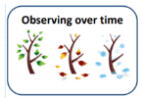
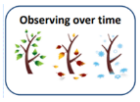
Science Scheme of Work

Perranporth C P School

Year 5 Autumn Term

	AUTUMN 1st Half	Autumn 2nd Half
Science (All NC subject content covered)	**Properties and Changes of Materials** **Pupils should be taught to:** • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda **Working Scientifically (WS):** During year 5, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	**Researching Real Life Scientists** 
WS opportunities	         	

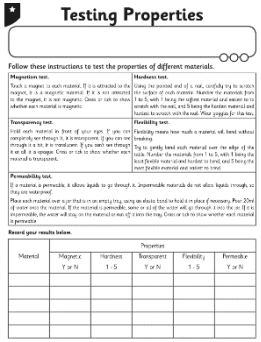
Key questions / knowledge and understanding to be explained
Key Knowledge and facts to be recalled

1. **What do we know now? KWL or mind-map activity of children's current knowledge.**

2. **I can explain properties of a range of materials**

Any substance that is used to make something is a material. Natural materials such as stone, wood and cotton are used or worked with in the way they are found in nature. Synthetic or human-made materials are made from natural materials but are altered with the help of heat or chemicals. Some examples include plastics, polyester, and Kevlar.

The words used to describe a material are known as its **properties**. Each material has its own set of properties. These properties make different materials useful for different purposes. It is useful to know properties of different materials because if you know the properties of a material, you can then choose the best material for a purpose.


Testing Properties

Follow these instructions to test the properties of different materials.

Magnetism test.
Touch a magnet to each material. If it is attracted to the magnet, it is a magnetic material. If it is not attracted to the magnet, it is not magnetic. Cross or tick to show whether each material is magnetic.

Hardness test.
Using the pointed end of a nail, carefully try to scratch the surface of each material. Number the materials from 1 to 5, with 1 being the softest material and easiest to scratch with the nail, and 5 being the hardest material and hardest to scratch with the nail. Write answers for this test.

Transparency test.
Hold each material in front of your eyes. If you can see completely see through it, it is transparent. If you can see through it a bit, it is translucent. If you can't see through it at all, it is opaque. Cross or tick to show whether each material is transparent.

Flexibility test.
Flexibility means how much a material will bend without breaking.
Try to gently bend each material over the edge of the table. Number the materials from 1 to 5, with 1 being the least flexible material and hardest to bend, and 5 being the most flexible material and easiest to bend.

Permeability test.
If a material is permeable, it allows liquids to go through it. Impermeable materials do not allow liquids through, so they are waterproof.
Place each material over a jar that is in an empty tray, using an elastic band to hold it in place if necessary. Pour 20ml of water onto the material. If the material is permeable, some or all of the water will go through it into the jar. If it is impermeable, the water will stay on the material or run off it into the tray. Cross or tick to show whether each material is permeable.

Record your results below.

Material	Properties					
	Magnetism Y or N	Hardness 1 - 5	Transparent Y or N	Flexibility 1 - 5	Permeable Y or N

WS activity opportunity

Children to develop investigations to test the properties of a range of materials. Children should be driven to test in the following areas:

- magnetism;
- hardness;
- transparency;
- flexibility;
- permeability.

Children create their own question to investigate and use the template recording sheet to record results and develop appropriate conclusions about each material's properties and what it may, therefore, be used for.

3. **I can investigate thermal conductors and insulators.**

Thermal Conductors

Heat can travel easily through thermal conductors. Metals are good thermal conductors, as they allow heat to move through them. Thermal conductors are used to make items that need heat to travel through them, like a pan or a radiator.

Thermal Insulators

Thermal insulators do not let heat travel through them easily. Some fabrics, wood and plastics are good thermal insulators. Thermal insulators can keep heat out or in. For example, a vacuum flask stops heat from the air travelling through to the food or drink inside, keeping it cool. A coat stops the heat from your body travelling through to the air outside, keeping you warm.

Heat always travels from a warmer area to a cooler one.

Children to develop their own investigation to mee the needs of the brief below:

1. **Initial thoughts –** present children with a photograph of each scientist. Children to make notes on who **Initial thoughts** – present children with a photograph of each scientist. Children to make notes on who they think the people are and what they may do. Elicit that each is a scientist and explain their links to our science learning.

2. (a) Scientist 1

David Attenborough was born in London in 1926. He has two brothers: Richard, the oldest, and John, the youngest. David is the middle brother. As a child, he loved collecting fossils, stones, and other natural specimens, displaying these in a *museum* he created. During the Second World War, Attenborough's family adopted two Jewish refugee girls from Europe. Attenborough won a scholarship to Cambridge University in 1945 to study geology and zoology, although in 1947 he was called up for two years National Service in the navy. Attenborough married Jane Elizabeth Ebsworth Oriel in 1950 and they had two children. In 1952, he started to work for the BBC (even though he didn't own a television at this time. The first programme he presented was called *Animal Pattens*, where he described the camouflage of a variety of animals from London Zoo. Attenborough became controller of BBC2 in 1965 but didn't like the fact it stopped him making programmes, so he resigned in 1971. **Life on Earth,** Attenborough's first major success on television was broadcast in 1979. He has since made many inspiring wildlife documentaries for the BBC, including **Blue Planet, Planet Earth, Frozen Planet and Seven Worlds, One Planet.** He is now a well-respected expert on all things natural on our planet and has given his support to those fighting for action on climate change.

2. (b) Scientist 2

On the 20th of July 1969, the Apollo 11 spacecraft landed on the Moon. Inside the spacecraft were astronauts including Neil Armstrong and Buzz Aldrin. **Margaret Hamilton**, born on 17th August 1936, in Paoli, Indiana, U.S. A., was the expert who ensured they got there safely! Hamilton worked at NASA and was responsible for programming the on-board flight software on the Apollo computers. She wrote the code that the computer used to navigate from Earth to the Moon and made sure that the computer would land the spacecraft safely on the surface of the Moon. Coding was not well known at this time and many people did not think computers could safely help the missions to space.

A moment that Hamilton has described as one of her biggest successes is the moment the Apollo 11 spacecraft landed on the Moon:

"A radar had been mistakenly switched on, so the computer was receiving too much information. It could not land safely while this was happening."

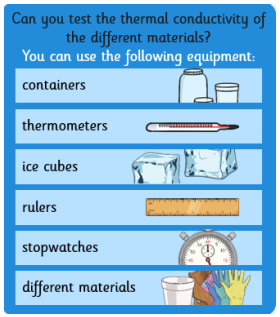
Since then, when reflecting on her huge achievements, she has said:

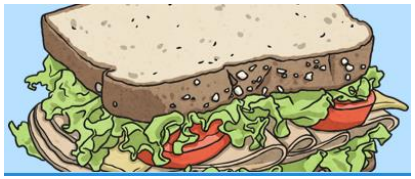
"We had to find a way and we did. Looking back, we were the luckiest people in the world; there was no choice but to be pioneers."

Margaret Hamilton worked on every one of the Apollo manned flights and several unmanned ones. Her work in computer engineering set the standard for the use of computers in space travel. Her work made many future space missions, and other forms of flight, possible.

2. (c) Scientist 3

The Brilliant Bags Company want to make a new lunch box for children to bring their packed lunches to school in. Food will be stored in the lunch box for quite a long time – probably all morning. They want to make sure the lunch box keeps the children's lunches cool and fresh, so they need to think about the best material to use to make the inner lining of the lunch box.

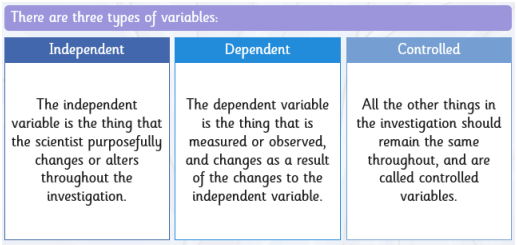


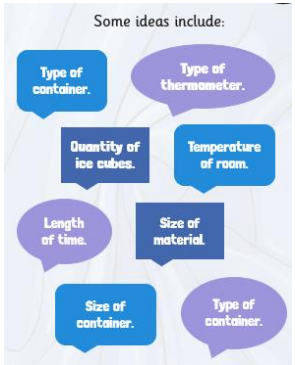


Thermal conductors will let heat through and make the food warm up quickly.
Thermal insulators will stop the heat getting through and keep the food cool for longer. Children will need to set up a comparative investigation to test the different materials to see if they conduct heat or insulate from it.

Children could wrap the different materials around the containers, and then fill them with the ice cubes. Any material which stops heat from the outside getting through will keep the ice cubes solid for longer. These materials are thermal insulators. **By checking the temperature of the containers at intervals of time, children will be able to see which materials allow heat from the surroundings through easily. These materials will cause the ice to melt quicker. They are thermal conductors.**

To consider for this session:
When setting up investigations, scientists have to consider the variables of each experiment. A variable is any factor or condition that will change or can be changed in the investigation.





Stephanie Kwolek was born in 1923 in Pennsylvania, USA. Kwolek's father, who died when she was ten, was interested in science and passed this interest on to his daughter, who left university aged 23 with a degree in chemistry. After nine years of research work, Kwolek made her breakthrough, discovering **Kevlar**. Her pathway to this discovery began a year earlier, when she began looking for a new, lightweight plastic to be used in car tyres. The idea was that lighter tyres would allow vehicles to enjoy better fuel economy.

