



Science Subject knowledge, discipline and vocabulary

Year 1

Unit	Animals including Humans (Biology)	Materials	Plants	Seasonal Changes
Previous Learning	<ul style="list-style-type: none"> The names of some common animals. The parts of the human body and how they are associated with each sense. Know how to keep healthy by doing exercise and eating healthily. Know some rhymes about the body (e.g. Heads, Shoulders, Knees and Toes) 	<ul style="list-style-type: none"> Objects feel and look different based on the material they are made from. Use different materials when painting and making art. 	<ul style="list-style-type: none"> Plants can grow. Deciduous trees lose their leaves in the autumn and winter. 	<ul style="list-style-type: none"> There are times when it is hot outside and there are times when it is cold outside. The months of the year. What happens in autumn and winter (key events, what people do, what people wear) What the weather is like in autumn and winter. In autumn and winter, the days become shorter, and the nights become longer.
Subject Knowledge	<p>What are vertebrates? Vertebrates are animals that have a backbone. There are five groups of vertebrates:</p> <ul style="list-style-type: none"> mammals fish birds reptiles amphibians <p>What are invertebrates?</p> <ul style="list-style-type: none"> Invertebrates are animals that do not have a backbone. They include: <ul style="list-style-type: none"> insects such as flies, ladybirds and bees arachnids such as spiders molluscs such as snails 	<p>Which materials are some objects made from?</p> <p>Which materials are natural and which are man-made?</p> <ul style="list-style-type: none"> Some materials are natural while others are man-made. Natural materials are materials which are found in nature. Man-made materials are materials which have been produced by humans. 	<p>The names of some common garden plants.</p> <ul style="list-style-type: none"> People may grow plants in their gardens and care for them. They may grow flowering plants which are beautiful to look at or beans and seeds to grow plants for food. When plants are grown for food, this may be called a herb garden or vegetable patch. <p>The names of some common wild plants.</p> <ul style="list-style-type: none"> A wild plant will grow by itself. It does not need to be cared for. If it grows somewhere unwanted, it may be a weed. <p>Deciduous and evergreen trees</p> <ul style="list-style-type: none"> Deciduous trees lose their 	<p>What is a season?</p> <ul style="list-style-type: none"> There are four seasons <ul style="list-style-type: none"> Autumn - September, October, November Winter - December, January, February Spring - March, April, May Summer - June, July, August <p>What happens in the spring?</p> <ul style="list-style-type: none"> As the seasons change from winter to spring, it gets warmer and the temperature begins to rise. Some things that happen in spring are: <ul style="list-style-type: none"> leaves begin to appear on deciduous trees. some trees begin to blossom. many plants begin to grow. lambs are born and chicks begin to hatch. the days become longer and the nights become shorter. In the spring, there are events such as Easter and St. George's Day. The weather may be slightly sunny but still a little windy and rainy on some days. The clothes you might wear include long-sleeved tops and long trousers. As it gets closer to summer, you may wear t-shirts and shorts on sunnier and

What are mammals?

- give birth to live young
- usually have hair or fur
- **warm-blooded**
- cannot breathe underwater

What are fish?

- have fins and scales
- breathe underwater using **gills**
- lay eggs in water
- **cold-blooded**
- some common fish are salmon, cod and tuna

What are birds?

- **warm-blooded**
- have wings and beaks
- have feathers
- lay eggs

What are reptiles?

- **cold-blooded**
- lay eggs
- have scales
- cannot breathe underwater

What are amphibians?

- **cold-blooded**
- lay eggs
- live on land and water - can breathe underwater through **gills**

The Human Body

- What are the different parts of the human body?
- What are the uses of each

leaves in the autumn every year. Their **leaves** are generally broad, flat and have veins running through them.

- **Evergreen trees** have green **leaves** all year round. Their **leaves** are generally thick, waxy and narrow like needles

What are the parts of **common trees**?

warmer days.

What happens in the **Summer**?

- As the **seasons** change from **spring** to **summer** it gets **warmer** still - this is because the **temperature** has risen.
- The days get longer and the nights get shorter. **Summer** has the longest days and the shortest nights of all the **seasons**.
- In the **summer**, there are events such as the long school **summer holidays** and
- Things people might do are have picnics, go to the beach, have a paddling pool in the garden and mow the lawn.
- The **weather** may be **hot** and **sunny**. There may not be many clouds in the sky.
- The clothes you might wear include t-shirts, shorts and swimming costumes.
- It is important to stay safe in the **summer** as the sun can be very strong. You can wear sun hats, sunglasses
- and sun cream to help keep you safe.

What happens in the **autumn**?

- The **temperature** begins to fall, which means it gets **colder**.
- The leaves on **deciduous** trees change colour and begin to fall to the ground.
- The days get shorter and the nights get longer.
- In the **autumn**, there are events such as Halloween and Bonfire Night.
- Things people might do are rake leaves, pick blackberries and collect **conkers** and pine cones.
- The **weather** may be **slightly sunny, windy or rainy**. There are more **clouds** in the sky during **autumn** compared to the **summer**.
- The clothes you might wear include t-shirts and shorts on **sunnier** and **warmer** days, and woolly hats and scarves on **colder** days - especially as it gets closer to **winter**.

	<p>part?</p> <ul style="list-style-type: none"> • What are the five senses and when do we use each of them? 			<p>What happens in the Winter?</p> <ul style="list-style-type: none"> • As the seasons change from autumn to winter it gets colder still - this is because the temperature has fallen. • Sometimes, it can freeze overnight and in the mornings, there may be ice and frost. • Deciduous trees have completely lost their leaves and the braches are bare. • The days get shorter and the nights get longer. Winter has the shortest days and the longest nights of all the seasons. • In the winter, there are events such as Christmas and Valentine's Day. • Things people might do are build snowmen, eat warm foods like stews and soups and light fires. • The weather may be windy, rainy and chilly. Sometimes it also snows. <ul style="list-style-type: none"> • The clothes you might wear include warm coats, jumpers, woolly hats and scarves on colder days.
<p>Subject Discipline</p>	<ul style="list-style-type: none"> • Use observations in the local environment to compare animals or through videos and photographs. • Describe how to identify and group animals. • Group animals according to what they eat. • Research how to take care of animals taken from the local environment and how to return them safely. <p>The Human Body</p> <ul style="list-style-type: none"> • Label the different parts of the body and describe what each part does. • Draw around one of the pupils in your class using chalk - label the different 	<ul style="list-style-type: none"> • How are objects similar / different based on the materials they are made from? • How are materials similar / different to each other? • Can you sort natural materials from man-made materials? • What is the best material for an umbrella? • What is the best material for a lining a dog basket? • What is the best material for a superhero costume? • What is the best material for curtains? • What is the best material for a bookshelf? 	<ul style="list-style-type: none"> • Plant a bean or a seed and watch it grow. Record your observations in a diary. • Go on a wild plant hunt! Create a tally chart to show how many of each plant you have found and then use the information to answer questions. • Plant some garden plants, care for them and watch them grow. • Go on a tree hunt around the Country Park - what types of trees can you see? Collect fallen leaves and identify which tree they came from using pictures to help you. Sort the leaves between deciduous and evergreen trees. • Label the parts of a plant showing where the leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, and stems are. 	<ul style="list-style-type: none"> • Go on a spring nature walk - what signs of spring can you spot? • Measure the temperature every day - what do you notice about the difference in temperature from the start of the unit to the end? • Match events to the seasons they happen in? What is weather like during these events (e.g. Easter, summer holidays) • Discuss what happens when the children go home from school in the spring and summer - what do they notice about daylight? Compare this to what happens in the winter. • Analyse simple graphs that show how day length changes throughout the seasons. • Go on an autumn nature walk - what signs of autumn can you spot? • Measure the temperature every day - what do you notice about the difference in temperature from the start of the unit to the end? • Match events to the seasons they happen in? What is weather like during these events (e.g. Christmas Day, Halloween, Bonfire Night?) • Discuss why it is good that fireworks happen in the

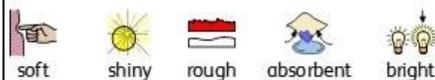
	<p>parts of the body.</p> <ul style="list-style-type: none"> • Complete a simple exercise (such as a star jump) and describe which parts of your body move. • Participate in a sensory experience where you taste, feel, look at and see different foods (check for allergies first). • Use senses to compare different textures, sounds and smells • Discuss activities where you might use more than one sense (e.g. playing football). 			<p>autumn. What would happen if the happened in the summer?</p> <ul style="list-style-type: none"> • Discuss what happens when the children go home from school in the autumn and winter - what do they notice about daylight? Compare this to what happens in the summer. • Analyse simple graphs that show how day length changes throughout the seasons. <ul style="list-style-type: none"> • Research animals that hibernate or migrate in winter months.
<p>Key Vocab</p>	<ul style="list-style-type: none"> • backbone • carnivores • cold-blooded • environment • farm • gills • herbivore • omnivore • pet • temperature • vertebrate • warm-blooded • wild • Senses • Smell • Taste • Hear • See • Touch 	<ul style="list-style-type: none"> • absorbent • bendy • brick • dull • elastic • fabrics • foil • glass • man-made • metal • natural • opaque • plastic • rock • rough • shiny • smooth • soft • stiff • stretchy • transparent • waterproof • wood 	<ul style="list-style-type: none"> • branches • bulb • common • deciduous • evergreen • flower • flowering • fruit • garden • herb • leaf / • leaves • petal • plant • roots • seed • stem • tree • trunk • vegetable • vegetation • weed • wild 	<ul style="list-style-type: none"> • autumn • blossom • day length • daylight • deciduous • holiday • hot • months • nature • rain • season • slightly • spring • summer • sunny • temperature • warm • weather • windy • winter

