

Science Intent (Sticky Knowledge)

Record of progression of key skills (knowledge) and vocabulary

Sticky Knowledge can be divided into two main mains: firstly, interesting facts that will remain with pupils forever in their long-term memory and secondly, knowledge that individuals need to learn as part of the national curriculum.

Year 1 Sticky Knowledge	Year 1 Key Vocabulary
<ul style="list-style-type: none">● Biology - Plants● In the local area, there will be a great variety of plants which all have specific names● Plants can be identified by looking at their key characteristics● Plants have common parts but they vary between the different types of plants● Some trees keep their leaves all year (evergreen) whilst others drop their leaves during autumn and grow them again in spring (deciduous)● Some trees can live for thousands of years● Around 2000 different types of plants are used by humans to make food● Some plants are carnivores, eg: the Venus Flytrap● Bamboo can be a fast growing plant, some can grow almost a metre a day● Touching poison ivy will cause an allergic reaction, usually an itchy rash on the skin● As well as looking beautiful, trees help make the air cleaner and provide food and shelter for all sorts of creatures● Water and nutrients travel up the tree trunk, through the branches and all the way out to the leaves ● Biology - Animals	<ul style="list-style-type: none">● Flower● Plants● Stem● Roots● Leaves● Petal● Wild● Environment● Trees● Deciduous● Evergreen● Trunk● Branches● Roots● Leaves● Names of trees in the local area● Names of garden and wild flowering plants in the local area

- Animals vary in many ways having different structures, eg: wings, tails, ears etc.
- They also have different skin coverings eg: scales, feathers, hair.
- These key features are used to identify them
- Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals
- The blue whale can produce the loudest sound of any animal
- Horses and cows sleep standing up
- Giant Artic jellyfish have tentacles that can reach over 36 metres in length
- Tigers can grow up to a length of 3 metres and weigh up to 300kg when fully developed
- There are about 400 million dogs in the entire world.
- The average life of a dog depends on the breed, but is roughly 10-14 years
- Dolphins use whistling, clicking and other sounds to communicate with each other
- Camels can survive up to 6 months without water or food due to the fatty tissues stored in their humps
- The cheetah is the fastest animal in the world, with top speeds of 113km per hour

- Fish
- Birds
- Reptiles
- Mammals
- Amphibians
- Carnivore*
- Herbivore*
- Omnivore*
- Pets
- Wild
- Tame
- Nocturnal
- Fur
- Beak
- Tail
- Wing
- Claw
- Fin
- Scales
- Feathers
- Fur
- Paws
- Hooves
- The children need to be able to name and identify a range of animals in each group eg: name specific birds or fish. They do not need to use the terms mammal, reptiles etc, or know the characteristics of each, although they will probably be able to identify birds and fish based on their characteristics
- * the children do not need to use the words carnivore, omnivore or herbivore, but if they do, ensure they understand the carnivores eat other animals not just meat.

- **Biology - Humans**

- Humans have key parts in common, but these vary from person to person
- Humans (and other animals) find out about the world using their senses
- Humans have 5 senses - sight, touch, taste, hearing and smelling
- These senses are linked to particular parts of the body
- Although we often use our fingers and hands to feel objects, we can also feel with other parts of our body

- **Chemistry - Everyday materials**

- All objects are made from one or more materials
- Some objects can be made from different materials, eg: plastic, metal or wooden spoons
- Materials can be described by their properties, eg: shiny, stretchy, rough etc
- Some materials, eg: plastic, can be in different forms with very different properties
- Glass is used for: windows in houses and cars to see through; mirrors to see yourself - reflection
- Metal is used for: strength - in construction of planes, cars and trains and especially tall buildings

- Heart
- Brain
- Tongue
- Hands
- Eyes
- Mouth
- Ears
- Arms
- Legs
- Human
- Body
- Senses
- Touch
- Taste
- Hear
- Smell
- see

- Materials
- Wood
- Plastic
- Metal
- Glass
- Stone/ Rock
- Paper
- Fabric
- Elastic
- Foil
- Card/cardboard

- Wood is used for: doors, furniture
- Plastic is moulded or shaped to form any shape from buckets to animal jelly casts
- Materials for clothes: leather, for shoes, jackets, belts; wool, for jumpers, socks, pyjamas, coats; cotton, for clothes we wear on warmer days, shirts; silk, expensive material used for scarves and blouses