Not only did Kevlar find use in tyres, its combination of lightness and strength has seen it used in a large variety of protective clothing applications, such as bulletproof vests, which have saved the lives of countless police officers and other people. In addition, Kevlar has been included in the manufacture of protective gloves, diving equipment, boots, helmets and fireproof clothing.

Speaking about her discovery, Stephanie Kwolek, *"I don't think there's anything like saving someone's life to bring you satisfaction and happiness."*

3. (a) Preparing to present - what have we found out? What surprised you? Each pair of children given one of the five scientists to develop their knowledge into an oral presentation.

3. (b) Presenting our findings – children present their research to another pair of children in class.

4. What have we learnt about each scientist? How is their research linked? What do we know now that we didn't know in lesson 1?

4. I can investigate which electrical conductors make a bulb shine brightest.

Electricity can travel easily through electrical conductors, but some materials do not let electricity pass through them. These are known as electrical insulators.

Share the following webpage and video with the children on electrical conductors and insulators (link in scientist picture).

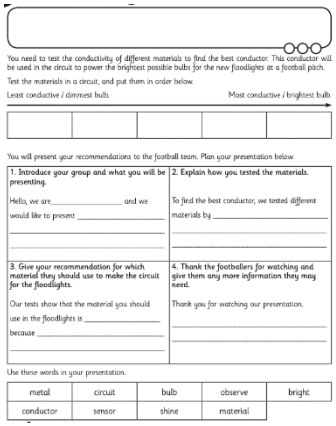
Conductors and Resistance

Some conductors make it easier for electricity to pass through them than others. All materials have some electrical resistance. Resistance is the opposition to the flow of electricity through a material. Electrical insulators have a very high resistance, and it is very hard for electricity to travel through these objects.

Electrical conductors have very low resistance, and it is very easy for electricity to pass through them. Different conductors have different levels of resistance, so even though they can all conduct electricity, some allow electricity to flow through easier than others.

WS investigation opportunity

Provide the children with the scenario below (adjust to a different idea to suit cohort interests).



You need to test the conductivity of different materials to find the best conductor. This conductor will be used in the circuit to power the brightest possible bulbs for the new floodlights at a football pitch.

Test the materials in a circuit, and put them in order below.

Least conductive / dimmest bulb → Most conductive / brightest bulb

You will present your recommendations to the football team. Plan your presentation below.

1. Introduce your group and what you will be presenting. Hello, we are _____ and we would like to present _____	2. Explain how you tested the materials. To find the best conductor, we tested different materials by _____
3. Give your recommendation for which material they should use to make the circuit for the floodlights. Our tests show that the material you should use in the floodlights is _____ because _____	4. Thank the footballers for watching and give them any more information they may need. Thank you for watching our presentation.

Use these words in your presentation.

metal	circuit	bulb	observe	bright
conductor	sensor	shine	material	

A football team need new floodlights to illuminate their football pitch for evening games.

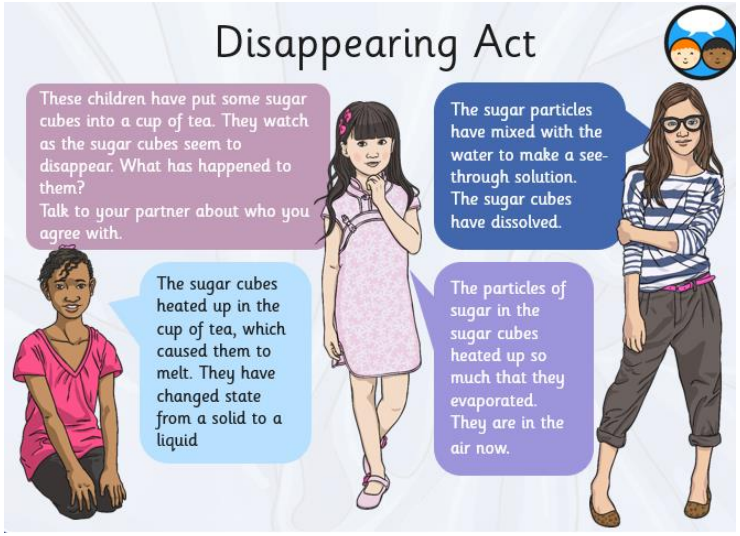
They need to find the best conductors for the circuits in their lights, so that the bulbs in the lights shine as brightly as possible.

They want you to investigate the best electrical conductors and present your recommendation for which material they should use.

Children will test different materials in a circuit to see which ones conduct electricity best. Children will be able to tell which conductors are the best as they will make the bulb light up the brightest. Children could observe the bulb each time to see how bright it is or could measure the light levels using a light sensor (if we have them). **Ask D CROCKER about iPad apps!**

5. I can investigate materials which will dissolve.

Initiate lesson by asking children to explain their thinking on the 'concept cartoon' below:



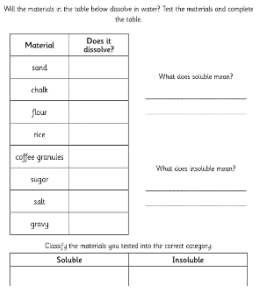
The concept explained: Dissolving occurs when the particles of certain solids mix with the particles of certain liquids. When a material dissolves, it looks like it disappears. But it has just dissolved in the liquid to make a transparent solution. A solution is formed when a solid dissolves in a liquid. Not all solids will dissolve, and not all liquids will allow solids to dissolve. When you mix sugar with water, the sugar dissolves to make a transparent solution.

Many people get confused between dissolving and melting, but there are several important differences:

Dissolving

- Dissolving involves a liquid and another material, often a solid.
- In dissolving, the solid mixes into the liquid to make a new liquid, called a solution.
- Dissolving doesn't need heat to occur.

Melting


Will the materials in the table below dissolve in water? Test the materials and complete the table.

Material	Does it dissolve?
sand	
chalk	
flour	
rice	
coffee granules	
sugar	
salt	
gravy	

What does soluble mean?

What does insoluble mean?

Classify the materials you tested into the correct category.

Soluble	Insoluble

- Melting involves only a solid.
- In melting, the solid changes into a liquid that is the same material.
- Melting needs heat to occur.

Materials that will dissolve are known as **soluble**. Materials that won't dissolve are **insoluble.**

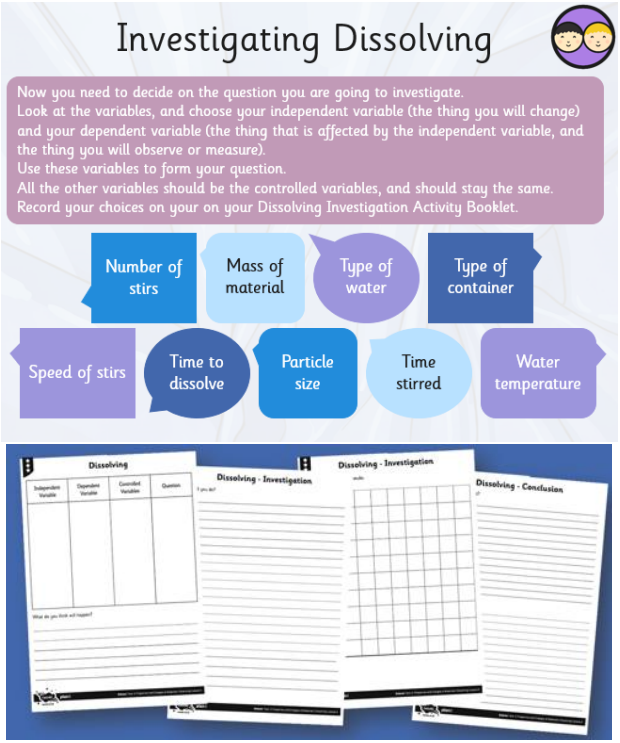
WS Investigation Opportunity

Children work in pairs to find out which materials are soluble, and which are insoluble.

Children will mix a teaspoonful of each material with 50ml of water.

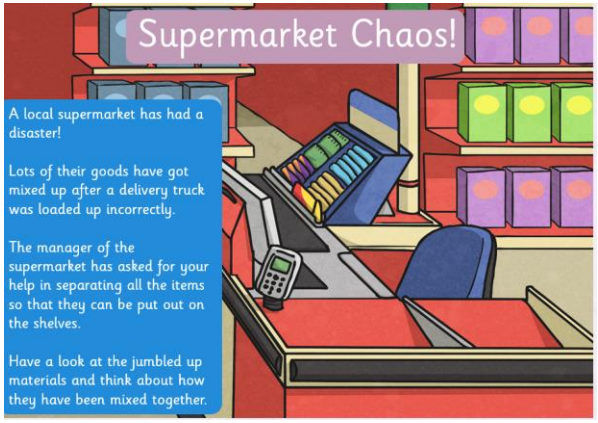
If the material does dissolve, the water will be transparent. It may have changed colour but will be see through. You will not see the particles of solid anymore. If the material does not dissolve, you will still see the particles of the solid in the water.

Variables to consider:



6. WS INVESTIGATION I can use different processes to separate mixtures of materials

*adapt the scenario given below to fit with your own interests if you like!