Science Subject knowledge, discipline and vocabulary

Year 2

Unit	Materials	Plants	Living things and their habitats
Previous Learning	<ul style="list-style-type: none"> Objects are things that you can touch or see. Objects are made from materials. Some materials that objects are made from (e.g. glass, wood, plastic) Some words to describe materials (e.g. shiny, soft, rough absorbent) Materials which are natural and which are man-made. 	<ul style="list-style-type: none"> Plants can grow. The names of some common garden plants (e.g. poppy, rose) and the names of some common wild plants (e.g. daisy, dandelion, nettle). Deciduous trees lose their leaves in the autumn every year. Evergreen trees have green leaves all year round. The parts of a plant including petals, fruits, roots, bulbs, seeds, stem, trunks and branches. 	<ul style="list-style-type: none"> Which things are living, dead and things which have never been alive. The names of some common plants and types of trees. Some animals are suitable to be kept as pets but others are not. All animals need water, air and food to survive Animals can be grouped into vertebrates and invertebrates Animals can be grouped into carnivores, herbivores and omnivores Animals, including humans, have offspring which grow into adults. Different vegetation belts and biomes around the world.
Subject Knowledge	<p>What are materials used for?</p> <ul style="list-style-type: none"> Materials are used for different purposes based on their properties. For example, wood is used to make furniture and floors. Metal can be used to make coins, cans, cars and cutlery. Glass can be used to make windows. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> glass</div> <div style="text-align: center;"> metal</div> <div style="text-align: center;"> rock</div> <div style="text-align: center;"> plastic</div> <div style="text-align: center;"> wood</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> water</div> <div style="text-align: center;"> brick</div> <div style="text-align: center;"> paper</div> <div style="text-align: center;"> fabrics</div> <div style="text-align: center;"> elastic</div> <div style="text-align: center;"> foil</div> </div> <p>What properties of materials make them suitable for a particular use?</p> <ul style="list-style-type: none"> Glass can be used to make windows because it is transparent. 	<p>Plants are living things and require things to grow.</p> <ul style="list-style-type: none"> Plants require things such as water, warmth, nutrients from soil and light to grow. If they do not have one or more of these things, they may stop growing. Plants can: <ul style="list-style-type: none"> move grow react to their surroundings (sense) absorb nutrients reproduce <p>Which plants do we eat?</p> <ul style="list-style-type: none"> Many plants provide us with food by bearing fruits which carry their seeds. When farmers grow plants to provide us with food, these are called crops. We eat many fruits that contain seeds (including tomatoes!). We also eat different parts of vegetable plants: 	<p>What is a habitat?</p> <ul style="list-style-type: none"> A habitat is a place where living things, such as animals and plants, can find all of the things they need to survive. This includes food, water, air, space to move and grow and some shelter. Some habitats are large, like the ocean, and some are very small, such as under a log. Some habitats in our local area include the river and woodlands. Other habitats include the coast and the forest. <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> ocean</div> <div style="text-align: center;"> forest</div> <div style="text-align: center;"> river</div> <div style="text-align: center;"> pond</div> <div style="text-align: center;"> coast</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> desert</div> <div style="text-align: center;"> woodland</div> <div style="text-align: center;"> tundra</div> <div style="text-align: center;"> habitat</div> </div> <p>What is a micro-habitat?</p>

- Rulers can be made from **wood, plastic** or rubber because these materials are **smooth** and can be cut straight.
- Spoons are made from **metal**, because it is **waterproof** and can be cleaned easily.
- They can also be made from **plastic** for children because **plastic** is light and it cannot hurt children's growing teeth.



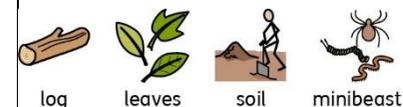
How can you change the shape of materials?

- The shape of some materials can be changed when they are **stretched, twisted, bent** and **squashed**.

- **root vegetables** (carrots, potatoes)
- **stem vegetables** (celery, spring onion)
- **leafy vegetables** (cabbage, lettuce)
- **flowering vegetables** (cauliflower, broccoli)
- We eat grains and cereals from **plants** too (wheat, oats).
- Nuts and seeds are also sometimes edible (sesame seeds, pumpkin seeds, peanuts).
- Many **herbs** are also grown to add flavour to foods.

What are the parts of **common trees** and **plants**?

- **Microhabitats** are very small **habitats** where **minibeasts** may live.
- Examples of **microhabitats** include under stones, in grass, under fallen leaves and in the soil.
- **Minibeasts** that can be found there include worms, snails, ants, centipedes, millipedes, and butterflies and they help to keep the **microhabitat** healthy.
- **Minibeasts** are able to **survive** in their **habitats** because they can find the things they need to **survive** there, such as food and water. For example, caterpillars can **survive** on leaves as they give them food.



How do **animals** and **plants** depend on each other?

- Animals and **plants** depend on each other to **survive**. For example, worms **depend** on **plants** because they feed on dead leaves, but **plants** depend on worms who make the soil healthy by digging holes and allowing air in.
- Birds also need worms because they eat them. Worms are a **source** of food for birds.
- This called a **food chain**.
- If there were no worms, there would be less birds as there would be more competition for food. The soil would not be as healthy without worms. All living things (or things that were once living) have a part to play in **food chains**. Without them, other animals and **plants** may not be able to survive.

Subject Discipline

- Compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs)
- Observe closely the uses of different materials, and record your observations.
- Distinguish between **absorbent** and **waterproof** materials. Discuss

- Sort through pictures to show which things are living, which are dead and things which have never been alive.
- Go on a **plant/tree** hunt. What do you notice about what they look like? What are their features?
- **Plant** a **bulb** or a **seed** and watch it grow. Record your observations in a diary. Compare the growth of that **plant** with a **plant** (using the same **bulb** or **seed**) where one of the conditions is different (no water, no light, a smaller container).

- Observe carefully a **microhabitat** (forest school) and sketch the **plants** you find. Can you find any evidence of **plants** being eaten? What other living things can you see?
- Compare two different **habitats** and explain what animals and **plants** can be found there.
- Go on a **minibeast** hunt. What **minibeasts** can you find? Why can they

	<p>what happens when water is placed on these materials.</p> <ul style="list-style-type: none"> Consider why some properties of materials make them suitable or unsuitable for different uses. Investigate if some items can be made by more than one material (e.g. cutlery) and explain why. Investigate if some materials can be used to make more than one thing. Discuss which materials are recyclable and why. Follow the recycling process. Investigate how some objects can be changed by squashing, bending, twisting and stretching. Find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam 		<ul style="list-style-type: none"> Plant a seed on a wet cotton bud. Does it grow? Why might it grow for a little while and then stop? Dissect a variety of fruits and locate where their seeds are. Eat a variety of vegetables and identify which part of the plant they come from (note: do not taste nuts in school as they are allergens). Create a bar chart to show how tall your plants are to the nearest cm. 		<p>survive in their habitat? Create a tally chart or pictogram to show your results.</p> <ul style="list-style-type: none"> Compare two different microhabitats. What do you notice about the minibeasts that live in each one? Why do you think that is? Discuss how the minibeasts help keep the microhabitat healthy. Use your knowledge of biomes to describe the types of animals and plants that live there. Match animals and plants to their habitats (e.g. forest, ocean, poles, desert). Answer questions such as 'Why would a polar bear not survive in the desert?' Create simple food chains that begin with a plant. <p>Discuss what would happen if one of those living things in a food chain did not exist.</p> <ul style="list-style-type: none">
<p>Key Vocab</p>	<ul style="list-style-type: none"> absorbent bendy brick dull elastic fabrics foil glass man-made metal natural opaque plastic process properties 	<ul style="list-style-type: none"> purpose recyclable rock rough shiny smooth soft squash stiff stretchy suitable transparent twist unsuitable waterproof wood 	<ul style="list-style-type: none"> branches bulb common crop deciduous evergreen flower flowering fruit garden herb leaf / leaves 	<ul style="list-style-type: none"> nutrients petal plant reproduce roots seed stem tree trunk vegetable vegetation weed wild 	<ul style="list-style-type: none"> food chain habitat herbivore invertebrate microhabitat minibeast offspring omnivore plant source tree vegetation vertebrate



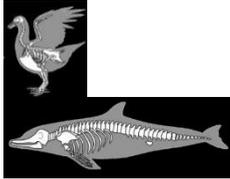
Science Subject knowledge, discipline and vocabulary

Year 3

Unit	Animals including Humans (Biology)	Forces and Magnets (Physics)	Rocks (Chemistry)	Light (Physics)	Plants (Biology)
Previous Learning	<ul style="list-style-type: none"> • The parts of the human body and what they do. • There are five types of vertebrates (mammals, fish, reptiles, amphibians, birds) • Vertebrates are animals that have a backbone. • Invertebrates are animals that do not have a backbone. • All animals need water, air and food to survive. • The different ways in which humans can be healthy. 	<ul style="list-style-type: none"> • The shape of some materials can be changed when they are stretched, twisted, bent and squashed. • Know how different toys move. • Know what a force is and be able to explain that a push and pull are types of forces. • That when forces are applied to an object they allow them to move or stop moving. • The strength of the force determines how far and fast an object moves. 	<ul style="list-style-type: none"> • The role of Mary Anning in palaeontology and the discovery of fossils. • Soil contains nutrients and these help plants to grow. • The meaning of the word absorb. • That magma is molten rock that is formed in very hot conditions inside the earth. • Why some materials are used for certain purposes because of their properties 	<ul style="list-style-type: none"> • Certain things produce light, usually by burning (e.g. the Sun) or electricity (e.g. street lights) • Shiny materials do not make light but do reflect it. • Shadows are caused when certain materials block light. 	<ul style="list-style-type: none"> • Which things are living and which are not. • A variety of common wild and garden plants, including deciduous and evergreen trees and how to identify them. • The structure of common flowering plants, including trees (including leaves, flowers, fruits, roots, bulbs, seeds, stem, trunks and branches) • Seeds and bulbs grow into mature plants • Plants need water, light and a suitable temperature to grow and stay healthy. • Different vegetation belts and climate zones around the world • Plants and animals depend on each other to survive.