- **Physics - Seasonal changes**

- In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again
- The weather also changes with the seasons
- In the UK, it is usually colder and rainier in winter and hotter and dryer in summer
- The change in weather causes many other changes, eg: the numbers of minibeasts found outside, seed and plant growth, leaves on trees and type of clothes worn by people
- In the UK, we have 4 seasons: spring, summer, autumn, winter. Summer is the hottest and winter the coldest

- Rubber
- clay
- Liquid
- Leather
- Wool
- Man made
- Natural
- Stretchy
- Stiff
- Bendy
- Waterproof
- Shiny
- Dull
- Strong
- Fragile
- Transparent
- Soft
- Flexible
- Absorbent

- Seasons
- Autumn
- Fall
- Spring
- Summer
- Winter
- Weather
- Temperature
- thermometer
- Sunny

<ul style="list-style-type: none"> • Spring starts when the day and night are the same length • In summer, the longest day is around 21st June, and in winter, the shortest day is around 21st December • When we have our summer, it is winter in the southern hemisphere, and when we have our winter, it is summer in the southern hemisphere • The UK and Australia have opposite seasons, so when we have summer, it is winter in Australia • In the USA and many other countries, autumn is known as the Fall because this is when so many trees fall from the trees • Seasons change throughout the year because of the way the Earth travels around the sun. 	<ul style="list-style-type: none"> • Rainy • Windy • Snowy • Sun • Sunrise • Sunset • Day length
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Year 2 Sticky Knowledge	Year 2 Key Vocabulary
<ul style="list-style-type: none"> • Biology - Living things and their habitat • All objects are either living, dead or have never been alive • Living things are plants (including seeds) and animals • Dead things include dead animals and plants, and parts of plants and animals that are no longer attached eg: leaves and twigs, shells, fur, hair and feathers (this is a simplification but appropriate for Year 2 children) • An object made of wood is classed as dead • Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels) • Animals and plants live in a habitat to which they are suited which means that animals have suitable features that help them 	<ul style="list-style-type: none"> • Living • Dead • Never been alive • Suited • Suitable • Food • Food chain • shelter • Indigenous • Rivers • Woodlands • Ponds

move and find food, and plants have suitable features that help them grow well.

- The habitat provides the basic needs of the animals and plants - shelter, food and water.
 - Within a habitat, there are different micro-habitats eg: in a woodland - in the leaf litter, on the bark of trees, on the leaves etc.
 - These micro-habitats have different conditions, eg: light or dark, damp or dry
 - These conditions affect what plants and animals live there
 - The plants and animals in a habitat depend on each other for food and shelter etc
 - The way animals obtain their food from plants and other animals can be shown in the food chain
 - Animals like cockroaches are really important in a habitat - they eat dead plants and recycle the nutrients back in the ground
 - People are causing harm to many habitats - forests are being burnt down, lakes and rivers polluted and the polar ice caps are melting
 - Because resources like food and water may be limited, plant and animal species often compete with each other for food and water
 - Because the Earth is always changing, habitats are constantly changing
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- **Biology - Plants**
 - Plants may grow from either seed or bulbs
 - These then germinate and grow into seedlings which then continue to grow and mature into plants
 - These mature plants may have flowers which then develop into seeds, berries, fruits etc

- Sea
 - Rainforest
 - Desert
 - Habitats (and names of them, especially local habitats)
 - Species
 - Microhabitats (and names of some, eg: under logs, in bushes etc)
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- Roots
 - Crown
 - Deciduous
 - Evergreen
 - Blossom
 - Bulb

- Seeds and bulbs need to be planted outside at particular times of the year and they will germinate and grow at different rates
- Some plants are better suited to growing in full sun and some grow better in partial or full shade
- Plants also need different amounts of water and space to grow well and stay healthy
- Trees and shrubs take in water and carbon dioxide and give out oxygen
- A single tree has many roots. The roots carry food and water from the ground through the trunk and branches to the leaves of the tree
- The trunk is the main body of the tree and it is covered with bark which protects it from damage
- The leaves can be of many different shapes.
- Leaves take in sunlight and use water and food from the roots to make the tree grow
- As a tree grows, it usually produces growth rings as new wood is laid down around new wood