- Several water bottles have leaked into a bag of play sand.
- A bag of salt has split open, and the salt has mixed with some water from the water bottles.
- Raisins have poured out of their boxes into the bags of flour.

- Some boxes of paper clips have spilled into the bags of rice.

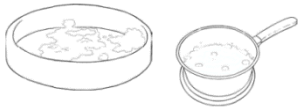
Ensure children can explain the different mixtures as shown below:

Since each of these mixtures of materials has been mixed differently, children will need to use different processes to separate them. Encourage children to think about ways they could separate them.

Introduce the four processes they will use:

Process 1 - Evaporation

Boil the mixture, or leave it for a few days, so the liquid evaporates leaving the solid behind.



Process 2 – Magnetic Attraction

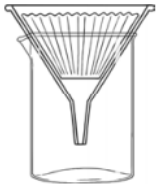
Use a magnet to attract any magnetic materials and remove them from the mixture.

Process 3 – Filtration

Line a funnel with filter paper and place it over a beaker. Pour the mixture slowly into the filter paper. The liquid will get through and any insoluble solids will be caught in the filter paper.

Process 4 – Sieving

Pour the mixture through a sieve held over a bowl. The smaller particles will fall through into the bowl and the larger particles will remain in the sieve.



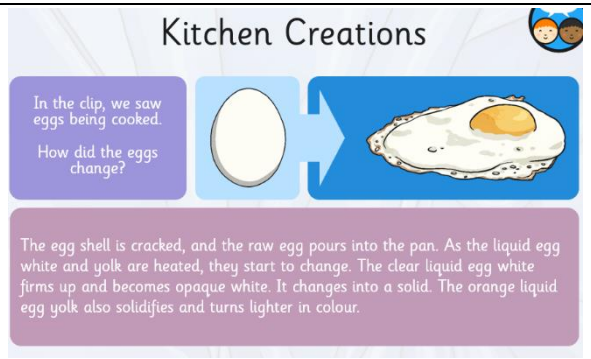
Elicit the method that will work for each mixture (this can be done through the children's discussions, independently, or as a whole class before the investigation starts.

Children complete their investigation and are then shown the image below to test their skills – which method would work for the scenario below?

7. I can identify and explain irreversible chemical changes.

Start the lesson by showing the video below and asking the children to discuss its content:

Chemical reactions are useful in cooking and help to improve the taste of food. Cooking and chemistry have quite a bit in common. The starting materials in a chemical reaction are called the reactants. These react with each other to form a completely new substance known as the product. Products have very different properties to the reactants. Cakes are firmer and taste better than the individual reactants. The colour is different too. Not all chemical reactions need heat energy to make them happen. When bicarbonate of soda and vinegar are mixed, the chemical reaction produces a gas.



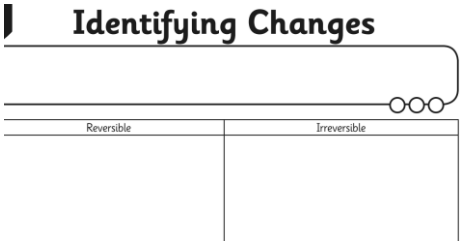
The heat causes an irreversible chemical change to occur.
The cooked egg cannot be cooled and turned back into a raw egg.
It is a chemical change because a new product has been made, and irreversible because it cannot be changed back.

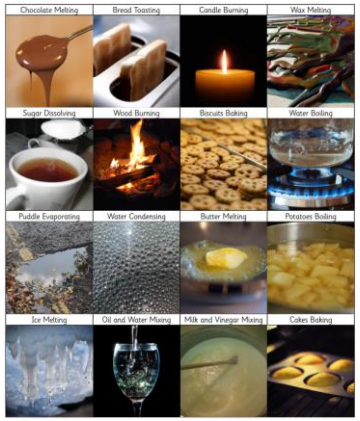
Melting, freezing, evaporating, condensing and dissolving are examples of reversible physical changes.

These are physical changes because no new materials are created. They are reversible changes because they can be changed back or reversed.

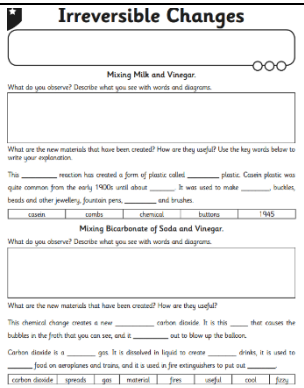
Chemical Changes
Chemical changes involve **reactants** and **products.** The reactants are the materials that you start off with before the chemical change happens. The products are the materials that are formed in the chemical change.

Children then identify and group reversible and irreversible changes:

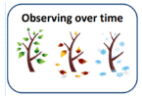
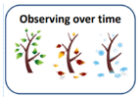


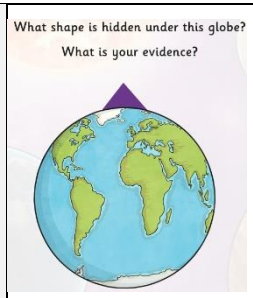


Children then given opportunities to investigate some irreversible changes:

	 **Irreversible Changes** **Mixing Milk and Vinegar.** What do you observe? Describe what you see with words and diagrams. What are the new materials that have been created? How are they useful? Use the key words below to write your explanation. This _____ reaction has created a form of plastic called _____ plastic. Casein plastic was quite common from the early 1900s until about _____. It was used to make _____, buckles, beads and other jewellery, fountain pens, _____ and brushes. casein | combs | chemical | buttons | 1945 **Mixing Bicarbonate of Soda and Vinegar.** What do you observe? Describe what you see with words and diagrams. What are the new materials that have been created? How are they useful? This chemical change creates a new _____ carbon dioxide. It is this ____ that causes the bubbles in the froth that you can see, and it _____ out to blow up the balloon. Carbon dioxide is a _____ gas. It is dissolved in liquid to create _____ drinks, it is used to _____ food on aeroplanes and trains, and it is used in fire extinguishers to put out _____. carbon dioxide | spreads | gas | material | fires | useful | cool | fizzy	
Key Vocabulary	As previous plus: · properties · hardness · solubility · transparency · electrical conductor · thermal conductor · response to magnets · dissolve / dissolving · solution · mixing · separate · separating · reversible changes · filtering · sieving · irreversible · new material · burning · rusting · magnetism · chemists · quantitative measurement s · conductivity · insulation · chemical	David Attenborough, naturalist Margaret Hamilton, Apollo II, computer code Stephanie Kwolek, Kevlar

Year 5 Spring Term

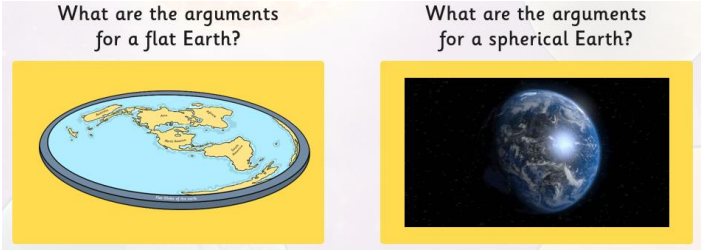
	Spring 1st Half	Spring 2nd Half
Science (All NC subject content covered)	**Earth and Space** Pupils should be taught to: • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky **Working Scientifically (WS):** During year 5, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	**Living Things and their Habitats** **Pupils should be taught to:** • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals **Working Scientifically (WS):** During year 5, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.
WS opportunities	    	    
Key questions / knowledge and understanding to be explained **Key Knowledge and facts to be recalled**	1. **KWL, Mind-map or other 'what I know now' activity starter.** 2. **I can explain why we know the Sun, Earth and Moon are spherical. I can identify scientific evidence which does or does not provide evidence for an idea or argument.**	1. **KWL, Mind-map or other 'what I know now' activity starter.** 2. **I can describe how some plants reproduce.** **All living things need to make more of themselves so that their species does not die out.** Reproduction is the process by which new living things are made. There are two types of reproduction: **sexual** and **asexual**.



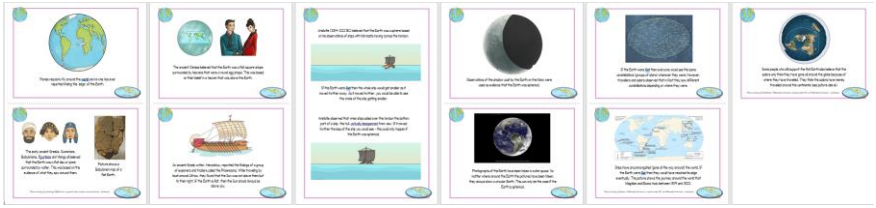
Begin the session by showing the children an image that is partly covered and ask them to infer what is behind the cover. This example (or others) could be used.

After discussing this image and the missing shape, take the children outside and introduce the counter arguments of spherical Earth (science) and flat Earth.

Why might early humans have believed the Earth was flat from looking at the world as we are now (outside in the school grounds?



Share some theories from both camps and ask the children to group them under the headings above.