What are the different types of **skeletons**?

- **Vertebrates** are animals that have a **backbone**. These **skeletons** are called **endoskeletons** - this means that the **skeletons** are on the inside of the bodies. These **skeletons** grow with the bodies.



- When the **skeleton** exists outside the body, it is called an **exoskeleton**. An **exoskeleton** is a covering that supports and protects animals. These have to be shed and a new **skeleton** is grown.

What does an endoskeleton do?

- The three most important things a **skeleton** does are:
 - provide **support** and shape to an animal's body
 - allow movement through the **joints**
 - **protect organs** (e.g. the skull protects the brain)

What are **forces**?

- **Forces** are **pushes** and **pulls**.
- These **forces** change the **motion** of an object.
- They will make it start to move or speed up, slow it down or even make it stop.
- For example, when a cyclist **pushes** down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves.
- When the cyclist **pulls** the brakes, the bike slows down and eventually stops.

How do different **surfaces** affect the **motion** of an object?

- **Forces** act in **opposite** directions to each other.
- When an object moves across a surface, **friction** acts as an **opposite** force.
- **Friction** is a **force** that holds back the **motion** of an object.
- Some **surfaces** create more **friction** than others which means that objects move across them slower.
- On a ramp, the **force** that causes the object to move downwards is **gravity**.
- Objects move differently depending on the
- **surface** of the object itself and the **surface** of the ramp.

How do **magnets** work?

- **Magnets** produce an area of **force** around them called a **magnetic field**.
- When objects enter this **magnetic field**, they will be **attracted** to or **repelled** from the **magnet** if they are **magnetic**.

What are the different types of **rocks**?

- There are three types of **rocks** that are formed **naturally**.
- **Igneous**:
- When **molten magma** cools, **igneous rocks** are formed.
- This either cools and forms **rocks** under the earth's **surface**, or flows out of erupting **volcanoes** as lava and may mix with other use this **minerals**.
- Examples include granite and basalt.
- This type of rock is strong, hard-wearing and **non-porous**.
- **Sedimentary**:
- Sometimes, little pieces of rocks that have been **weathered** can be found at the bottom of lakes, seas and rivers This is called **sediment**.
- Over millions of years, layers of this **sediment** builds up forming **sedimentary rocks**.
- Examples include limestone and chalk.
- **Sedimentary rocks** are **porous** and can easily be worn down

What is a **light source**?

- A **light source** is something that **emits light** by burning, electricity or **chemical reactions**.
- Burning **light sources** include the Sun, flames from a fire and stars.
- We must never look directly at the Sun as the **light** produced is very **bright** and can be harmful to our eyes. This is why we wear **sunglasses**.
- **Electric lights** include lamps, car headlights and street **light**.
- **Lights** that are caused by **chemical reactions** are much less common. This happens when different chemicals reach and **light** is a **produce** of that

The **functions** of the different parts of the **flowering plants** – flower, seed, leaf, stem, roots.

- The **petals** on a **flower** are usually bright – this is to attract bees and other insects so that they can collect **pollen** to make **seeds**.
- The **seeds** are then able to grow to make new **plants**. This is called **germination**.
- **Leaves** use **carbon dioxide** and sunlight to make food for the **plant**.
- The **stem** carries water and other **nutrients** from the **roots** to the rest of the **plant**. **Leaves** use this water to make food.
- The **stem** also helps to keep the plant upright so that the sunlight can reach it easier.
- The **roots** help to anchor the **plant** in the **soil**. They also **absorb** water and **nutrients** from the soil for the **stem** to carry to the rest of the **plant**.

What do different **plants** need to grow?

- Air, water, sunlight, **nutrients** from the **soil**, rooms to grow, suitable **temperature**.
- The amount of each of these may vary depending on the type of **plant**. For example, cacti need less water than other **plants**.

How is water **transported** within **plants**?

- Water is **absorbed** from the **soil** by the **roots**.
- It is then **transported** from the **roots** to the **stem** and then to the rest of the **plant**.

How do **flowers** help in the **life cycle** of the **flowering plants**?

- The **flower's** job is to create **seeds** so

How do we move?
Joints are where **bones** meet - they allow our bodies to move.
Muscles contract and **relax**.
 You place an **elbow** on a desk and lift your arm. **Muscles** in your upper arm (biceps) **contract** while **muscles** behind the upper arm (triceps) **relax**. The **muscles** work together and in opposition to allow your arm to move. **Muscles** are connected to bones by tendons.

Bones and joints in the human **skeleton**.

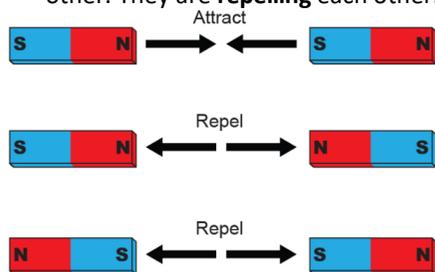
- When **magnets repel**, the **push** each other away
- When **magnets attract**, they **pull** together.

Which materials are **magnetic**?

- Objects that are **magnetic**, are **attracted** to **magnets**.
- Iron and steel are **magnetic**.
- Aluminium and copper are **non-magnetic**.

How do **magnetic** poles work?

- The ends of a **magnet** are called poles.
- One end is called the north pole and the other end is called the south pole.
- **Opposite** poles **attract**, similar poles **repel**.
- If you place two **magnets** so the south pole of one faces the north pole of the other, the **magnets** will move towards each other. This is called **attraction**.
- If you place the **magnets** so that two of the same poles face each other, the magnets will move away from each other. They are **repelling** each other.



- **Metamorphic:**
 - When some **igneous** and **sedimentary** rocks are heated and squeezed (**pressured**), they form **metamorphic rocks**.
 - Examples include slate and marble.
 - **Metamorphic rocks** are strong
- Bricks and concrete are not **rocks** because they are **man-made**.

What are **fossils**?

- **Fossils** are the remains of **prehistoric** life.
- They are usually formed when a living thing (plant or animal) dies and the body is covered up or buried by **sediment** over tens of thousands of years.
- Some **fossils** are formed when the tough bones and teeth in animals, and the woody part of plants are **preserved**.
- Other **fossils** are made from **imprints** in **surrounding sedimentary rock** such as footprints or **imprints** from

reaction.
 Examples can include glow sticks and fire flies.

Why do we need **light**?

- We need **light** so that we are able to see in the **dark**.
- This is because the **dark** is the absence of **light**. The Sun and stars always give us **light** but we can only see the stars when it is **dark**. At night time we cannot see the Sun's **light** as the Earth turns and our part of the Earth is not lit up by the Sun at night.
- When we are driving, we need car headlights or street **lights** to help us.
- If we are walking or out in the dark, we would need **torches** to help us see. You should not look directly into the **torch** as this is dangerous.

What are not **sources of light**?

- The Moon is not a **source of light**

that new **plants** can grow.

- **Pollination** occurs when **pollen** from the **anther** is transferred to the **stigma** by bees and other insects.
- The **pollen** then travels down and meets the **ovule**. When this happens, **seeds** are formed – this is caused **fertilisation**.
- **Seeds** are then **dispersed** so that **germination** can begin again.

shells.

- **Fossils** tell us about the Earth and about life that existed hundreds of thousands and millions of years ago.

What is soil?

- **Soil** is made from pieces of rock, **minerals, decaying** plants and water.
- When **rock** is broken down into small **grains, soil** is formed.
- There are layers of **soil**:
 - above the soil is **leaf litter** and recently **decaying** plants.
 - as the **soil** becomes deeper, the **rock grains** become larger until **bedrock** is reached.

even though we can see it in the **dark**.

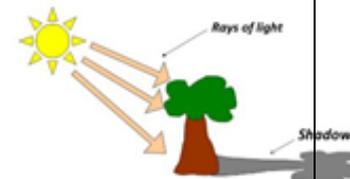
- This is because the Sun's **light reflects** on the **surface** of the Moon making it appear as though the Moon **emits light**.
- Shiny things are not **light sources** - they appear to be **sources** of **light** as they are **bright**.

How does **light** travel?

- **Light** travels in straight lines.

When **light** is blocked by an **opaque** object, a **dark shadow** is formed.

How are **shadows** formed?