- **Biology - Animals including humans**

- Animals including humans have offspring which grow into adults
- In humans, and some animals, these offspring will be young, such as babies or kittens that grow into adults
- In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages when they grow into adults
- The young of some animals do not look like their parents (eg: tadpoles)
- All animals including humans have basic needs of feeding, drinking and breathing that must be satisfied in order to survive

- Trunk
- Stem
- Habitat
- Woodland
- Oxygen
- Light
- Shade
- Sun
- Warm
- Cool
- Water
- Grow
- Healthy
- Names of common UK trees - oak, chestnut, conifer, willow

- Offspring
- Reproduction
- Growth
- Child
- You/old stages (eg: chick and chicken, baby, child, adult; caterpillar and butterfly.
- Exercise
- Heartbeat
- Breathing
- Hygiene
- Germs
- Disease

- To grow into healthy adults, they also need the right amounts and types of food and exercise
- Good hygiene is also important in preventing infections and illnesses
- Keeping healthy means caring for your body so you have enough energy to learn, play and grow
- All foods contain nutrients which your body needs to stay active throughout the day. Some foods have more nutrients than others
- Everyone should have their 5 a day - 5 portions of fruit and vegetables
- It is important not to eat too much sugar and salt: sugary foods are bad for your teeth and can be fattening, and salty foods can lead to heart disease
- Keep your mouth healthy by brushing and flossing to have clean teeth and gums
- It is important to have 30-60 minutes of exercise every day. This can include running around and playing games with your friends.

- **Chemistry - Uses of everyday materials**

- All objects are made of one or more materials that are chosen specifically because they have suitable properties for that task, eg: a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water.
- When choosing what material to make an object from, the properties need to be compared with the properties of the possible materials, identified through simple tests and classifying activities
- A material can be suitable for different purposes and an object can be made of different materials

- Food types (eg: meat, fish, vegetables, bread, rice, pasta)
- Healthy
- Diet
- Exercise
- Protein
- Fats
- Carbohydrates
- Nutrition
- Vitamins

- Metal
- Plastic
- Wood
- Glass
- Fabric
- Stone/rock
- Squashing
- Bending
- Twisting
- Stretching
- Opaque
- Transparent
- Translucent

<ul style="list-style-type: none"> • Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting, eg: clay can be shaped by squashing, stretching, rolling, pressing etc. • This can be a property of the material or depend on how the material has been processed, eg: thickness • Most of the cardboard and paper we use came from trees • Glass is a hard transparent material that can be made into many shapes • Glass is usually transparent, which means you can see through it, but it can also come in different colours • Glass is often used to make windows and bottles • Many churches have special coloured glass often used to make religious pictures • Plastics are used to make many of the things we use in everyday life, eg: toys, bicycle, helmets, mobile phones, window frames and many other common items 	<ul style="list-style-type: none"> • Reflective • Non-reflective • Flexible • rigid
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Year 3 Sticky Knowledge	Year 3 Key Vocabulary
<ul style="list-style-type: none"> • Biology - Plants • Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom • The roots absorb water and nutrients/minerals around the plant and hold 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) 	<ul style="list-style-type: none"> • Photosynthesis • Pollen • Insect/wind pollination • Seed formation • Seed dispersal • Wind dispersal • Animal dispersal • Water dispersal • Roots

- 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
- Trees are more than just part of our natural landscape. They provide shelter and food for wildlife.
- Trees absorb carbon dioxide and produce breathable air.
- A large tree can consume 100 gallons of water out of the ground in one day.
- The oldest known living tree is 4,800 years old.
- Several centuries ago in Holland, tulips were more valuable than gold.
- Some plants such as orchids do not need soil to grow-they get all of their nutrients from the air
- Broccoli is actually a flower.

- **Biology - Animals including humans**

- 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 that are needed by the body to stay healthy - carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water.
- 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
- The spine is made up of 33 bones and the smallest bone is found in our ear.
- Muscles make up 40% of our total body weight and the smallest muscle is found in our ears.
- Muscles are attached to bones by tendons and help them to move. When a muscle contracts it gets shorter and pulls on the

- Stem
- Leaves
- Stigma
- Anther
- nutrients

- nutrients
- nutrition
- carbohydrates
- sugars
- protein
- vitamins
- minerals
- fibre
- fat
- water
- skeleton
- bones
- muscles

bone it is attached to.