Children then use this discussion and evidence of the theories to make their own decision on which has the most persuasive reasoning and how/why. **Ensure children are ready for this stage and can clearly explain the pros and cons for each theory (and that spherical Earth is the scientific fact).**

3. WS INVESTIGATION **I can name and describe features of the planets in our solar system. I can order the planets in our solar system.**

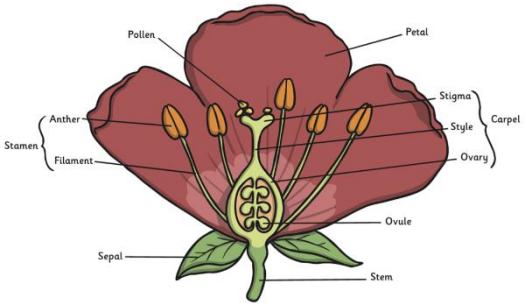
Ask the children to discuss and make a paired or group list of planets they know already. Which ones can they name and spell accurately, including correct use of capital letters?

Sexual reproduction requires two parents to make one offspring. Asexual reproduction needs only one parent, which creates offspring that are exact copies of the parent.

Living things that use sexual reproduction have sex cells called gametes. These are split into male gametes and female gametes. In some living things, the male and female are separate, but in other living things one organism contains both male and female gametes.

In plants, the male gametes are contained in the pollen and the female gametes are called ovules.

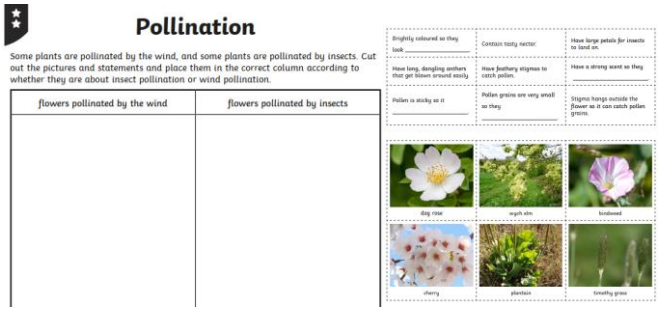
Sexual reproduction happens when a male gamete and a female gamete join. This is called fertilisation.



Sexual reproduction produces offspring that are like both parents, but not identical to either.

In pollination, pollen from the stamen is transferred to the stigma. A pollen tube then grows down through the style to the ovary. The pollen travels down the pollen tube and fuses with an ovule in the ovary. This is fertilisation.
Although flowers contain both the male gametes (in pollen) and the female gametes (ovules), most plants cannot fertilise themselves. They rely on other ways of transferring the pollen to the stigma; this starts the pollination and fertilisation process.

Two ways that flowers can be **pollinated** are by insect or by the wind.



3. **I can describe how some plants reproduce.**

Discuss and feedback and then share key vocabulary linked to the planets and our solar system:

Sun	star	planet	Mercury
Venus	Earth	Mars	Jupiter
Saturn	Uranus	Neptune	rotate
	axis	sphere / spherical	orbit

How many did they correctly name? What vocabulary is new or are they unsure of?

Children then given time to research facts about each planet using the cards below and the internet (a couple of links are shown below):

[The Solar System - KS2 The World Around Us - BBC Bitesize]

[Planet Facts - Interesting Facts about the Planets (space-facts.com)]

Asexual reproduction

Some plants use sexual reproduction to make seeds, which grow to make new plants. These plants need pollen (containing the male gamete or sex cell) from one flower to fuse with the ovule (the female gamete) of another flower, which makes a seed.

However, some plants use **asexual reproduction** to make new plants.

Unlike sexual reproduction, **asexual reproduction only needs one parent plant** to make new plants.

Because there is only one parent plant, there is no fusion of gametes, and no mixing of genetic information. **The new plants are identical to the parent plant. They are clones**.

Other plants produce side branches or runners with new plantlets on. The roots of each plantlet grow down into the soil, and the plantlets will grow to form new plants identical to the parent.

Spider plants and strawberries are examples of plants that reproduce this way.

Daffodil bulbs store energy underground. Once the daffodil plant has died back, the bulb develops side shoots that will grow into new daffodils for next year.

Potato plants grow tubers underground during the spring and summer. These tubers will grow into new plants the following spring if they are left undisturbed.

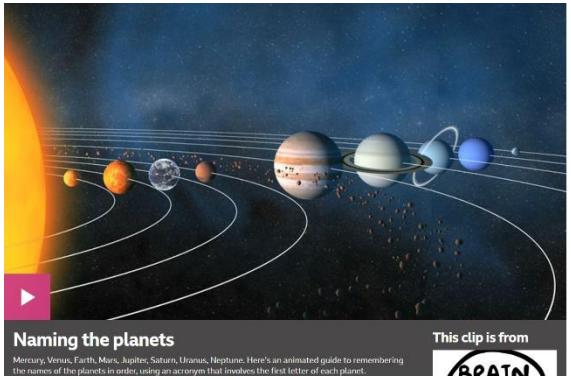
Some plants develop bulbs or tubers underground. These bulbs or tubers will develop into new plants for the following year. The new plants will be genetically identical to the parent plant.

Daffodils and potatoes are examples of plants that reproduce this way.

Strawberry plants send out runners with small plantlets on. These will each grow into a new strawberry plant.

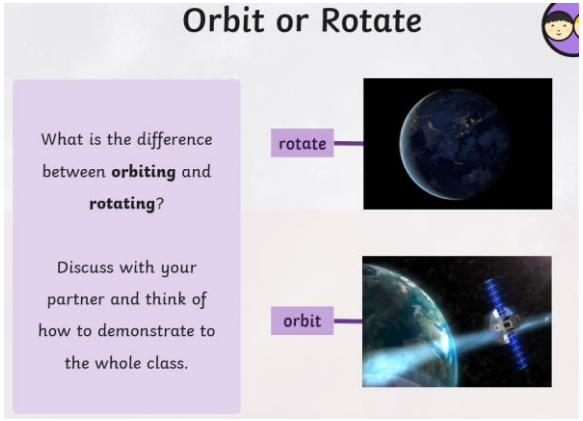
Spider plants send out branches with baby plantlets on. Each plantlet will grow into a new plant.

[BBC - Brainsmart, Naming the planets]

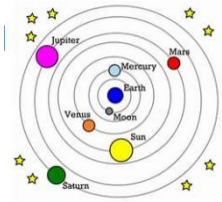


Children use the research to record the planets in order with associated facts for each planet.

4. **I can explain how planets move in our solar system. I can identify scientific evidence which does or does not provide evidence for an idea or argument.**



Geocentric v Heliocentric



Geocentric

The geocentric model of the solar system (and indeed of the universe) asserts that the earth sits, unmoving, at the centre of all existence. Every other object in the sky revolves around the earth, following paths dictated by a variety of mathematical rules – some of them quite complex!

Heliocentric

Show children the following video clip, which shows the work of, **Nicolaus Copernicus**, the forebearer of the Heliocentric model of the solar system.

Science KS2: The work of Nicolaus Copernicus - BBC Teach

There are advantages and disadvantages to plants using sexual or asexual reproduction. Children to complete a table to identify and explain these.

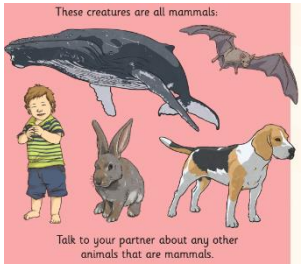
Statements			
Time and energy are needed to wait for another parent plant to reproduce with.	Diseases will not affect all the individuals in a habitat because they will all be different.	The species can change over time to adapt to new environments and habitats.	Reproduction is not possible for an isolated plant.
Only one parent plant is needed so new plants can be made even if there are no other plants nearby.	There is no variation or difference in new plants, so the species is less resilient to diseases or changes in climate.	The population can be increased quickly.	Good features of the parent plant will always be passed on.

4. **I can describe the life cycles of different mammals. *This session contains references to language and content on sexual reproduction and may require parents are informed beforehand, or that this session is covered during or after the School SRE week.**

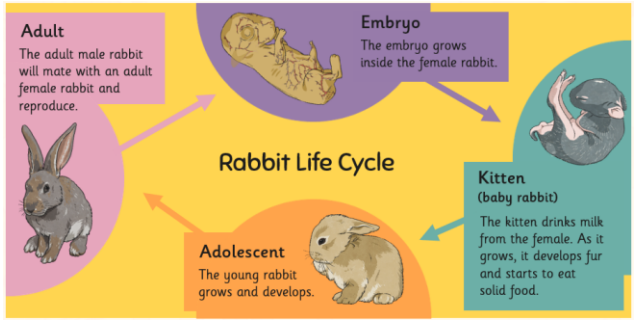
Lifecycle of a mammal

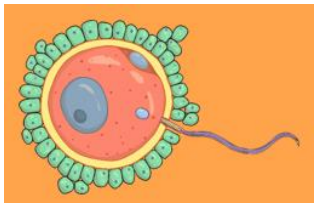
A mammal is a particular type of animal. There are two things that make mammals special:

5. Mammals make milk to feed their babies.
6. They are all warm blooded. This means they can maintain a constant body temperature, independent of the temperature of their environment.



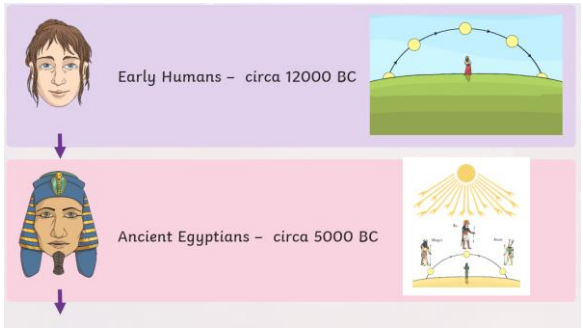
Here are the stages of the life cycle of a rabbit, a mammal.