- When **light** is blocked by an **opaque** object, a **dark shadow** is formed. An **opaque** material blocks **light** so we can't see through it and shine a **light** through it.
- When **light** is shone onto a **transparent** object, the **light** travels through it, we can see through it

				<p>and it makes a very faint shadow.</p> <ul style="list-style-type: none">• When light is shone onto a translucent object, some of the light travels through it, we can see bright light sources through it and it makes a fairly dark shadow.• The size of a shadow changes as the light source moves. The further away the light source is, the smaller the shadow is. The closer the source of the light, the bigger the shadow.	
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rSubject Discipline	<ul style="list-style-type: none"> • Identify and group animals with and without skeletons and compare the ways in which they move. • Match animals to their skeletons and explain your reasons for this. • Explore ideas about what would happen if humans did not have skeletons. • Identify which bones are used for support (e.g. backbone), which are used for protection (e.g. cranium) and which are used for movement (e.g. joints) • Create a presentation to show how muscles contract and relax. • Compare the size of straight arms and bent arms. Measure around the top of an arm when it is straight and when it is bent . What do you notice? 	<ul style="list-style-type: none"> • Investigate the amount of friction created by different surfaces. Use measures (such as length and time) to show how far or fast an object travels. • Compare how different things move and group them. • Observe how a magnetic field attracts iron filings by using a bar magnet. • Investigate how magnets are used in everyday life. • Investigate which materials are magnetic and sort between objects that are magnetic and those that are non-magnetic. • Investigate if the size of a magnet affects how strong it is (using chains of paper clips of varying lengths) • Investigate if all metals are magnetic. • Observe what happens when magnets with similar poles are placed next to each. Repeat this for when the poles are different. 	<ul style="list-style-type: none"> • Explore the types of rocks you can find in the local environment. • Explain why rocks are used for different purposes based on their properties. • Research the different living things whose fossils are found. • Explore the different kinds of soils , including those you can find in the local environment. • Compare different types of soils by saying what is similar and what is different using scientific vocabulary. • Investigate what happens when rocks are rubbed together. • Investigate what happens to rocks when they are in water. • Sort different types of rocks based on how rough or smooth they are, whether they have grains or crystals, how permeable they are, how easily they can break down, how strong they are and what they look like. 	<ul style="list-style-type: none"> • The brightness of torches - can you put torches in order from brightest to dimmest? What would make it a fair test? • Why do lights seem brighter in the dark? • Explore which objects form shadows when light is shone on them. • How can you change the size and shape of shadows by using the same object? • What happens when light is reflected from different surfaces? What happens when light is reflected from a mirror? What happens when the angle of the mirror (or light source changes?) 	<ul style="list-style-type: none"> • Compare the effect of different factors in plant growth (e.g. the amount of water, the amount of light and the amount of fertiliser). Discuss what would make this a fair test. • Place white carnations in dyed water to observe how plants transport water. • Discover how seeds are formed by observing plant life cycles. • Dissect fruits to observe their structure and use this to explain how seeds are dispersed. • Dissect a flower and identify each of the different parts that help with fertilisation.
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<p>Key Vocab</p>	<ul style="list-style-type: none"> • backbone • bones • contract • elbow • endoskeleton • exoskeleton • joints • muscles • organs • protect • relax • skeleton • support • tendons • vertebrate 	<ul style="list-style-type: none"> • attract • bendy • friction • force • gravity • magnet • magnetic field • metal • motion • non- • magnetic • opposite • position • pull • push • repel • resistance • squash • stretchy • surface • twist 	<ul style="list-style-type: none"> • absorb • bedrock • decaying • grain • igneous • imprint • leaf litter • magma • man-made • metamorphic • mineral • molten • natural • nutrients • palaeontology • permeable • porous • prehistoric • preserve • pressure • properties • rock • sediment • soil • surface • surrounding • volcano • weathered 	<ul style="list-style-type: none"> • angle • bright • chemical reactions • dark • dim • electricity • emits • light • mirror • opaque • product • reflects • shadows • source • sunglasses • surface • torches • translucent • transparent 	<ul style="list-style-type: none"> • absorb • anther • branches • bulb • carbon • dioxide • climate zone • common • deciduous • dispersed • dissect • evergreen • fertilisation • fertiliser • flower • flowering • fruit • function • garden • germination • healthy • leaf / leaves • life cycle • mature • nutrients • ovule • petal • plant • pollen • pollination • roots • stigma • structure • temperature • transported • tree • trunk • vegetation • wild
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4

Science Subject knowledge, discipline and vocabulary

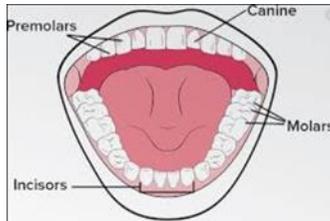
Year 4

Unit	Animals including Humans (Biology)	Electricity (Physics)	Sound (Physics)	States of Matter (Chemistry)	Living things and their habitats (biology)
Previous Learning	<ul style="list-style-type: none"> • The parts of the human body and what they do. • All animals need water, air and food to survive. • The different ways in which humans are healthy. • Animals get nutrition from what they eat. • Humans and some animals have skeletons and muscles for support, protection and movement. • What carnivores, omnivores and herbivores are. • Excretion is one of the seven living processes. • Animals can be grouped into carnivores, herbivores and omnivores and other ways in which to classify animals. • The differences between the teeth (incisors, molars, canines) of carnivores and herbivores. • Examples of habitats (including microhabitats) and the animals and plants that can be found there. • Plants need sunlight to grow. • Living things depend on each other to survive. • The seven life processes and that nutrition is one of them. • Nutrition is the life process by which animals get energy. • How environments are changing. 	<ul style="list-style-type: none"> • Electricity is a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for devices. • Sources of light and sound may need electricity to work. 	<ul style="list-style-type: none"> • Hearing is one of my five senses. • Sounds can be combined using musical instruments. • What the word vibration means. 	<ul style="list-style-type: none"> • Why some materials are used for certain purposes because of their properties • The water cycle, and the processes of evaporation, condensation and precipitation. 	<ul style="list-style-type: none"> • Animals can be grouped into vertebrates (and then further into fish, reptiles, amphibians, birds and mammals) and invertebrates • Animals can be grouped into carnivores, herbivores and omnivores • The differences between the teeth of carnivores and herbivores. • The names of some common wild and garden plants and deciduous and evergreen trees. • Examples of habitats (including microhabitats) and the animals and plants that can be found there. • Living things depend on each other to survive. • How land use has changed over time and the effects this has on the • environment (e.g. urban development)

What is the role of our **teeth** and how do we look after them?

- Teeth are used for cutting and chewing food.
- They start the **digestive process** which gives us the energy we need to live.
- Humans look after their teeth by brushing and flossing and ensuring that they do not eat foods high in sugar.
- Not looking after teeth can lead to an increase in **plaque** and **tooth decay**.

What are the different names and



functions of human **teeth**?

- **Canines** are pointed for tearing and ripping food - these are usually used when chewing meat.
- **Incisors** are shovel shaped and help bite lumps out of and cutting food.
- **Premolars** and **molars** are flat and they grind and crush food.

The **digestive system**

- The smell of food triggers **saliva** to be produced.
- The **digestive** system begins with the mouth and teeth where food is **ingested** and chewed.
- **Saliva** is mixed with the food which helps to break it up.
- When the food is small enough to be swallowed, it is pushed down the
- **oesophagus** by **muscles** to the **stomach**.
- In the **stomach**, food is mixed further.

Where does **electricity** come from?

- **Electricity** is **generated** using **energy** from natural **sources** such as the Sun, oil, water and wind.
- These can also be called **fuel sources**.

Which **appliances** run on **electricity**?

- Some **appliances** use **batteries** and some use **mains electricity**.
- **Batteries** come in different sizes depending on how much and for how long the **appliance** is used.
- Common **appliances** that use **electricity**.



How does a **circuit** work?

- A complete **circuit** is a loop that allows **electrical current** to flow through **wires**.
- A **circuit** contains a **battery (cell)**, **wires** and an

What is a sound?

- A thing that can be heard.
- The object that makes the sound is called the **source**.

How is a sound made?

- When objects **vibrate**, a sound is made.
- The **vibration** makes the air around the object **vibrate** and the air **vibrations** enter your ear. These are called **sound waves**.
- If an object is making a sound, a part of it is **vibrating**, even if you cannot see the **vibrations**.



How do sounds **travel**?

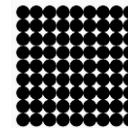
- **Sound waves** travel through a **medium** (such as air, water, glass, stone, and brick).
- For example, if somebody is

What is a **particle**?

- **Particles** are what materials are made from.
- They are so small that we cannot see them with our eyes.
- The **properties** of a substance depend on what its particles are like, how they move and how they are arranged
- **Particles** behave differently in **solids, liquids** and **gases**.

What is a **solid**?

- In the **solid** state, the material holds its shape.
- **Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't poured.
- **Solids** always take up the same amount of space.



What is a **liquid**?

- In the **liquid** state, the material holds the shape of the container it is in.
- This means that **liquids** can change shape, depending on the container.
- **Liquids** have **particles** which are close together but random.
- **Liquid particles** can move over each other.

How can living things be grouped?

- All living things, which can also be called **organisms**, have to do certain things to stay alive. These are the **life processes**:
 - movement
 - **respiration**
 - **sensitivity**
 - growth
 - **reproduction**
 - **excretion**
 - **nutrition**



- Living things can be grouped according to different **criteria** (where they live, what type of **organism** they are, what features they have). For example, a camel can belong in a group of **vertebrates**, a group of animals that live in the desert, and a group of animals that have four legs.

What is a **classification key**?

- The mixed food is then sent to the small **intestine** which **absorbs nutrients** from the food.
- Any leftover broken down food then moves on to the large **intestine**.
- The food minus the nutrients arrives in the rectum where **muscles** turn it into **faeces**. It is stored here until it is pushed out by the anus. This is called **excretion**.
- A **food chain** is a simple way to show the direction in which **energy** moves from the **producer** to the various **consumers** to the top or **tertiary consumer**.
- The **producer** (a plant) gets its **energy** from the Sun.



- In this example, the **producer** is the wheat, which gets its **energy** from the Sun.
- The mouse eats the wheat and gets its **energy** from it. The mouse is the **primary consumer**.
- The mouse is then eaten by the owl, which is the **secondary consumer**. The owl gets its **energy** from the mouse. The owl is the **predator** and the mouse is the **prey**.
- The owl is then eaten by the wolf, which is the **tertiary consumer**. The wolf gets its **energy** from the owl.
- The arrows show the direction in which the **energy** travels.
- A **food web** shows the direction in which **energy** travels when animals and **producers** (plants) are eaten by more than one thing.
- A **food web** shows multiple **food chains** where there are multiple feeding relationships.
- When part of the **food chain** is removed, this has an impact on the other parts of

appliance that requires **electricity** to work (such as a **bulb**, **motor** or **buzzer**).