- Muscles are attached to the bone by tendons and work in pairs to allow for smooth movement.
- When we are born we have about 300 bones in our body by the time we are adults we have 206 because some bones have fused together.
- When broken our bones will repair themselves. Doctors use casts or splints to make sure they grow back straight.
- The longest bone in the human body is the thigh bone called the femur.
- Bone marrow makes up 4% of a human body mass. It produces red blood cells which carry oxygen all around the body.
- Cartilage is a connective tissue found in many areas of the body including joints between bones e.g. the elbows, knees and ankles.
- Joints allow the body to make movements. The body has many bones and are connected through the joints.

- **Chemistry - Rocks**

- Rock is a naturally occurring material
- There are different types of rocks, eg: 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 piece and the amount of organic matter affect the property of the soil
- Some rocks contain fossils

- support
- protect
- move
- skull
- ribs
- spine
- joints
- cartilage
- rib cage
- tendon

- rock
- stone
- pebble
- boulder
- grain
- crystals
- layers
- hard
- soft
- texture
- soil
- fossil
- marble

- 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
- Sediment deposited over time, often as layers at the bottom of lakes and oceans, forms sedimentary rocks.
- Extreme pressure and heat over time forms metamorphic rocks. Examples are marble and slate.
- When magma cools and solidifies it forms igneous rock. Examples are granite and pumice.
- Rocks have been used by humans for millions of years, from early tools and weapons through to construction materials for modern buildings.

• Physics - Light

- We can 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

- chalk
- granite
- sandstone
- slate
- soil
- peat
- sandy/chalk/clay soil
- sedimentary
- metamorphic
- igneous

- light
- light source
- dark
- absence of light
- transparent
- translucent
- opaque
- shiny
- matt
- surface
- shadow
- reflect
- mirror
- sunlight
- refraction
- convex

- The size of the shadow depends on the position of the source, object and surface
- Refraction is the change of direction of a light ray as it passes through different surfaces, for example, from air to water.
- Convex lenses, also called positive lenses, are lenses that curve outward from the edges to the centre.
- A concave lens is one where the centre of the lens is thinner than the edges.

• Physics - Forces and Magnets

- 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 move better or it may hinder its movement eg: ice skater compared to walking on ice in normal shoes
- A magnet attracts magnetic material
- Iron, nickel and other materials containing these, eg: stainless steel, are magnetic.
- These strongest parts of a magnet are the poles
- Magnets have 2 poles - a north and south pole
- If 2 like poles, eg: 2 north poles, are brought together, they will push away from each other = repel.
- If 2 unlike poles, eg: a north and south pole, are brought together, they will pull together = attract
- For some forces to act there must be contact eg: a hand opening a door, the wind pushing the trees
- Some forces can act at a distance eg: magnetism. The magnet does not need to touch the object that it attracts
- The Earth is a very big magnet. Its North and South poles are highly magnetic.
- A magnet always has north and south poles. Cutting a magnet in half makes two magnets, each with two poles

- concave
- magnetic pole
- attract
- repel
- force
- push
- pull
- twist
- contact force
- non-contact force
- magnetic force
- magnet
- strength
- bar magnet
- ring magnet
- button magnet
- horseshoe magnet
- north pole
- south pole

- Magnets only attract certain types of metals, other materials such as glass, plastic and wood aren't attracted.

Year 4 Sticky Knowledge	Year 4 Key Vocabulary
<ul style="list-style-type: none"> • Biology - Living things and their habitats • Living things can be grouped (classified) in different ways according to their features. • Classification keys can be used to identify and name living things • Living things live in a habitat which provides an environment to which they are suited • These environments may change naturally, eg: through flooding, fire, earthquakes etc • Humans also cause the environment to change, in either a good way - positive human impact (eg: setting up nature reserves) or in a bad way - negative human impact (eg: littering) • These environments also change with the seasons - different living things can be found in a habitat at different times of the year • Biology - Animals including humans • Food enters the body through the mouth and digestion starts when the teeth start to break the food down • Saliva is added and the tongue rolls the food into a ball • The food is swallowed and passes down the oesophagus to the stomach where the food is broken down further by being churned around and other chemicals added. • The stomach is filled with powerful acids that break down food 	<ul style="list-style-type: none"> • Classification • Classification key • Environment • Habitat • Human impact - positive and negative • Migrate • Hibernate • Digestive system • Digestion • Mouth • Teeth - incisors, canines, molars and premolars • Saliva • Oesophagus • Stomach • small intestine • large intestine

into smaller pieces, and it also lets us know when we are hungry.