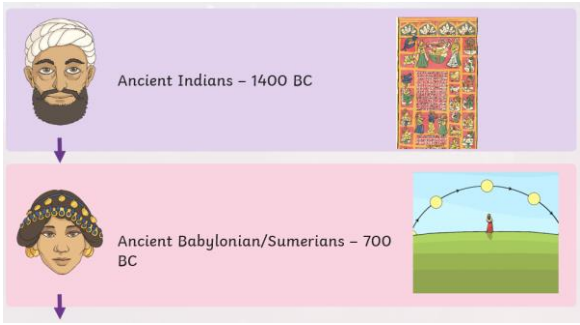




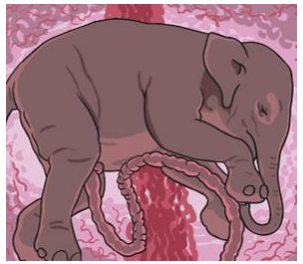
Mammals use sexual reproduction to produce their offspring. The male gamete is called sperm. The sperm travels down the male's penis and enters the female's body through the vagina. A sperm cell will fuse with the ovum, the female gamete. When this happens, the ovum is fertilised.

Show children following slides to elicit that the views of humans have changed over time, as more evidence as become available:





This fertilised cell splits in half, creating two cells. These cells continue to divide, so that the number of cells doubles each time. Eventually, the cells will form a baby, and the heart starts to beat.



The baby will grow inside the female for the length of the pregnancy. This is known as the gestation period. At the end of the pregnancy, the baby is born.

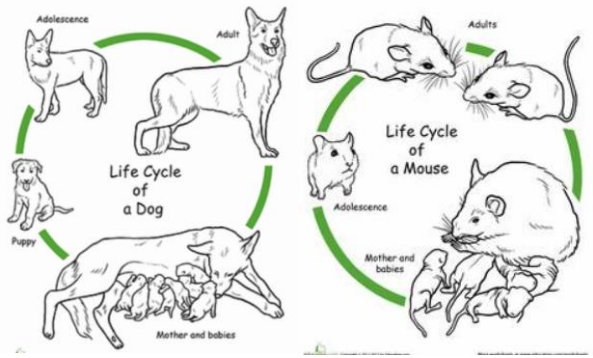
Monotremes

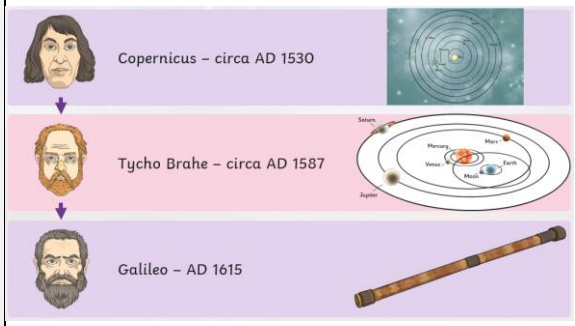
There is a group of mammals called monotremes that do not grow their young inside their bodies.

Monotremes lay eggs instead of giving birth to live babies. The only existing monotremes are the platypus and the echidna, and they live in Australia and New Guinea.

They are still classed as mammals because once their babies are hatched out they do feed them milk.

Other lifecycles of mammals





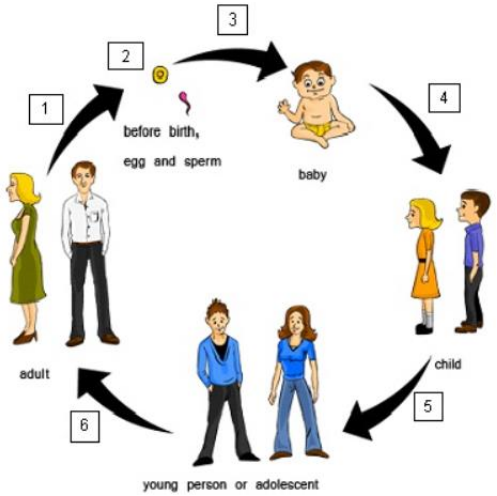
5. I can explain that day and night is due to rotation of the Earth. I can explain using evidence how night and day occur.

Show children the timelapse video embedded in the image below: Use the following question starter: Does the position of the sun change over the course of the day? How do you know?

Elicit that the sun doesn't move. As a star and as identified in the last session, it is stationary in the middle of our solar system.

The Earth's rotation gives us night and day. The Earth completes one rotation every 24 hours to give us day and night. When Britain faces the Sun, it is daytime, but the other side of the world is in darkness. So, in Australia it is the middle of the night. Show the children the short video clip embedded in the photo opposite.

Children use this create their own explanation text on Night and Day.



5. WS INVESTIGATION I can research and explain what Jane Goodall discovered about chimpanzees.

Jane Goodall is a British scientist who has studied chimpanzees for many years. She is considered to be the world expert on chimpanzees and their behaviour. Goodall was born in 1934 in London. When she was a child, her father gave her a chimpanzee toy, which began her lifelong love of animals.

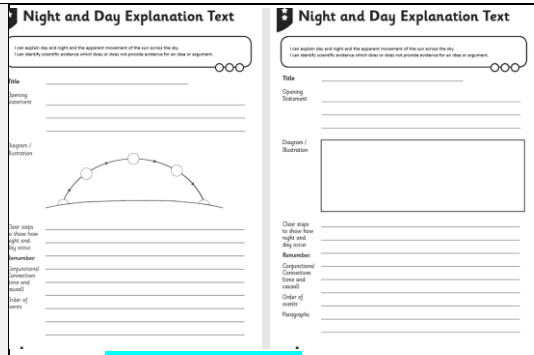
In 1960, Goodall was appointed as a chimpanzee researcher by a famous archaeologist called Louis Leakey. Leakey sent her to Gombe Stream National Park, in what is now called Tanzania in Africa, to observe the chimpanzee troop living there.

Tanzania was known as Tanganyika when Jane Goodall went to study the chimpanzees there.

Jane began to study the Kasakela chimpanzee community. She used unusual methods, such as giving the chimpanzees names. At that time, scientists working with animals would use numbers to identify the animals, so they didn't get too attached. Goodall's methods allowed her to observe the chimpanzees' personalities and emotions.

Observing patiently over a number of years, Goodall won the trust of the chimpanzees, and noticed new and interesting things about the chimpanzees' behaviour.

She found that the chimpanzees had strong family bonds that would last for the whole of the chimpanzees' lives. She observed family members hugging, kissing, patting each other on the back, and even tickling each other!



6. WS INVESTIGATION I can investigate night and day in different parts of the Earth. I can report and present findings from enquiries.

Use the following question as a starter for this session: **Does night and day occur at the same time everywhere on Earth?**

Show children Google Maps/Earth (Google Maps). What do they think? Why? How can you explain?

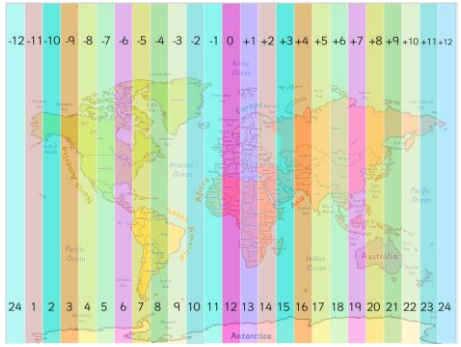
Ask children to make a prediction about the time of day in two different locations:

If it is 12:00 in _____ then I predict the sun will be rising in _____, setting in _____ and it will be night time in _____.

Prediction – what country do children think will be at each time?

Time	Sunrise (on average around 6am)	Midday (12pm)	Sunset (on average around 7pm)	Night (12am)
				
Country				

Show children the world map with time indicated – one version of this shown below:



Goodall became familiar with several families of chimpanzees and watched new family members be born. She saw the life cycle of the chimpanzees in action.

Endangered species?

100 years ago, there were around 1 million chimpanzees in Africa. Scientists believe that there are now less than 200 000 left in the wild. The species has already disappeared from 4 African countries, and chimpanzees are nearing extinction in several other countries.

Chimpanzees do still live in Tanzania, and the Gombe Stream chimpanzees are still living in the area where they were originally observed by Jane Goodall.
The Jane Goodall Institute was set up by Goodall to protect the wild chimpanzees that are left in Africa.

The Institute supports sanctuaries and public education programmes to protect chimpanzees in the wild. It raises money for these programmes and developments through donations from the public.

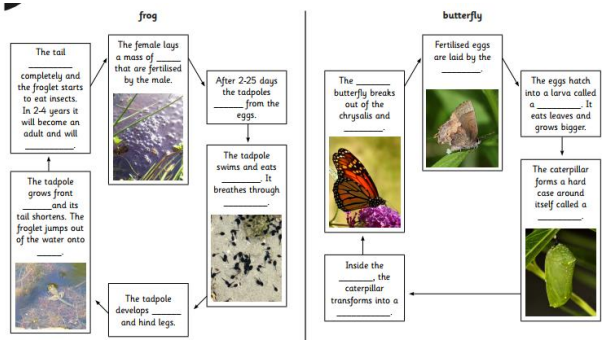
6. I can compare the life cycles of amphibians and insects.