- The **electrical current** flows through the wires from the **battery (cell)** to the **bulb**, **motor** or **buzzer**.
- A **switch** can break or reconnect a **circuit**.
- A **switch** controls the flow of the **electrical current** around the **circuit**. When the **switch** is off, the **current** cannot flow. This is not the same as an incomplete **circuit**.

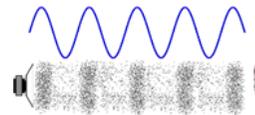
What are **electrical conductors** and **insulators**?

- When objects are placed in the **circuits**, they may or may not allow **electricity** to pass through.
- Objects that are made from materials that allow **electricity** to pass through create a complete **circuit** are called **electrical conductors**.
- Objects that are made from materials that do not allow **electricity** to pass through and do not complete a **circuit** are called **electrical insulators**.

playing music in the room next door, the sound can travel through the bricks in the wall.

How do we hear sounds?

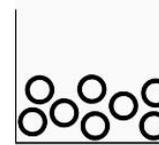
- When an object **vibrates**, the air around it **vibrates** too. This **vibrating** air can also be known as **sound waves**.
- The **sound waves** travel to the ear and make the **eardrums vibrate**.
- Messages are sent to the brain which recognises the **vibrations** as sounds.



How do sounds change?

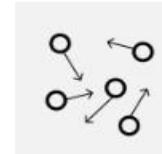
- Pitch:**
- The **pitch** of a sound is how **high** or **low** it is.
 - A squeak of mouse has a **high pitch**.
 - A roar of a lion has a **low pitch**.
- Volume:**

- **Liquids** can be poured.



What is a gas?

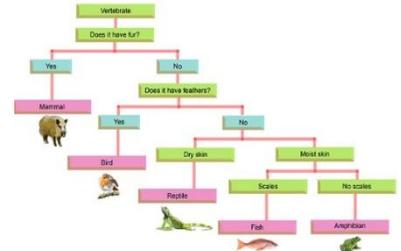
- In the **gas** state, **particles** can escape from open containers.
- **Gases** have **particles** which are spread out and move in all directions.



What happens to the **particles** in water when it is **heated** or **cooled**?

- When water (in its **liquid** form) is **heated**, the particles start to move faster and faster until they have enough energy to move about more freely. The water has **evaporated** into a **water vapour**.
- When water is **cooled**, the particles start to slow down until a solid structure (ice) is formed. The water has **frozen**.
- The **temperature** at which water turns to ice is called the **freezing point**. This happens at 0°C.

- A **classification key** is a tool that is used to group living things to help us identify them.

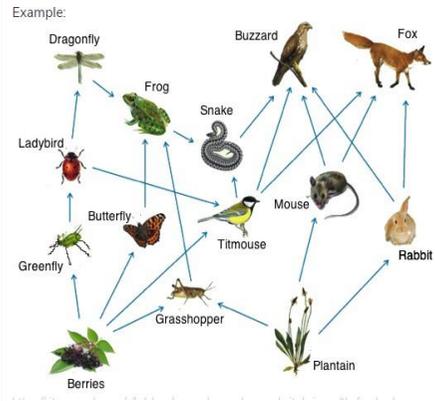


How can **environments** change?

- **Habitats** can change throughout the year and this can have an effect on the plants and animals that live there.
- Humans can have positive and negative effects on the environment:
- positive effects: nature reserves, ecological parks
- negative effects: litter, **urban** development

the **food chain**. The number of some species will increase, while the population of others will decrease.

- This can have a direct impact on the survival of the species.
- The population of **tertiary consumers** depends on healthy populations of **producers, primary and secondary consumers**.

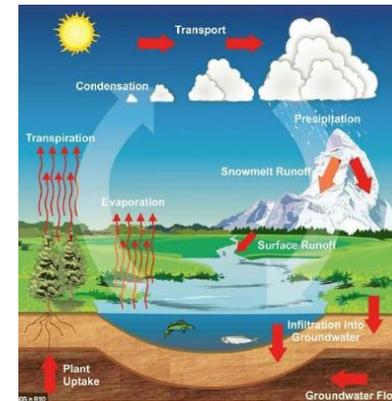


- The **volume** of a sound is how **loud** or **quiet** it is.
- When a sound is created by a little amount of **energy**, a weak **sound wave** is created which doesn't **travel** far. This makes a **quiet** sound.
- A small tap of a hammer is used with small amounts of **energy** and so creates a **quiet** noise.
- A **vibration** with lots of **energy** makes a powerful
- **sound wave** and therefore a **loud** sound.
- A powerful, smashing tap of a hammer is used with lots of **energy** and so creates a **loud** noise.

How do we measure sound?

- **Amplitude** measures how strong a **sound wave** is.
- **Decibels** measure how **loud** a sound is.
- **Frequency** measures the number of

What is the **water cycle**?



			times per second that the sound wave cycles.		
Subject Discipline	<ul style="list-style-type: none"> Investigate the amount of sugar in drinks and learn how sugar leads to an increase in plaque and how this destroys tooth enamel. Compare the teeth of carnivores, omnivores and herbivores. What do you notice? Match animals to their teeth and explain your reasons for this. Identify the parts of the digestive system and explain their functions Create a presentation to show how our food is digested. Match predators and their prey depending on their habitats. Create food chains for different habitats and compare them. How do the producers, predators and prey compare? What are their teeth like? Compare animal populations and explain why some populations (e.g. insects) might be higher than others (e.g. wolves) Explore what happens when part of a food chain is removed. Create food webs. Explore how the changing environment is having an impact on feeding relationships and food chains/webs. 	<ul style="list-style-type: none"> When objects are placed in the circuits, they may or may not allow electricity to pass through. Objects that are made from materials that allow electricity to pass through a create a complete circuit are called electrical conductors. Objects that are made from materials that do not allow electricity to pass through and do not complete a circuit are called electrical insulators. 	<ul style="list-style-type: none"> Fill identical jars with different volumes of water. Which one creates the highest pitch? Which material would make the best sound defender? How can you investigate this? Make musical instruments using different length strings. How do their pitches differ? 	<ul style="list-style-type: none"> Group materials according to their states. Explain the particle structure of solids, liquids and gases. Explore the effect of temperature on substances such as chocolate, butter, cream. Compare their melting points and place them in a table. Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. Observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting. Analyse and interpret different forms of data (tables, graphs) to show the effects of temperature on states of matter. Present what you know about the water cycle using a variety of skills using appropriate vocabulary (The Water Cycle Knowledge Organiser). Observe evaporation and condensation in action by using bowls of water and mirrors /glass (The Water Cycle Knowledge Organiser). 	<ul style="list-style-type: none"> Complete Venn diagrams to show if living things can be grouped into two or more groups. Use criteria to sort living things in a Carroll diagram. Sort vertebrate and invertebrate animals into groups, describing their key features. Use a classification key to identify which group of vertebrates animals belong to and then create your own. Sort plants into groups (e.g. flowering plants and non-flowering plants) and then create a classification key to help others identify plants. Carefully observe minibeasts in a microhabitat and use a classification key to identify them. Use simple computer software programmes to create a branching classification key. Explore examples of human impact (both positive and negative) on environments.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Key Vocab</p>	<ul style="list-style-type: none"> • absorb • canine • canine • carnivore • carnivore • classification key • decay • digestion • enamel • energy • environment • excretion • faeces • food chain • food web • habitat • herbivore • herbivore • incisor • incisor • ingested • intestines • life 	<ul style="list-style-type: none"> • microhabitat • molar • muscles • nutrition • oesophagus • omnivore • organ • organism • plaque • predator • prey • primary consumer • producer • secondary consumer • tertiary consumer • prey • primary consumer • process • processes • producer • saliva • secondary consumer • stomach • tertiary consumer 	<ul style="list-style-type: none"> • appliances • battery • bulb • buzzer • cell • circuit • component • conductor • current • device • electricity • energy • fuel • generate • insulator • mains • motor • power • source • switch • wires 	<ul style="list-style-type: none"> • amplitude • decibel • electricity • energy • frequency • medium • pitch • power • sound waves • source • transmit • travel • vibrations • volume 	<ul style="list-style-type: none"> • condensation • cooling • evaporation • freezing • freezing point • gas • heating • liquid • melting • melting point • particles • precipitation • process • properties • solid • temperature • vibrations • water cycle • water vapour 	<ul style="list-style-type: none"> • biomes • carnivore • classification key • criteria • deciduous • environment • evergreen • excretion • food chain • habitat • herbivore • invertebrate • life • processes • microhabitat • minibeast • nutrition • omnivore • organism • reproduction • respiration • sensitivity • urban • vegetation • vertebrate
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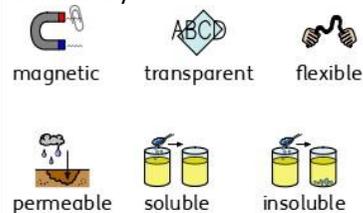
Science Subject knowledge, discipline and vocabulary