- The food then passes into the small intestine where nutrients are removed for use elsewhere in the body
- 90% of food absorption takes place in the small intestine
- The liver creates different enzymes to help process food nutrients that are collected in the small intestine
- The gallbladder is a storage unit for all of the bile and enzymes created by the liver. It stores them until they are needed for digestion
- The rest of the food then passes into the large intestine where water is removed for use elsewhere in the body
- What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet
- The pancreas produces juices called enzymes which help the body digest food
- Humans have 4 types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing)
- The outside of our teeth are covered in enamel and the inside have blood vessels and nerves
- Living things can then be classified as producers, predators and prey according to their place in the food chain

• **Chemistry - States of Matter**

- A solid keeps its shape and has a fixed volume
- A liquid has a fixed volume but changes its shape to fit the container
- A liquid can be poured and keeps a level, horizontal surface
- A gas fills the available space - it has no fixed shape or volume
- Granular and powdery solids can be confused with liquids because they can be poured, but when they are poured, they

- nutrients
- rectum
- anus
- herbivore
- carnivore
- omnivore
- producer
- predator
- prey
- food chain
- pancreas
- organ
- salivary gland
- enzymes
- liver
- gallbladder
- enamel

- solid
- liquid
- gas
- state change
- melting
- freezing
- melting point
- boiling point
- evaporation

form a heap and do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid

- Melting is a state change from solid to liquid
- Freezing is a state change from liquid to solid
- The freezing point of water is 0 degrees Celsius
- Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid
- Water boils when it is heated to 100 degrees Celsius
- Evaporation is the same state change as boiling (liquid to gas) but it happens slower at lower temperatures and only at the surface of the liquid. It happens more quickly if the temperature is higher, the liquid is spread out or it is windy
- Condensation is the change back from a gas to a liquid causing cooling
- Water at the surface of seas, rivers etc evaporates into water vapour (a gas)
- This rises, cools and condenses back into a liquid forming clouds
- When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc and drain back into rivers etc. This is known as precipitation and is the water cycle
- Stages of the water cycle: 1.) the sun heats up rivers, lakes and the sea; 2.) water evaporates into the air, this is called water vapour; 3.) the water vapour rises, cools and condenses to water in the form of clouds; 4.) the droplets in the clouds become too heavy and fall as rain, snow, hail etc; 5.) the rain, snow, hail etc is then collected in rivers that run off to the sea; 6.) the cycle starts again
- About 70% of the Earth is covered in water
- There are underground reservoirs called aquifers
- Some water in the ground may stay there for thousands of

- condensation
- temperature
- water cycle
- precipitation
- droplets

years

- The Nile is 4132 miles long making it the longest river in the world
- Humans are made up of about 75% water
- 97% of water is in the oceans (this is salty water) and 2% is in the ice caps, leaving only 1% available to drink.

- **Physics - Sound**

- A sound source produces vibrations which travel through a medium from the source to our ears
- Different mediums such as solids, liquids and gases can carry sound but sound cannot travel through a vacuum (an area empty of matter)
- The vibrations cause parts of our body in our ears to vibrate, allowing us to hear (sense) the sound.
- Our ear drums vibrate in a similar way to the original source of the vibration, allowing us to hear many different sounds.
- The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source
- A sound insulator is a material which blocks sound effectively
- Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds, eg: smaller objects usually produce higher pitched sounds
- Sound travels with a speed of 767 miles per hour
- Dogs can hear sounds at a higher frequency than humans
- When traveling through water, sound moves four times faster than when it travels through air
- Sound is used by many animals to detect danger, warning them of possible attacks before they happen.

- sound
- source
- vibrate
- vibration
- travel
- pitch (high,low)
- volume
- faint
- loud
- insulation
- outer, middle and inner ear
- cochlea
- auditory
- frequency
- hammer

- The loud noise you create by cracking a whip occurs because the tip is moving so fast it breaks the speed of sound!