Metamorphosis

Metamorphosis is a process by which animals undergo an abrupt and obvious change in the structure of their body and their behaviour.

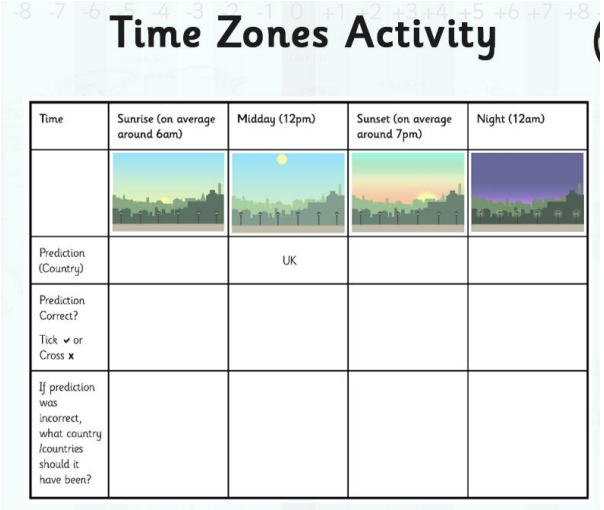
Some animals undergo complete metamorphosis, in which they completely transform. Other animals experience incomplete metamorphosis, where they go through several different stages, with each stage getting bigger than the last.

Amphibians and insects are examples of animals that undergo metamorphosis. Their life cycles show the stages of their transformations.



Children look at the life cycles they have described on the activity sheet.
Children to find 3 similarities between the life cycles of the animals and 3 differences between the life cycles.

Children use the map above to follow up their predictions with accurate times for different places around the world using the sheet (or an adapted version thereof) below. They could also use this interactive map for the task: https://24timezones.com/timezone-map?msclkid=931a5048d11811eca35292c792335f0c



Time Zones Activity

Time	Sunrise (on average around 6am)	Midday (12pm)	Sunset (on average around 7pm)	Night (12am)
Prediction (Country)		UK		
Prediction Correct? Tick ✔ or Cross ✘				
If prediction was incorrect, what country /countries should it have been?				

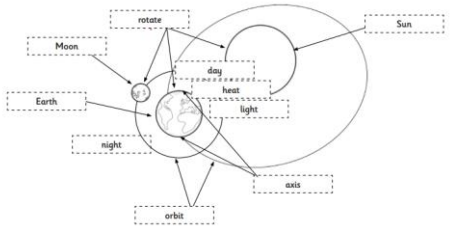
7. **I can explain the movement of the Moon.**

Show children the video clip animation of the orbit of the moon.

Orbit_of_the_Moon_in_2013.mp4

Our view of the Moon changes because it's constantly moving through space, just like Earth is. The moon has two main movements: its revolution and its rotation.

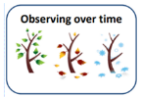
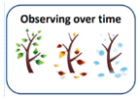
The Moon moves around the Earth in a movement called revolution or orbit. This is very similar to Earth's orbit around the Sun. It takes about 27 days for the Moon to revolve around the Earth once. The revolution of the Moon around Earth is not its only movement, though! It's also spinning in space. This can be shown via video in the link below: https://study.com/academy/lesson/movements-of-the-moon-lesson-for-kids-orbit-rotation.html?msclkid=e41493f3d11911ec91d0edf99f9b2c32



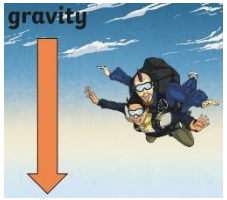
7. **Refer to initial KWL grid from lesson 1 and expand with knowledge learnt and retained. Make links to real world context.**

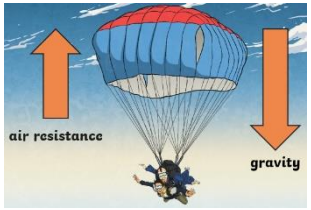
	8. Refer to initial KWL grid from lesson 1 and expand with knowledge learnt and retained. Make links to real world context.	
Vocabulary	vibrate • vibration • data logger • sound survey • air • medium • ear • hear • sound • volume • pitch • faint • fainter • distance • loud • louder • string • percussion • woodwind • brass • insulate • insulation	As previous plus: • Life cycles • Life process of reproduction • Reproduction – plants: sexual, asexual and animals: sexual • Life cycles around the world – rainforest, oceans, desert • Prehistoric • David Attenborough • Jane Goodall

Year 5 Summer Term

	Summer 1st Half	Summer 2nd Half
Science (All NC subject content covered)	**Forces** Pupils should be taught to: • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect **Working Scientifically (WS):** During year 5, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	**Animals including Humans** **Pupils should be taught:** • describe the changes as humans develop to old age **Working Scientifically (WS):** During year 5, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar, and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.
WS opportunities	    	    
Key questions / knowledge and understanding to be explained Key Knowledge and facts to be recalled	1. **KWL, Mind-map or other 'what I know now' activity starter.** 2. **I can identify forces as pushes and pulls. I can identify and explain the different forces acting on objects.** Forces are often referred to as pushes and pulls. Children will have learnt this in Year 3. Forces affect the movement or shape of an object. They can make an object start to move, stop moving, move faster or move more slowly. They could also make an object change its shape or cause a moving object to change direction.	1. **KWL, Mind-map or other 'what I know now' activity starter.** 2. **I can order the stages of human development. I can name the 6 stages of human development. I can explain the changes that occur during the stages of human development.**

Gravity is a **pulling** force exerted by the Earth. The gravitational force from the Earth pulls in a direction towards the centre of the Earth. Gravity is pulling the skydivers towards the Earth.



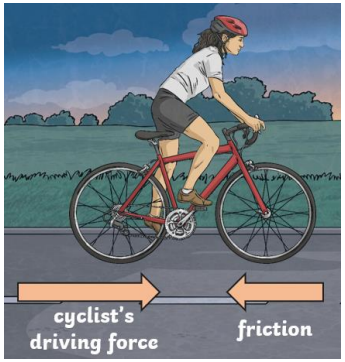


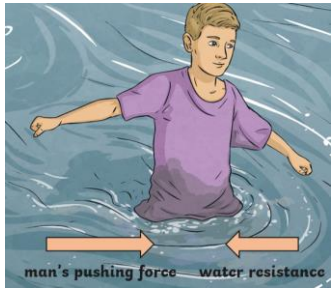
Air resistance is the name of the force that is pushing up against the parachute.

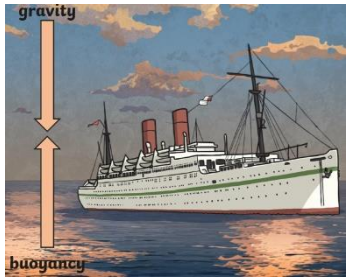
Gravity is pulling the skydivers towards the ground. However, they are slowed down because a force (air resistance) pushes against the inside of the parachute and they descend more slowly.

Gravity and air resistance are opposing forces in this situation.

As well as gravity and air resistance, there are other forces that can act on objects.







In this example, the boat doesn't sink because there is a buoyant force (upthrust) created by the volume of water. It is the balance of the gravity and the buoyancy that keeps the boat floating.

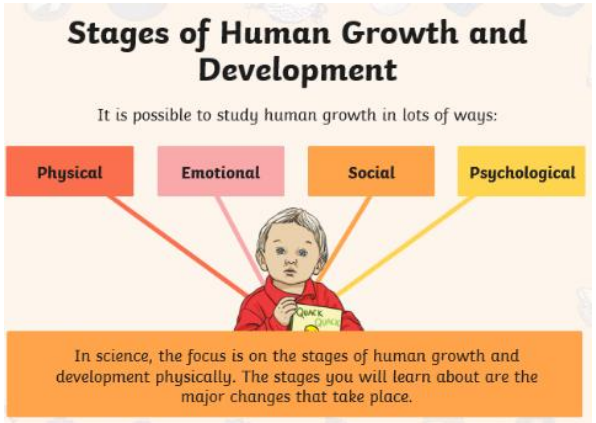
3. **I can explain the effect of gravity on unsupported objects. I can explain Isaac Newton's role in developing a theory of gravity. I can accurately measure the force of gravity pulling on objects.**

Types of Reproduction

How does new life start?

	Asexual Reproduction	Sexual Reproduction	Both Sexual and Asexual Reproduction
What is it?	One parent produces new life.	Two parents – one male and one female – are required to produce new life.	Either one or two parents.
How does it occur?	One cell simply starts to divide itself. All cells of the offspring are **identical** to the parent. This means that it is a **clone** of the parent.	Male sex cells (sperm/angiosperm/pollen are different versions of male sex cells) fertilise female sex cells (eggs). This fusion means that the offspring resembles but is **not** identical to the parents.	Some living things have the capacity to reproduce in sexually or asexually.