Year 5

Unit	Properties and changes of materials (Chemistry)	Living things and their habitats (Biology)	Forces (Physics)	Earth and Space (Physics)	Animals including Humans (biology)
Previous Learning	<ul style="list-style-type: none"> • A variety of everyday materials including wood, plastic, glass, metal, water and rock. • The physical properties of a variety of everyday materials (including those that are transparent) and to compare and group materials on the basis of these properties • How materials are suitably used based on their properties. • How magnets and electrical circuits work. • Some materials which are magnetic. • How shapes of solid objects can be changed by squashing, bending, twisting and stretching. • Materials that are solids, liquids and gases and their particle structure. • Some materials change state when they are heated or cooled and the temperature at which this happens. • The roles of melting, evaporation and condensation in the water cycle and the role temperature has on the rate of evaporation. • Some rocks are permeable. 	<ul style="list-style-type: none"> • Animals can be grouped into vertebrates (and then further into fish, reptiles, amphibians, birds and mammals) and invertebrates • Some examples of life cycles (including those of plants and humans) • The processes of dispersal, fertilisation and germination • Reproduction is one of the seven life processes. • Parts of a plant, their features and what their functions are. • The work of David Attenborough. • The word metamorphic means 'a change of form' (in the context of rocks) 	<ul style="list-style-type: none"> • Know what a force is and be able to explain that a push and pull are types of forces. • That when forces are applied to an object they allow them to move or stop moving. • The strength of the force determines how far and fast an object moves. • Friction is the resistance of motion when there is contact between two surfaces • The force that causes objects to move downwards towards the ground is gravity. • That magnets have poles, and that opposite poles attract, while similar poles repel. 	<ul style="list-style-type: none"> • We have four seasons (autumn, winter, spring and summer). • The Sun is a source of light but the Moon is not. • Know that a shadow is caused when an object blocks light from passing through it. • To know the history of space travel. • The properties of a sphere. 	<ul style="list-style-type: none"> • Animals can be grouped into vertebrates (and then further into fish, reptiles, amphibians, birds and mammals). • Some examples of life cycles (including those of plants and humans) • Reproduction and growth are two of the seven life processes. • How to live a healthy lifestyle.

How to group **materials** based on their **properties** using more complex vocabulary.



What are **thermal insulators** and **conductors**?

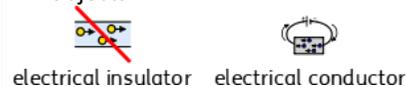
- **Materials** which are good **thermal conductors** allow heat to move through them easily.
- **Thermal conductors** are used to make items that require heat to travel through them easily, such as a saucepan which requires heat to travel through to cook food.
- **Thermal insulators** do not let heat travel through them easily.
- Examples of **thermal insulators** include woollen clothes and flasks for hot drinks.



- thermal insulator thermal conductor

What are **electrical insulators** and **conductors**?

- **Electrical conductors** allow electricity to pass through them easily while **electrical insulators** do not.
- **Electrical insulators** have a high **resistance** which means that it is hard for electricity to pass through these objects.



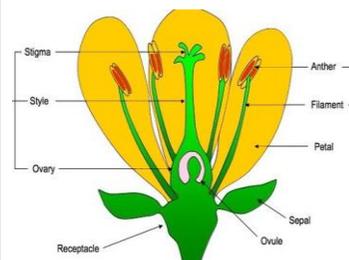
What is **dissolving**?

- When the **particles** of a **solid** mix with the

What is **reproduction**?

- **Reproduction** is when an animal or plant produces one or more individuals similar to itself:
- **Sexual reproduction**:
- requires two parents with **male and female gametes (cells)**
- will produce **offspring** that is similar to but not identical to the parent
- **Asexual reproduction**:
- will produce **offspring** that is identical to the parent
- requires only one parent

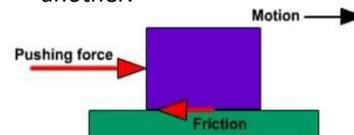
How do **plants reproduce**?



- Male **gametes** can be found in the **pollen**.
- Female **gametes** can be found in the **ovary** (they are called **ovules**).
- **Pollination** occurs when **pollen** from the **anther** is transferred to the **stigma** by bees and other insects.
- The **pollen** then travels down and meets the **ovule**. When this happens, **seeds** are formed - this is called **fertilisation**.
- **Seeds** are then **dispersed** so that **germination**

What are **forces**?

- **Forces** are pushes and pulls.
- These **forces** change the **motion** of an object.
- They will make it start to move or speed up, slow it down or even make it stop.
- For example, when a cyclist pushes down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves.
- When the cyclist pulls the brakes, the bike slows down and eventually stops.
- **Friction** is a **force** - it is the **resistance of motion** when one object rubs against another.



- Other forces that create resistance of motion include water resistance and air resistance.

What is **gravity** and **air resistance**?

- **Gravity** is the **force** that pulls objects to the centre of the Earth.
- **Air resistance** pushes up on the parachute, **opposing** the force of **gravity**. This makes the parachute land more slowly.

What causes day and night?

- The Earth **rotates** on its **axis** anti-clockwise and makes a complete **rotation** over 24 hours (a day).
- This makes it appear as the Sun moves through the sky but the Earth's **rotation** causes day and night.
- Different parts of the Earth experience daylight at different times - this means that it is morning, afternoon and night in different places. This is also the reason why we have **time zones**.
- Because of the Earth's tilt, the poles experience 24 hours of sunlight in the summer, and very few hours of sunlight in the winter.
- As the Earth **rotates**, **shadows** that are formed change in size and orientation.

Year length and the seasons

- The Earth takes 365 and a quarter days to **orbit** the Sun.
- Because of the extra quarter day it takes to **orbit** the Sun, every four years on Earth is a **leap year**!
- It is the Earth's tilt that causes the seasons.

What are the main stages of the human **life cycle**?

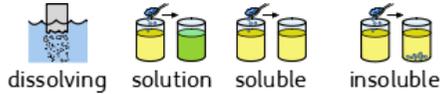
- **Foetus** – an unborn animal or human being in the very early stages of **development**.
- **New born** – this is a baby that has just been born.
- **Infancy** – This is a period of **rapid** change. Many **toddlers** learn to walk and talk at this stage.
- **Childhood** – children learn new things as they grow. They become more **independent**.
- **Adolescence** – This is when the body starts to change and prepare itself for **adulthood**. **Hormonal** changes take place over a few years. This is also known as **puberty**.
- Early **adulthood** – this is when humans are usually at their fittest and strongest.
- Middle **adulthood** - changes such as hair loss may happen. There are also some **hormonal** changes again and the ability to **reproduce** decreases.
- **Late adulthood** – there is a decline in fitness and strength.

What is **puberty**?

- **Puberty** is the change

particles of a **liquid**, this is called **dissolving**.

- The result is a **solution**.
- **Materials** that **dissolve** are **soluble**.
- **Materials** that do not **dissolve** are **insoluble**.



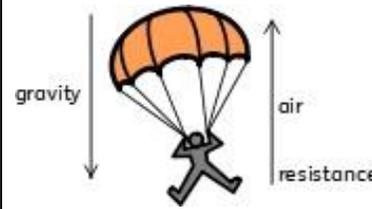
Can **materials** be separated after they have been mixed?

- Some **materials** can be separated after they have been mixed based on their **properties**- this is called a **reversible** change.
- Some methods of separation include the use of a magnet, a **filter** (for insoluble materials), a sieve (based on the size of the solids) and **evaporation**.
- When a mixture cannot be separated back into the original components, this is called an **irreversible** change. Examples of this include when materials burn or mixing bicarbonate of soda with vinegar.

- can begin again.
- Some **plants**, such as daffodils and potatoes, can also produce **offspring** using asexual **reproduction**.

What are examples of **life cycles**?

- The **life cycles** of mammals, birds, amphibians and insects have similarities and differences.
- One difference is that amphibians and insects go through the process of **metamorphosis**. This is when the structure of their bodies changes significantly as they grow (for example, from tadpole to frog or caterpillar to butterfly).

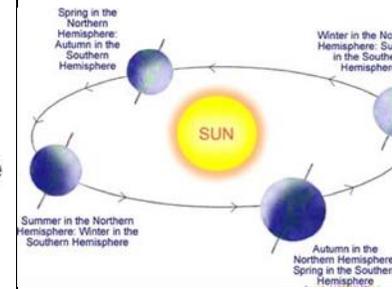


What is water **resistance**?

- Water **resistance** is the **friction** that is created between water and an object that is moving through it.
- Some objects can move through water with less **resistance** if they are **streamlined**.

What are examples of **mechanisms**?

- **Levers** allow us to do heavy work with less effort. For example, trying to pick up a large heavy box is difficult, however if a **lever** is used it becomes much easier to move it.
- **Pulleys** also allow us to do heavy work - objects are attached to ropes and **pulley** wheels, and so instead of lifting heavy object upwards, we can pull on the **pulley** rope downwards.
- **Gears** are toothed wheels. Their 'teeth' can fit into each other so that when the first wheel turns, so does the next one. This allows **forces** to move across a **surface**.



The Moon

- The Moon **orbits** the Earth anticlockwise and takes approximately 28 days.
- The Moon spins once on its **axis** every time it **orbits** Earth. This means that we only see one side of the Moon.
- The Moon has different phases depending on where it is in its **orbit**.
- The Moon's **gravity** causes high and low tides.

What is the **solar system**?

- There are 8 planets in our Solar System (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune). Pluto is a dwarf **planet**.
- They all orbit the Sun, which is a **star**, and they all have moons.
- The first four **planets** are relatively small and rocky, while the four outer **planets** are gas giants (Jupiter and

that happens in late childhood and **adolescence** where the body starts to change because of **hormones**.

- Some changes include **growth** in height, more sweat, hair **growth** on arms and legs, under the armpits and on **genitals**, and **growth** in parts of the body such as male **genitals** and breasts.
- Females begin to **menstruate**.