- **Physics - Electricity**

- Many household devices and appliances run on electricity
- Some plug into the mains, others run on batteries
- An electrical circuit consists of a cell/battery connected to a component using wires.
- If there is a break in the circuit, a loose connection or a short circuit, the component will not work
- A switch can be added to the circuit to turn the component on and off
- Metals are good conductors so that can be used as wires in a circuit
- Non-metallic solids are insulators except for graphite (pencil lead)
- Water, if not completely pure, also conducts electricity
- Electricity is a type of energy that can build up in one place to flow to another
- A power station is a place where electricity is created and sent to our homes. The first power plant opened in 1882 and was opened by Thomas Edison.
- Electricity travels at the speed of light, which is more than 186,000 miles per hour.
- One flash of lightning could power 1000 houses for a whole year.
- When an electric charge builds up on the surface of an object it makes static electricity. This is why we sometimes have a small electric shock

- electricity
- electrical appliance/device
- mains
- plug
- socket
- electrical circuit
- complete circuit
- component
- cell/battery
- positive
- negative
- connect/connections
- loose connection
- short circuit
- crocodile clip
- bulb
- switch
- buzzer
- motor
- conductor
- insulator
- metal
- non-metal
- symbol (NB: children do not need to use standard symbols until year 6)

Year 5
Sticky Knowledge

- **Biology - Living things and their habitats**
- As part of their life cycle, plants and animal reproduce
- Most animals reproduce sexually which involves two parents where the sperm from the male fertilises the female egg.
- Animals including humans have offspring which grow into adults
- In humans and some animals, these offspring will be born live, such as babies and kittens, and then grow into adults. In other animals, such as chickens and snakes, there may be eggs laid that hatch to young which then grow to adults.
- Some young undergo a further change before becoming adults, eg caterpillars to butterflies. This is called a metamorphosis.
- Plants reproduce both sexually and asexually.
- Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent.
- Gardeners may force plants to reproduce asexually by taking cuttings
- Sexual reproduction occurs through pollination, usually involving wind or insects
- Many insects have 4 stages in their lifecycle: egg or the unborn stage; larva - young stage; pupa - inactive (no feeding) stage; and adult stage.
- In general, the life cycles of plants and animals have 3 basic stages including a fertilised egg or seed, immature juvenile, and adult. However, some organisms may have more than 3 life cycle stages, and the exact names of each stage can slightly differ depending on the species.
- **Biology - Animals including humans (this builds on the learning in Living Things and their habitats and needs to be**

Year 5
Key Vocabulary

- Life cycle
- Reproduce
- Sexual
- Asexual
- Sperm
- Fertilise
- Egg
- Young
- Metamorphosis
- Plantlets
- Runners
- Bulbs
- Cuttings

- Puberty

taught alongside PSHE and puberty talk)

- When babies are young, they grow rapidly, especially their brains.
 - They are very dependent on their parents
 - The early years, especially the first 3 years of life, are very important for building a baby's brain. It is a time of rapid cognitive, linguistic, social, emotional and motor development
 - The years between 6 and 14 (middle childhood and early adolescence) are a time of important developmental advances that establish children's sense of identity
 - At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the body to reproduce
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- **Chemistry - Properties and changes of materials**
 - Materials have different uses depending on their properties and state (liquid, solid, gas).
 - Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets
 - Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.
 - Mixtures can be separated by filtering, sieving and evaporation.
 - Some changes to materials such as dissolving, mixing and changes of state are reversible and can be changed back
 - Examples of reversible changes: melting is when a solid converts to a liquid after heating; melting is turning ice into water; freezing is when a liquid converts to a solid
 - Some materials will dissolve in liquid to form a solution, and the substance can be recovered from the solution
 - Some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible which means they cannot

- Gestation
 - Reproduction
 - Teenager
 - Toddler
 - Embryo
 - Vocabulary to describe sexual characteristics
-
- Soluble
 - Insoluble
 - Solubility
 - Conductivity
 - Transparency
 - Thermal evaporation
 - Dissolve
 - Thermal/electrical insulator/conductor
 - Filter
 - Melt
 - Separate
 - Reversible
 - Non-reversible/irreversible

be changed back

- **Physics - Earth and Space**

- The sun is star which is at the centre of our solar system.
- There are 8 planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune
- They travel around the sun in fixed orbits
- Earth takes 365 and a quarter days to complete its orbit around the sun
- The Earth rotates (spins) on its axis every 24 hours
- As Earth rotates, half faces the sun (here it is day) and half is facing away from the Sun (night)
- As Earth rotates, the sun appears to move across the sky
- The moon orbits the Earth and takes about 28 days to complete the orbit
- The moon appears to be different shapes but it is the light reflected on it from the sun that can be seen
- The Sun, Earth and moon are approximately spherical
- One million Earths could fit inside the sun, and the sun is considered an average-sized star
- An asteroid about the size of a car enters the Earth's atmosphere roughly once a year, but it burns up before it reaches us
- The sunset on Mars appears blue
- Earth is the 3rd planet from the sun and the only world known to support an atmosphere with free oxygen, oceans of liquid water on the surface and life.
- There is no atmosphere in space, which means that sound has no medium or way to travel to be heard
- Venus is the hottest planet in the solar system and has an average surface temperature of around 450degrees Celsius.

