything that has mass; the Earth is large, so we are pulled towards it
mass		The measure of how much 'stuff' (or matter) is inside an object
weight		The measure of the force of gravity on an object; your mass would not change if you went to the moon, but your weight would as there is less gravity there
upthrust		A force that pushes objects up, usually in water
streamlined		When an object is shaped in a way to minimise air or water resistance
air resistance		A type of friction caused by air pushing against a moving object

Other words or phrases I may use for talking about…

…working scientifically		percentage, distribution, causal, correlate, dependent, variable, control, cancel out, imperial units, maximum, minimum, million, diagonal, reflex angle, rotation, sparse, abundant, capacity, phenomenon, exceptional, crucial, complex, sustain, perspective, rigorous
…skills		refute, inform, generalise, verify
…presentation		line graph, scatter graph, average, mode, range, sieve
…equipment		funnel, filter, paper
…forces		mechanisms, air resistance, water resistance, levers, pulleys, gears, cams, drag forces, transference

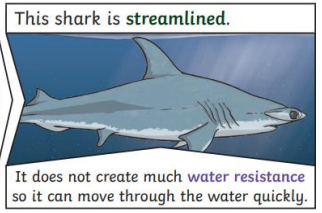


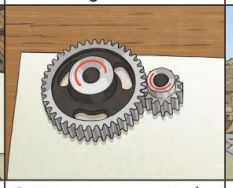




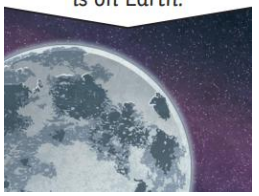
Water resistance and air resistance are forms of friction. Friction is sometimes helpful and sometimes unhelpful. For example, air resistance is helpful as it stops the skydiver hitting the ground at high speed. Friction on a bike chain can make the bike harder to pedal so it is unhelpful.

It has a pointed nose to cut through the water, and a smooth, low, curved back to allow the water to flow over and around it.



Pulleys	Gears/Cogs	Levers
		
Pulleys can be used to make a small force lift a heavier load. The more wheels in a pulley, the less force is needed to lift a weight.	Gears or cogs can be used to change the speed, force or direction of a motion. When two gears are connected, they always turn in the opposite direction to each other.	Levers can be used to make a small force lift a heavier load. A lever always rests on a pivot.

The Moon has a smaller mass than Earth so the gravitational pull on the Moon is smaller than it is on Earth.



Jupiter has a greater mass than Earth so the gravitational pull on Jupiter is stronger than on Earth.

Isaac Newton is famously thought to have developed his theory of gravity when he saw an apple fall to the ground from an apple tree.

Year: Six
Term: Spring 1

Science Knowledge Organiser
Evolution and Inheritance

SUPER 6

- I can talk about how scientific ideas have developed over time
- I can identify and use scientific evidence to support or refute ideas and arguments
- I can begin to separate opinion from fact when using secondary sources
- I can recognise that living things have changed over the time and how fossils help us understand this
- I know that offspring may not be identical to their parents
- I can describe how plants and animals have adapted to their environments and how this can lead to evolution

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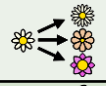
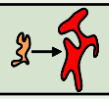
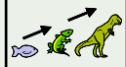
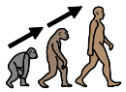
I can use specialist vocabulary and scientific terms in sophisticated ways

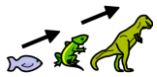
inheritance		This can be something you receive from a relative after they die; in scientific terms, it is when characteristics are passed from parents to offspring
variation		The differences between individuals in a species
adaptation		A trait or characteristic that increases an organism's chance of survival in a particular environment
evolution		Adaptation over a very long time; evolution can lead to new species being created
natural selection		The process where organisms that are better adapted to their environments tend to survive and produce more offspring
fossil		The remains, or imprint of, a prehistoric plant or animal that have been preserved

Other words or phrases I may use for talking about…

…working scientifically		recurring, proportion, ratio, radius, diameter, circumference, concentric, arc, intersecting, plane, cross-section, appropriate accuracy, degree of trust, robust, authentic, plausible, controversy, stance, bias, tertiary source
…skills		determine, attribute, analyse, corroborate, discern, epitomise, characterise, extrapolate
…presentation		pie charts, mean, four quadrants
…evolution and inheritance		(micro)organism, species, microbes, evolution, evolutionary change, natural selection, adaptation, competition, genes, dominant, recessive, DNA, chromosomes, inherit(ance), survival of the fittest, fossil record

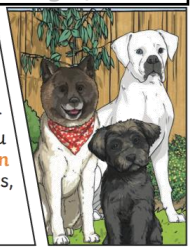


Evolution is the gradual (very slow) process where different kinds of living things have developed (or **evolved**) from earlier life forms over millions of years; scientists have proof that life is continuously **evolving** even today!

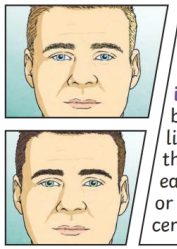


Offspring
Animals and plants produce **offspring** that are similar but not identical to them. **Offspring** often look like their parents because features are passed on.

Variation
In the same way that there is **variation** between parents and their **offspring**, you can see **variation** within any species, even plants.

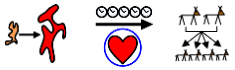


Adaptive Traits
Characteristics that are influenced by the **environment** the living things live in. These **adaptations** can develop as a result of many things, such as food and climate.



Inherited Traits
Eye colour is an example of an **inherited trait**, but so are things like hair colour, the shape of your earlobes and whether or not you can smell certain flowers.