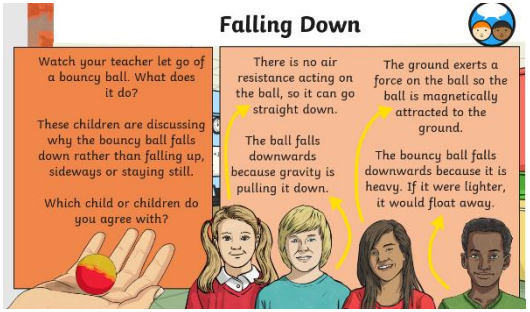
Stages of Human Growth and Development



Prenatal

Prenatal means before birth. This stage of development is from the time of fertilisation (when the male and female sex cells fuse together) to the time of birth.

Ask the children to discuss the concept cartoon opposite to introduce this lesson.



Gravity is the force that means that objects are pulled towards the centre of the Earth.

All objects exert a **gravitational pull**. However, the strength of an object's gravitational pull depends on its **mass**.

The Earth is a huge object with an extremely high mass, so its gravitational pull is very strong.

The force of gravity keeps us on the ground. Gravity also causes objects to fall down if they are dropped.

Isaac Newton famously developed his theory of gravity when he saw an apple fall to the ground from an apple tree. ***Opportunity for a research task into Sir Isaac Newton should this be appropriate.**

People often use the words weight and mass to mean the same thing. Mass is a measure of the amount of 'stuff' inside an object and is measured in kilograms (kg).

Weight is a measure of the strength of gravity acting on an object. It is measured in **newtons** (N).

The **weight** of an object is caused by **gravity** pulling it down. Objects with more **mass** have a greater weight, as the force of gravity pulls them down more strongly.
An object's mass will stay the same even if it is in a place with weaker gravity, like the Moon.

However, an object's weight can change! If the object were on the Moon, although it would have the same mass, it would weigh much less as the gravity would not be pulling it down as strongly. The Moon's gravity is much weaker than the Earth's.

Jupiter is a much bigger planet than Earth, so it has a stronger gravitational pull. Although an object would have the same **mass** on Jupiter as anywhere else, it would **weigh** much more due to the gravity pulling it more strongly.

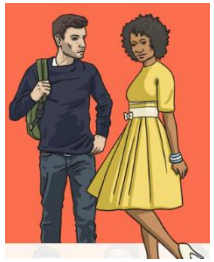
WS INVESTIGATION
Children to investigate the mass and weight of a variety objects.

Infancy
This stage of development is from birth to two years old. This includes babies and toddlers. The rate of physical development is fast at this stage. Infants are totally dependent on others for food and care.

Childhood
This stage takes place between the ages of three and ten. Physical growth is steadier. Children can feed themselves. They can increasingly take care of physical needs. There is considerable brain development at this stage.

Adolescence

The World Health Organisation defines an adolescent as being a young person aged between 10 and 19. Puberty results in changes in the body. Boys' bodies start changing from around age 12 but it can be earlier or later. Girls' bodies start changing from around the age of 9 but it can be earlier or later. The changes don't all come at once. They happen over a few years. These changes occur to enable reproduction during adulthood. Adolescents are increasingly independent. There is even more brain development at this stage.



Early Adulthood
This stage of development takes place from the ages of 18/19 to 39. The human body is at
its peak of fitness and strength. There is still some growth but not of height. This is the age at which most humans reproduce. Humans can take care of their physical needs completely independently.

Middle Adulthood
This stage of development takes place between 40 and 59 years of age. Both male and female ability to reproduce declines with age. Women experience menopause in their 40s or 50s when they no longer produce eggs. Physical changes can include loss of hair among men and greying hair for both men and women.

The weight of an object is measured using a **newton meter**.

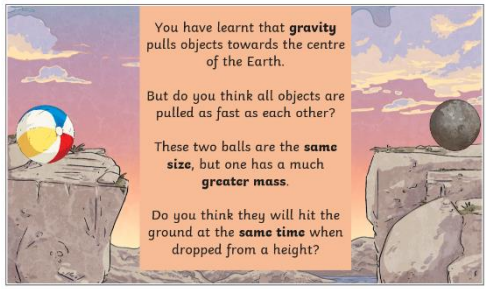
The mass of an object is measured using a set of **scales**. Remember, mass is a measure of how much matter (or 'stuff') is in the object.

You can find an object's weight by placing the object in a bag and hanging the bag from the newton meter to measure how strongly gravity is acting on the object.

The children should have identified that gravity pulls objects down with a force of approximately 1N for every 100g, 200g = 2N, 300g = 3N, etc…

4. I can explain how air resistance affects moving objects. WS INVESTIGATION I can plan and investigate the effects of air resistance.

Gravity and Falling

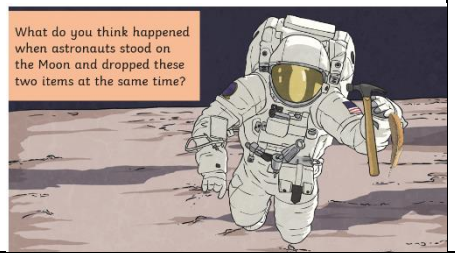


Start the session with this concept cartoon. Ask children to discuss and identify their thoughts, with an explanation.

Galileo Galilei (1564-1642) was an Italian scientist and mathematician who wondered about this.

In 1590, he decided to carry out an investigation to find the answer. He climbed to the top of the Leaning Tower of Pisa with two balls that were different in size and mass but had a similar density. He dropped both balls from the top of the tower at the same time. Both balls hit the ground at the same time.

Galileo's experiment proved that **all objects fall at the same rate**, no matter what their mass is.
But this can seem hard to believe!
Think about a feather and a hammer. If you dropped both objects at the same time, would they hit the ground at the same time?



Late Adulthood/Old Age
This is the last stage of human development and takes place after the age of 60. There is no physical growth although mental development is possible. The body declines in fitness and health.
Some older people can become more fragile physically. This can sometimes result in increasing dependency on others to care for them.

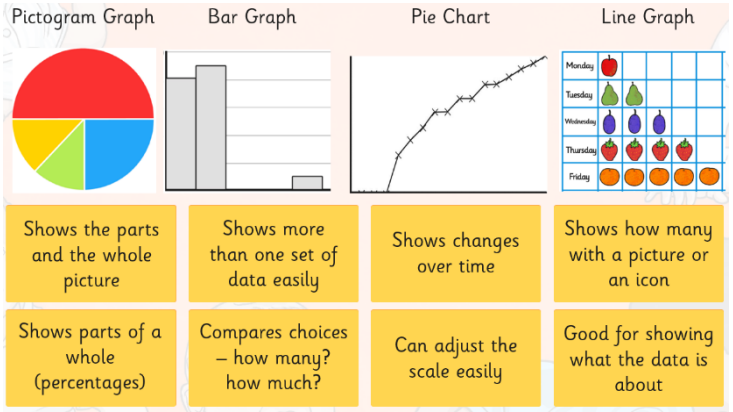
The end of the human life cycle is when a human dies. (The age at which this happens varies and is not simply dependent on physical factors).

3. I can explain how babies grow and develop. I can present data.

Data and Graphs
What does this data show us?
What are the categories?
What is the unit of measurement?
If this data was presented in a graph, what should be shown on the x/y axis? Why?
What kinds of graph should be used to present this data? Why?

Age	Height of babies
0 months	51cm
1 month	53.5cm
2 months	57.5cm
3 months	60.5cm
4 months	64.5cm
5 months	65cm
6 months	67cm
7 months	68cm
8 months	70cm
9 months	71cm
10 months	72cm
11 months	73cm
12 months	75cm

Types of Graphs



Comparing Graphs

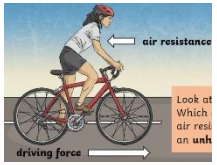
The feather and the hammer hit the surface of the Moon at the same time!

This proves that Galileo's findings are correct.

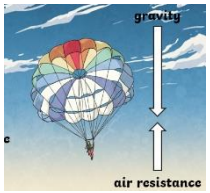
Can you think why the two objects might fall at the same speed on the Moon, but the feather falls so much more slowly on Earth?

What is different about the Moon and the Earth that could cause this to happen?

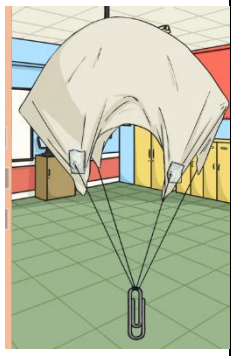
There is **no air** on the Moon.
Air pushes against any object moving through it. This is known as **air resistance**.
On Earth, air resistance acts on both objects. The feather has a large surface area in comparison to its mass. The hammer has a small surface area in comparison to its mass. Air resistance therefore has a greater upwards force on the feather.
Since there is no air on the Moon, there is no **air resistance** to push against the feather, so the two objects fall at the **same speed**.

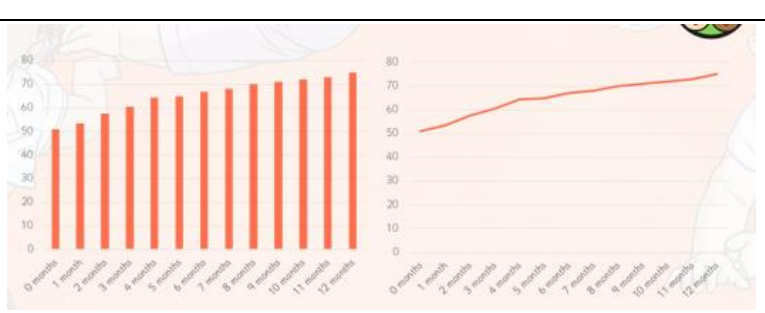


Air resistance can be a useful force, but it can also be unhelpful in certain situations.