			<ul style="list-style-type: none">• Springs can be stretched by pulling them or squashed by pushing them. The greater the force pulling or pushing the spring, the greater the force the spring uses to move back to its normal shape.	<p>Saturn) or ice giants (Uranus and Neptune).</p> <ul style="list-style-type: none">• There are also asteroids, meteoroids and comets in the Solar System.• The Solar System is in a galaxy called the Milky Way.• The galaxy is in the universe.	
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Subject Discipline</p>	<ul style="list-style-type: none"> • Find the best material to stop an ice cube from melting. Remember to keep it a fair test by using the same number of ice cubes, or same size and thickness material. • Place the same amount of a hot liquid in a thermal insulator and conductor. Measure the temperature over time and plot these on the same line graph. Use the line graph to ask and answer questions. • Find out if thermal conductors also make good electrical conductors. • Explain the difference between dissolving and melting. • Investigate which materials are soluble and insoluble. • Design an experiment that investigates dissolving - consider which variables you could change including: size of beaker, amount of liquid, number of stirs, size of solid, temperature of solid (remember that for a fair test all other variables must remain the same). • Create a variety of mixtures using materials such as salt, sand, water, paper clips and rice and use a variety of methods to separate them. • Observe and compare the changes that take place when cakes are baked or bicarbonate of soda mixes with vinegar. 	<ul style="list-style-type: none"> • Dissect a flower and identify the different parts of it. Label the different parts and explain their functions. • Grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. • Compare the life cycles of mammals, amphibians, insects and birds. What is similar about their life cycles? What is different? • Observe life cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. • Compare the life cycles of plants and animals in the local environment with other plants and animals (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. • Observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. • Compare what you already know about David Attenborough, and compare his work to that of Jane Goodall's. 	<ul style="list-style-type: none"> • Investigate the amount of friction created by different surfaces. Use measures (such as length and time) to show how far or fast and object travels. • Draw diagrams to show how objects move down ramps, through the air and through water, using arrows to show the direction of the forces. • Explore the effects of friction on motion and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel • Provide examples of when friction is useful. • Investigate how surface area affects air resistance and explain the relationship between them. • Make parachutes to investigate how air resistance works. Ensure that only one variable is changed while other variables stay the same. Variables may include the objects attached to the parachute, shape of parachute, size of parachute, length of string attached to the object, height of drop, material of parachute. Explain why this is necessary in an experiment. • Explore resistance in water by making and testing boats of different shapes • Design and make products 	<ul style="list-style-type: none"> • Compare the time of day at different places on Earth. • Construct shadow clocks and sundials. • Keep a Moon diary over the course of a month - what do you notice? 	<ul style="list-style-type: none"> • Research the gestation periods of other animals and comparing them with humans • Collect data around school about height and hand span of different age ranges of pupils. Record the mean, mode and median height of pupils of different ages. Create a graph summarising results. • Create a life story for a fictitious adult that has made healthy life choices. • Compare the growth pattern of humans to other animals. • Consider why humans take so long to learn to walk in comparison to other animals. • Create a Venn diagram to show what the similarities and differences are between children, adolescents and adults.
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			that use levers, pulleys, gears and/or springs and explore their effects		
Key Vocab	<ul style="list-style-type: none"> • circuit • condensation • conductor • dissolves • electricity • evaporation • filtering • flexible • gas • insoluble • insulator • irreversible • liquid • magnetic • melting • particles • permeable • process • properties • rate • resistance • reversible • solid • soluble • solution • state • temperature • thermal • transparent • variable • water cycle 	<ul style="list-style-type: none"> • anther • bulb • cell • dispersed • dissect • embryo • fertilisation • flower • flowering • function • gamete • germination • life cycle • mature • metamorphosis • ovary • ovule • petal • plant • pollen • pollination • reproduction • seed • stigma • structure 	<ul style="list-style-type: none"> • attract • friction • force • gear • gravity • lever • motion • opposite • pulley • repel • resistance • spring • streamlined • surface 	<ul style="list-style-type: none"> • asteroid • axis • comet • galaxy • gravity • leap year • meteorite • orbit • planet • shadow • Solar System • sphere • spin • star • time zones • universe 	<ul style="list-style-type: none"> • adolescence • adulthood • development • foetus • genitals • gestation • growth • hormones • independent • infancy • life cycle • life • processes • mature • menopause • menstruation • offspring • organ • puberty • rapid • reproduction • toddler • vertebrate

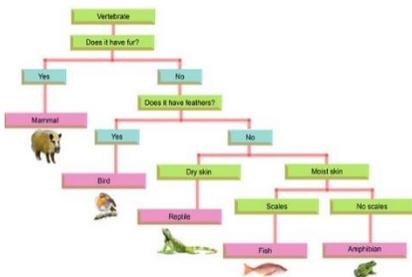


Science Subject knowledge, discipline and vocabulary

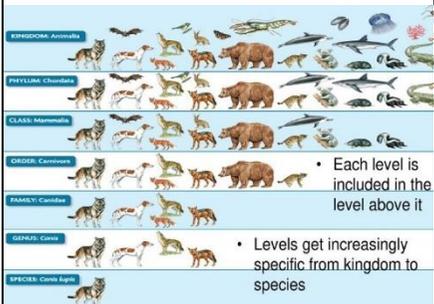
Year 6

Unit	Living things and their habitats (Biology)	Light (Physics)	Evolution and inheritance (Biology)	Electricity (Physics)	Animals including Humans (biology)
Previous Learning	<ul style="list-style-type: none"> Animals can be grouped into carnivores, herbivores and omnivores. They can also be grouped into vertebrates and invertebrates. Organisms can be classified and we can use a classification key to identify them. Examples of habitats (including microhabitats) and the organisms that can be found there. Living things depend on each other to survive. How environments are changing. The relationships between predators and prey. Food chains demonstrate the direction in which energy travels. How organisms have adapted and evolved over time. 	<ul style="list-style-type: none"> Certain things produce light, usually by burning (e.g. the Sun) or electricity (e.g. street lights) Shiny materials do not make light but do reflect it. Shadows are caused when certain materials block light. Light travels in straight lines. When light is blocked by an opaque object, a dark shadow is formed. The further away the light source is, the smaller the shadow is. The closer the source of the light, the bigger the shadow. 	<ul style="list-style-type: none"> Which things are living and which are not. Identifying animals (e.g. amphibians, reptiles, birds, fish, mammals, invertebrates) and plants using classification keys Animals that are carnivores, herbivores and omnivores. Animals have offspring which grow into adults. The basic needs of animals for survival (water, food, air) Some animals have skeletons for support, protection and movement. Food chains, food webs and the role of predators and prey. Features of habitats and the animals and plants that exist there (biodiversity) . Examples of different biomes The life cycle of some animals and plants Sometimes environments can change and this has an effect on the plants and animals that exist there Living things breed to produce offspring which grow into adults. This is called reproduction. The role of Mary Anning in palaeontology and the discovery of fossils. The features of some rocks and the role they play in the formation of fossils 	<ul style="list-style-type: none"> Electricity is a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for devices. Sources of light and sound may need electricity to work. Where electricity comes from Which appliances need electricity What a circuit is, the components of a circuit and how it works. What electrical conductors and insulators are. What happens when a switch is added to a circuit. What forces and resistance are. 	<ul style="list-style-type: none"> Which things are living and which are not. Classification of animals (e.g. amphibians, reptiles, birds, fish, mammals, invertebrates) Animals that are carnivores, herbivores and omnivores. Animals have offspring which grow into adults. The basic needs of animals for survival (water, food, air) The importance of exercise, hygiene and a balanced diet. Animals get nutrition from what they eat. Some animals have skeletons for support, protection and movement. The basic parts of the digestive system. The different types of teeth in humans. Respiration is one of the seven life processes. The life cycle of a human and how we change as we grow.

- Living things can be grouped according to different **criteria** (where they live, what type of **organism** they are, what features they have). For example, a camel can belong in a group of **vertebrates**, a group of animals that live in the desert, and a group of animals that have four legs.
- A **classification key** is a tool that is used to group living things to help us identify them using recognisable **characteristics**.



- The Linnaean system, named after Carl Linnaeus, has different levels where the number



of living things in each group gets smaller and smaller, until there will just be one type of animal in the **species** group.

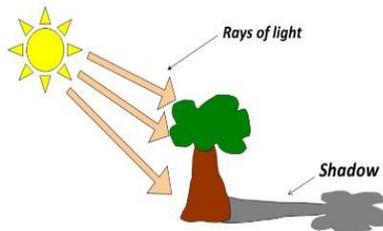
What are **microorganisms**?

How does **light** travel?

- Light** travels in a straight line.
- When you place a torch on a table in a **dark** room, the beam travels in a straight line.
- Reflection** is when **light** bounces off a surface - this changes the direction in which the **light** travels.

What is the relationship between **light sources** and **shadows**?

- Because **light** travels in straight lines, when there is an **opaque** object blocking the **light**, a **shadow** is formed.
- These **shadows** have the same shape as the objects that cast them.



- The size of a **shadow** changes as the **light source** moves.

What is **evolution**?

- Evolution** is a process of change that takes place over many **generations**, during which **species** of animals, plants, or **insects** slowly change some of their physical **characteristics**. This is because **offspring** are not identical to their parents.
- It occurs when there is competition to **survive**. This is called **natural selection**.
- Difference within a **species** (for example between parents and **offspring**) can be caused by **inheritance** and **mutations**.
- Inheritance is when **characteristics** are passed on from generation to the next.
- Mutations** in **characteristics** are not **inherited** from the parents and appear as new **characteristics**.

How do we know about **evolution**?

- Evidence of **evolution** comes from **fossils** - when these are compared to living creatures from today, **palaeontologists** can compare similarities and differences.
- Other evidence comes from living things - comparisons of some **species** may reveal common **ancestors**.