Organisms (living things) have **adapted** (or changed) to enable them to have a greater chance of survival in the environment they inhabit
Organisms that survive are more likely to **reproduce** and have **offspring**



Living Things		Habitat		Adaptive Traits
polar bear		arctic		Its white fur enables it to camouflage in the snow.
camel		desert		It has wide feet to make it easier to walk in the sand.
cactus		desert		It stores water in its stem.
toucan		rainforest		Its narrow tongue allows it to eat small fruit and insects.

There are many different **habitats** in the world; a good habitat provides shelter, space to move and grow, and plenty of food

There are many different **environments** or **biomes** around the world; examples include polar regions, tropical islands, rainforests, oceans, rivers, grasslands, etc.

Fossils are the preserved remains, or partial remains, of ancient plants and animals; they let us know how plants and animals used to look millions of years ago and are proof that **evolution** has taken place

Year: Six
Term: Spring 2

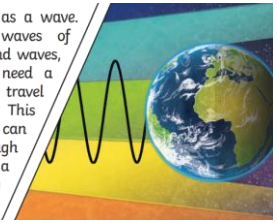
Science Knowledge Organiser
Light

SUPER 6

- I can make my own decisions about what observations and measurements to take
- I can choose the most appropriate equipment and explain why I have chosen it
- I can present my findings in a variety of ways
- I can describe how light travels
- I can explain how the way light travels helps us see objects
- I can explain why shadows have the shapes that they do

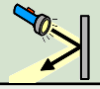
Red / Orange / Green
Red / Orange / Green
Red / Orange / Green
Red / Orange / Green
Red / Orange / Green
Red / Orange / Green

Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means light can travel through a vacuum - a completely airless space.



We need light to be able to see things; **light waves** travel out from **light sources** in straight lines; these lines are often called **rays** or **beams**

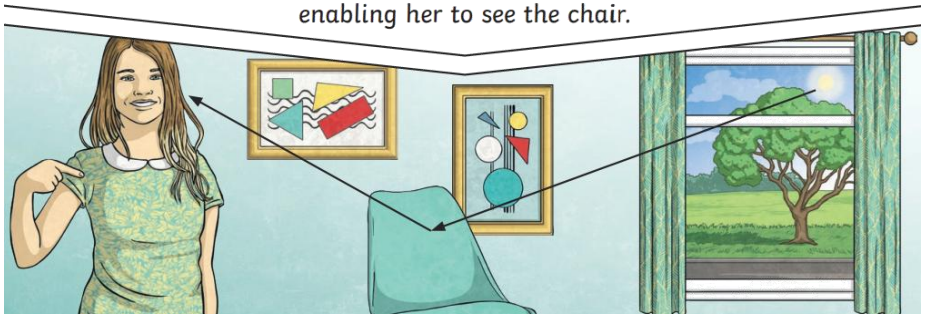
I can use specialist vocabulary and scientific terms in sophisticated ways

reflection		Reflection is when light bounces of a surface, changing the direction of a ray of light
refraction		This is when light 'bends' as it moves from one medium to another, an example is when light enters water; this happens as light travels at different speeds in different media
prism		A prism is a solid 3D shape with flat sides; the two ends are an equal shape and size; transparent prisms can separate visible light into the colours of the spectrum
visible spectrum		Light that can be seen by human eyes; it is made up of a spectrum of colours
translucent		Objects that let some light through, but a lot of the light is scattered so we cannot completely see through
opaque		No light is let though opaque objects

Other words or phrases I may use for talking about…

…working scientifically		recurring, proportion, ratio, radius, diameter, circumference, concentric, arc, intersecting, plane, cross-section, appropriate accuracy, degree of trust, robust, authentic, plausible, controversy, stance, bias, tertiary source
…skills		determine, attribute, analyse, corroborate, discern, epitomise, characterise, extrapolate
…presentation		pie charts, mean, four quadrants
…sound, light, Earth and space		transmission, optics, refraction, geocentric, heliocentric, universe

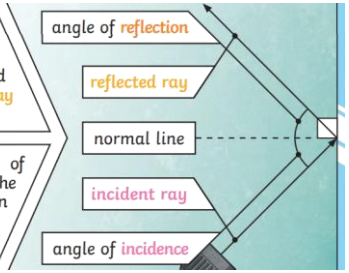
Light from the sun travels in a straight line and hits the chair. The light ray is then reflected off the chair and travels in a straight line to the girl's eye, enabling her to see the chair.



The law of reflection states that the angle of incidence is equal to the angle of reflection. Whenever light is reflected from a surface, it obeys this law.

The angle of reflection is the angle between the normal line and the reflected ray light.

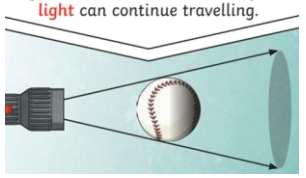
The angle of incidence is the angle between the normal line and the incident ray of light.

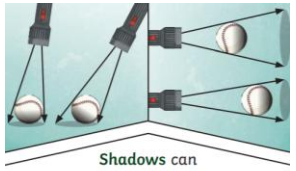


The spoon in this water looks as if it is bent. This is because light bends when it moves from air to water. When light bends in this way, it is called refraction.

Isaac Newton shone a light through a transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the spectrum. All the colours together merge and make visible light.

A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling.





Shadows can also be elongated or shortened depending on the angle of the light source. A shadow is also larger when the object is closer to the light source. This is because it blocks more of the light.