- Earth
- Sun
- Moon
- Mercury
- Venus
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune
- Spherical
- Solar system
- Rotate
- Rotation
- Star
- Orbit
- Planets
- Crescent moon
- Gibbous moon
- Full moon
- Half moon
- Eclipse
- Lunar

- The sheer size of space makes it impossible to accurately predict just how many stars exist
- **Physics - Forces**
- A force causes an object to start moving, stop moving, speed up, slow down or change direction
- Gravity is a force that acts at a distance
- Everything is pulled to earth by gravity and this causes unsupported objects to fall
- Air resistance, water resistance and friction are contact forces that act between moving surfaces.
- The object may be moving through the air or water, or the air or water may be moving over a stationary object
- A mechanism is a device that allows a small force to be increased to a larger force, however this requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, eg: a crowbar or bottle top remover
- Pulleys, levers and gears are all mechanisms, also known as simple machines
- Fictional force is any force that is caused due to friction, eg: using brakes on a bike
- Surface resistance is the force on objects moving across a surface, eg an ice skater on ice
- Air resistance is the force on an object moving through the air, eg: a plane moving through the sky. It affects how fast or slowly objects move through the air
- Water resistance is the force on objects floating on or moving in water
- Magnetic force is an invisible force created by electrons. Magnetic force controls magnetism and electricity
- Any kind of force is really just a push or a pull

- Force
- Gravity
- Earth
- Air resistance
- Water resistance
- Friction
- Mechanisms
- Simple machines
- Levers pulleys
- Gears
- Parachute
- Galileo
- Isaac Newton

- Galileo developed the telescope to enable close observation of the night sky
- During his lifetime, Isaac Newton developed the theory of gravity and made breakthroughs in the area of optics, such as the reflecting telescope

Year 6 Sticky Knowledge

- **Biology - Animals including humans**
- Your heart will beat about 115,000 times each day
- Your heart pumps about 2,000 gallons of blood every day
- The entire trip around your body only takes blood about 20 seconds in total. Blood is what is used to transport oxygen, waste, nutrients and more throughout the body
- The circulatory system includes the heart, blood vessels and blood, and is vital for fighting diseases and maintaining proper temperature
- Veins transport blood back to the heart
- All vertebrates have a heart, arteries and veins.
- Because your heart is crucial to your survival, it's important to keep it healthy with a well-balanced diet and exercise, and avoiding things that can damage it, like smoking
- Your heart beats faster when you exercise
- Your heart affects every part of your body. This also means that diet, lifestyle, and your emotional well-being can affect your heart.
- Muscles move our skeleton and work in pairs to do so.
- When muscles exercise, they need an increased flow of blood because they are working harder.
- There are different types of food in different food groups, and

Year 6 Key Vocabulary

- heart
- blood vessels
- rate
- pumps
- blood
- pulse
- transport
- lungs
- vein
- nutrients
- water
- muscles
- circulatory system
- diet
- exercise
- drugs
- cardiovascular
- cardiologist
- capillaries
- ventricles
- oxygen
- atrium

each food group is important for a healthy lifestyle.

- **Biology - Living things and their habitats**
- Living things can be grouped according to observable characteristics, based on similarities and differences.
- Plants and animals are 2 main groups, but there are other living things that do not fit into these groups, eg: micro-organisms such as bacteria and yeast.
- Plants can make their own food whereas animals cannot.
- Animals can be divided into 2 main groups -those that have a backbone (vertebrates) and those that do not (invertebrates).
- Vertebrates can be divided into 5 small groups - fish, amphibians, reptiles, birds and mammals. Each group has common characteristics.
- The largest vertebrate is the blue whale which can grow up to 25m long and weighs 140000kg.
- The smallest vertebrate is thought to be a tiny frog called the Paedophryne amanuensis which only grows to about 8mm in length.
- Vertebrate animals can either be cold or warm blooded. A cold-blooded animal cannot maintain a constant body temperature, which is determined by their outside surroundings.
- Invertebrates can be divided into a number of groups including insects, spiders, snails and worms.
- 97% of all animal species are invertebrates
- Frogs can breathe through their skin.
- Plants can be divided into 2 main groups - flowering plants and non-flowering plants.
- Carl Linnaeus divided the first formal classification system.
- **Biology - Evolution and inheritance**