What is **adaptation**?

- Adaptation** is when animals and plants have **evolved** so that they have **adapted** to **survive** in their **environments**. For example, polar bears have a thick layer of blubber under their fur to **survive** the cold, harsh **environment** of the Arctic while giraffes have long necks to reach the leaves on trees.
- Some **environments** provide challenges yet some animals and plants have **adapted** to **survive** there
- Sometimes **adaptations** can be

What will make a bulb brighter or a buzzer louder?

- More **batteries** or a higher **voltage** create more power to flow through the **circuits**.
- Shortening the wires means the **electrons** have less **resistance** to flow through.

What will make a **bulb** dimmer or a **buzzer** quieter?

- Fewer **batteries** or a lower voltage give less power to the **circuit**.
- More **buzzers** or **bulbs** mean the **power** is shared by more components.
- Lengthening the wires means the **electrons** have to travel through more **resistance**.

Series Circuit

- A **circuit** that has only one route for the **current** to take. If more **bulbs** or **buzzers** are added, the **power** has to be shared and so they will be **dimmer** or quieter. If just one part of this series circuit breaks, the **circuit** is broken and the flow of **current** stops.

What is the **circulatory system**?

- The **circulatory system** is made of the **heart**, **lungs** and the **blood vessels**.
- Arteries** carry **oxygenated** blood from the **heart** to the rest of the body.
- Veins** carry **deoxygenated** blood from the body to the **heart**.
- Nutrients**, **oxygen** and **carbon dioxide** are exchanged **via** the **capillaries**.

Choices that can harm the **circulatory system**

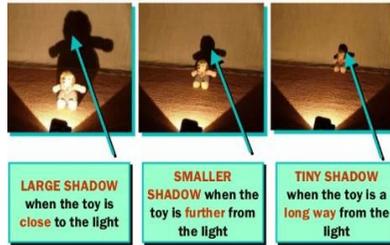
- Some choices, such as smoking and drinking alcohol can be harmful to our health.
- Tobacco can cause short-term effects such as shortness of breath, difficulty sleeping and loss of taste and long-term effects such as lung disease, cancer and death
- Alcohol can cause short-term effects such as addiction and loss of control and long-term effects such as **organ** damage, cancer and death

Why is exercise so important?

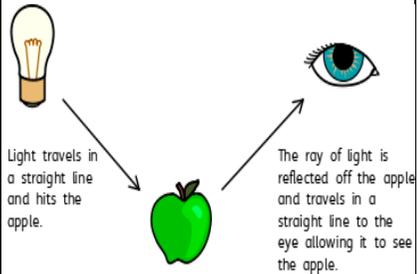
Exercise can:

- tone our muscles and reduce fat
- increase fitness
- make you feel physically and mentally healthier

- **Microorganisms** are very tiny **organisms** where a microscope has to be used to see them.
- Examples of **microorganisms** include dust mites, bacteria and fungi, such as mould.
- Some **microorganisms** can be helpful in certain situations. Others can be harmful, and their spread needs to be controlled or contained.



How do we see?



disadvantageous. One example of this can be the dodo, which became **extinct** as it lost its ability to fly through **evolution**. Flying was unnecessary for the dodo as it had lived for so many years without predators, until its native island became inhabited.

- When **adaptations** are more harmful than helpful, these are called **maladaptations**.

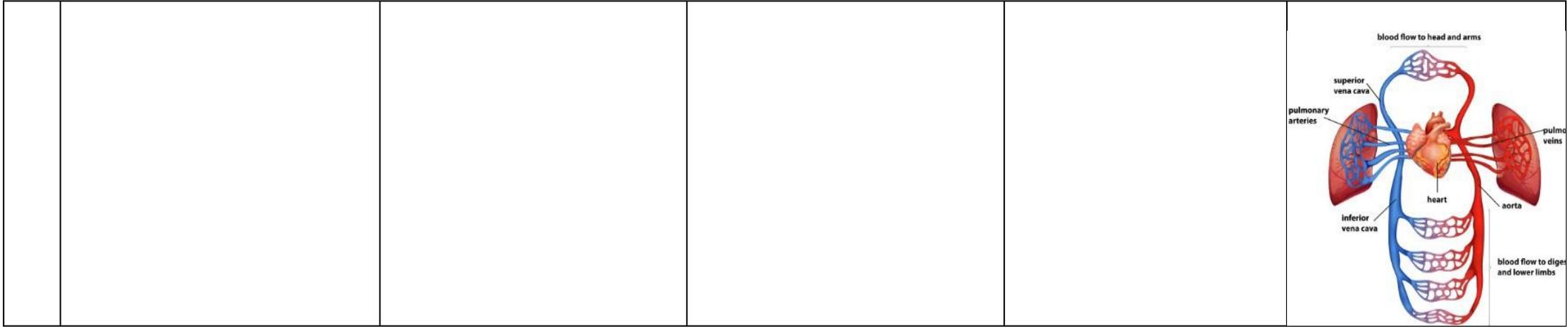
- strengthens the **heart**
- improves **lung** function improves skin

The Heart

- The **heart** is composed of four chambers; the right **atrium**, the right **ventricle**, the left **atrium** and the left **ventricle**.
- How often your **heart** pumps is called your **pulse**.

The Circulatory System

1. The right **atrium** collects the **deoxygenated** blood from the body, **via** the **vena cava**. It sends the blood to the right **ventricle**.
2. The right **ventricle pumps** the **deoxygenated** blood to the **lungs**. Here the blood picks up **oxygen** and disposes of **carbon dioxide**.
3. The **lungs** send **oxygenated** blood back to the left **atrium** which pumps it to the left **ventricle**.
4. The left **ventricle** pumps the blood to the rest of the body, **via** the **aorta**.



<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Subject Discipline</p>	<ul style="list-style-type: none"> Sort vertebrate and invertebrate animals into groups, describing their key features. Use a classification key to identify which group of vertebrates animals belong to and then create your own. Explore the different ways in which invertebrates can be classified (e.g. arachnids, insects, molluscs). Describe some organisms that may be difficult to classify (e.g. platypus) and explain why. Use simple computer software programmes to create a branching classification key. Sort scenarios where microorganisms might be helpful (e.g. yeast in baking) or harmful; (e.g. infectious diseases). Use classification systems and keys to identify some organisms in the immediate environment. Record these in a variety of ways (e.g. Venn and Carroll diagrams, tables) Research unfamiliar organisms from a broad range of other habitats and decide where they belong in the classification system. Research the work of Carl Linnaeus. 	<ul style="list-style-type: none"> What happens when light is reflected from different surfaces? What happens when light is reflected from a mirror? What happens when the angle of the mirror (or light source changes?) Draw diagrams to show how light travels and what happens when light is reflected from a mirror. Draw diagrams to show how we see. Design an experiment to measure shadow length by changing a variable. Show your results in a line graph to show the relationship between distance of light source and shadow length. Explain your findings using scientific vocabulary. Create shadow puppets to show how light travels and to demonstrate that a shadow has the same shape as the object that casts them. Make a periscope and explain how it works using diagrams and scientific vocabulary. Use the idea that light appears to travel in straight lines to explain how it works. Research how mirrors are used in different contexts (e.g. rear view mirrors, on a dangerous bend) and explain why and how they work. Explain why objects look bent in water. Explore different contexts in which light travels including 	<ul style="list-style-type: none"> Research the work of Charles Darwin and Alfred Russel Wallace. Create a fact file of an animal or plant identifying how it has adapted to its environment and how it has evolved to survive. Create a new planet and describe the environmental features. What animals and plants can live there? How have they adapted to survive? 	<ul style="list-style-type: none"> Match circuit symbols to their meanings and their words. Predict, then investigate what happens when more batteries are added to a circuit. Explain why this happens. Predict, then investigate what happens when more bulbs, motors are added to a circuit. Explain why this happens. Systematically identify the effect of changing one component at a time in a circuit. Use circuit symbols when representing a simple circuit in a diagram. Design and make a set of traffic lights, a burglar alarm or some other useful circuit. Investigate what happens when the voltage of the battery changes. Investigate what happens when the length of the wires changes. Investigate what happens when you add a resistor to a circuit. Use ammeters to measure the current in a circuit. 	<ul style="list-style-type: none"> How does your pulse change with exercise? What is the most efficient way of presenting this data? Which exercise produces the fastest pulse? How would you make this a fair test?
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		rainbows, colours on soap bubbles and coloured filters.			
Key Vocab	<ul style="list-style-type: none"> • adaptation • carnivore • characteristics • classification key • criteria • energy • environment • evolution • food chain • habitat • herbivore • invertebrate • microhabitat • microorganism • minibeast • omnivore • organism • predator • prey • species • vertebrate 	<ul style="list-style-type: none"> • angle • dark • dim • electricity • emits • light • mirror • opaque • reflects • shadows • source • surface • torches • translucent • transparent 	<ul style="list-style-type: none"> • adaptation • ancestor • biodiversity • biome • breeding • characteristics • environment • evolution • extinct • fossil • generation • inherit • maladaptation • mutation • natural selection • offspring • palaeontology • reproduction • species • survive • theory • variation 	<ul style="list-style-type: none"> • appliances • battery • bulb • buzzer • cell • circuit • component • conductor • current • device • electricity • energy • fuel • generate • insulator • mains • motor • power • resistance • resistor • source • switch • voltage 	<ul style="list-style-type: none"> • aorta • arteries • atrium • blood • vessels • capillaries • carbon dioxide • circulatory system • deoxygenated • heart • lungs • nutrients • organ • oxygen • oxygenated • pulse • respiration • veins • vena cava • ventilation • ventricle • via