- lifestyle
- carbon dioxide

- vertebrates
- invertebrates
- species
- micro-organisms
- fungi
- monera
- bacteria
- Protista
- Algae
- Carl Linnaeus
- Classification
- Classify
- Cold-blooded
- Warm-blooded
- Fish
- Amphibians
- Mammals
- Birds
- Reptiles

- Evolution is a scientific theory used by biologist to explain how living things changed over a long time and how they have come to be the way they are.
- All living things have offspring of the same kind, as features in the offspring are inherited from the parents.
- Due to sexual reproduction, the offspring are not identical to their parents and may vary from each other.
- Plants and animals have characteristics that make them suited (adapted) to their environment.
- If the environment changes rapidly, some variations of species may not suit the new environment and will die. If it changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young.
- Over time, these inherited characteristics become more dominant within the population.
- Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.
- Fossils give us evidence of what lived on Earth millions of years ago and provide evidence to support the theory of evolution.
- More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.
- Evolutionary questions are still being actively researched by biologists.
- **Physics - Light**
- Light travels in straight lines until it hits an object that will reflect it
- We see objects because light travels from the light source to our eyes or from light sources to objects and then to our eyes

- Off-spring
- Adaptation
- Evolution
- Inheritance
- Inherit
- Palaeontologist
- Charles Darwin
- Genes
- Chromosomes
- Syndrome
- Genotype
- Suited
- Suitable
- Characteristics
- Vary
- Variation
- Fossils
- Light wave
- Light source

- The light may come directly from light sources but for other objects some light must be reflected from the object into our eyes for the object to be seen
- Objects that block light (are not fully transparent) will cause shadows
- Because light travels in straight lines, the shape of the shadow will be the same as the outline shape of the object.
- Space doesn't have any light; we can see things in space due to light bouncing off of the objects in space
- Light doesn't travel as fast when it has to pass through mediums that are different, such as air, water or glass
- The light we see from the sun actually left the sun 10 minutes before we see it.
- Light can be produced and controlled in so many ways. A camera can control the amount of light that comes into the camera lens. We also use light in televisions, medical systems, copy machines, telescopes and satellites.
- Light is used by plants to convert the light into energy as their 'food'. The process is called photosynthesis and converts carbon dioxide through the energy of light.

- **Physics - Electricity**

- The brightness of a bulb is associated with the voltage
- Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound.
- Adding more bulbs to a circuit will make each bulb less bright, more motors will make each motor spin more slowly, more buzzers will make each buzzer quieter
- Turning a switch off (open) breaks a circuit. The circuit is not complete therefore electricity cannot flow.
- There are different, recognised symbols when representing a simple circuit in a diagram

- Concave
- Convex
- Filters
- Lens
- Retina
- Cornea
- Iris
- Pupil
- Reflect
- Photosynthesis

- Circuit
- Complete circuit
- Circuit diagram
- Circuit symbol
- Cell and battery (are used interchangeably)
- Bulb
- Buzzer
- Motor
- Switch
- Voltage
- Conductor

- Electricity travels at the speed of light, that's more than 186000 miles per second
- Electricity comes from the power station, the wind, sun and water and even animal's poo
- Electricity is a type of energy that builds up in one place (static), or flows from one place to another (current electricity)
- Coal is the biggest source of energy for producing electricity. It is burned in furnaces that boil water and create steam
- A popular way of producing electricity is through hydropower. This is a process where electricity is made by water which spins turbines attached to generators.
- Bolt of lightning can measure up to 3000000volts and lasts less than one second
- Electric fields work in a similar was to gravity. Whereas gravity always attracts, electric fields can either attract or repulse.
- Thomas Edison was a great inventor who came up with a way of making the electric light accessible for homes, industry and outside in the streets.

- Insulator
- Socket
- Generator
- Turbine
- Fuses
- Thomas Edison