WS INVESTIGATION – PERFECT PARACHUTES
Children will make three parachutes and drop them from a height. Each of the three parachutes should be slightly different.
They will observe which of the parachutes falls the **most slowly**. This parachute will have the most **air resistance** pushing it up.
Children construct their parachutes using a sheet of plastic or card. Tie or tape string to the corners, and tie or tape the four pieces of string to an object such as a toy figure, paper clip or piece of modelling clay.





Which graph should the data be presented with? Why?
Why do scientists want to present their data clearly?
What are the problems if they don't?

Age	Height of Boys	Height of Girls
0 months	52cm	50cm
1 month	54cm	53cm
2 months	58cm	57cm
3 months	61cm	60cm
4 months	64cm	63cm
5 months	66cm	64cm
6 months	68cm	66cm
7 months	69cm	67cm
8 months	71cm	69cm
9 months	72cm	70cm
10 months	73cm	71cm
11 months	74cm	72cm
12 months	76cm	74cm

Growth of Babies (Height)		
Age	Height of Boys (in cm)	Height of Girls (in cm)
0 months	52	50
1 month	54	53
2 months	58	57
3 months	61	60
4 months	64	63
5 months	66	64
6 months	68	66
7 months	69	67
8 months	71	69
9 months	72	70
10 months	73	71
11 months	74	72
12 months	76	74

Growth of Babies (Weight)		
Age	Weight of Boys (in kg)	Weight of Girls (in kg)
0 months	3.5	3.5
1 month	4.5	4.3
2 months	5.6	5.2
3 months	6.4	5.6
4 months	6.8	6.4
5 months	7.4	6.9
6 months	7.9	7.3
7 months	8.3	7.6
8 months	8.6	7.9
9 months	8.9	8.2
10 months	9.2	8.5
11 months	9.4	8.7
12 months	9.6	9

Children use this discussion and data on babies' height and/or weight to:
Create at least two types of graphs to compare
Make sure axis are labelled
Create a title for the graph(s)
Explain which of the graphs presents the data more clearly and why on the Presenting Data Using Graphs Activity Sheet.

4. I can describe and explain the main changes that occur during puberty. **Links to RSE, letters may need to go to parents beforehand. **

Puberty is the stage of development between childhood and adulthood. Physical growth occurs so that the body changes to that of an adult, which enables reproduction. Two parts of the brain – the hypothalamus and the pituitary gland – start to make more of some hormones. LH is the hormone for growth and FSH is the hormone for hair.

Puberty occurs at any time between 11 and 17. It is different for each person, and this is perfectly normal. Both boys and girls develop pubic hair and start to grow hair under their armpits. Overall, boys grow more hair and grow it on more body parts than girls (including the face and chest). However, how 'hairy' a person becomes is based the genes you inherit from your parents.

Everyone gets some spots during puberty; however, it varies from person to person. Acne is when you have a severe breakout of spots and can be painful. Doctors can help to treat this.

5. I can explain the effects of water resistance. I can identify streamlined shapes. I can minimise the effects of water resistance on an object.

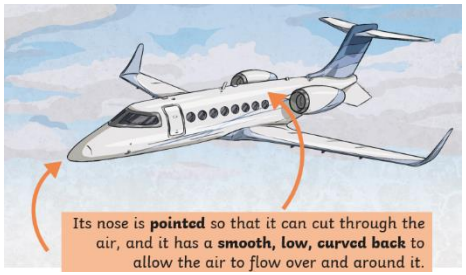
Start off session by posing this question: How does it feel to walk through deep water?

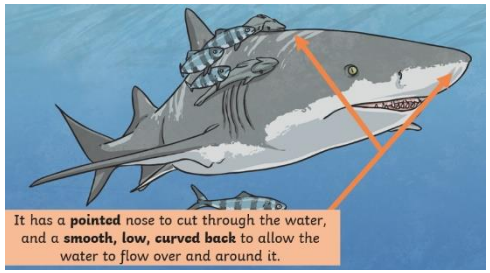
Think of some words and phrases to describe the feeling.

If you have ever walked through water, you will have felt the effects of water resistance pushing against you.
However, this also helps you to swim, as when you push against the water with your hands, the water resistance pushes back and helps you to move forward, like using oars to push against the water to row a boat.

It is possible to reduce the effects of water and air resistance. Objects that do not experience much water or air resistance are described as streamlined.

This aeroplane is streamlined. It does not create much air resistance so it can move through the air easily.





This shark is streamlined. It does not create much water resistance so it can move through the water quickly.

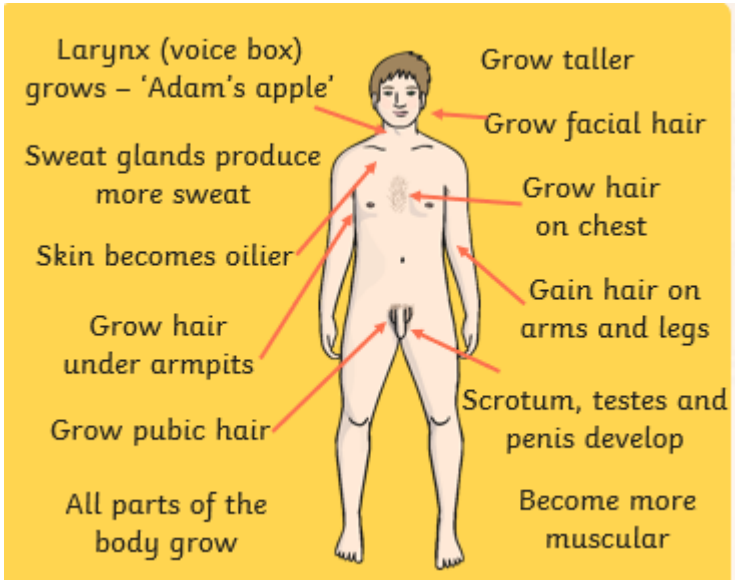
WS Investigation - Streamlined Shapes

Sweat does not smell! Sweat is mostly just water after all. What people refer to as a 'sweaty' smell is caused by bacteria on your body mixing with the sweat.

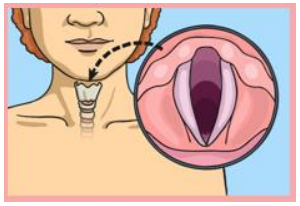
All parts of the body grow during puberty, but it is not true that they grow at the same rate and the same time. For example, you may notice that you get taller before your feet grow or that you start growing pubic hair before you start getting spots. It's normal for growth to be uneven during puberty.

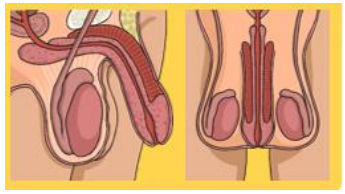
There is a wide range of shapes and sizes for breasts and penises, which are all normal. One of the problems that many teenagers going through puberty face today is coping with the images and messages they get about what is 'normal'. Often this does not match reality. As long as you are developing during this period of your life, then there is nothing to worry about.

Puberty for Boys



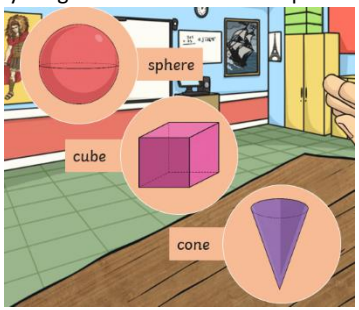
This is the development of the larynx.
This happens to both boys and girls but boys develop more so have deeper voices.
More laryngeal cartilage is needed to make a deeper voice.
This is why boys develop visible 'Adam's apples.'

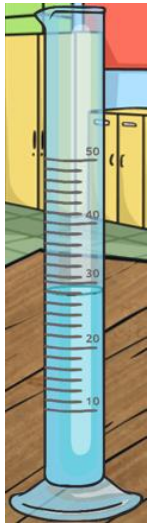




During puberty, the male sexual organs develop. This includes the testicles, scrotum, and penis. The testicles produce the hormone testosterone which stimulates the production of sperm, develops a deeper voice and bigger muscles as well as causing body and facial hair to grow.

Children weigh out three equal measures of playdough. Then mould each equal amount into three different shapes:



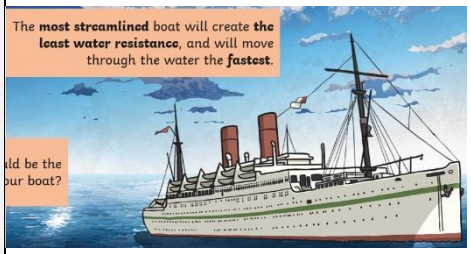


Children time how long it takes each shape to fall to the bottom of a measuring cylinder of water and discuss results, relating to water resistance on each shape.

They should notice that:

The cube should have fallen the slowest through the water. It is the least streamlined shape because it has a flat surface which creates a lot of water resistance. The water pushes against the flat surface, slowing it down.

The cone should have fallen the fastest through the water. It is the most streamlined shape as it has a pointed end to cut through the water.



Application of Streamlined knowledge:

Children to design and make a streamlined boat to move through water quickest.

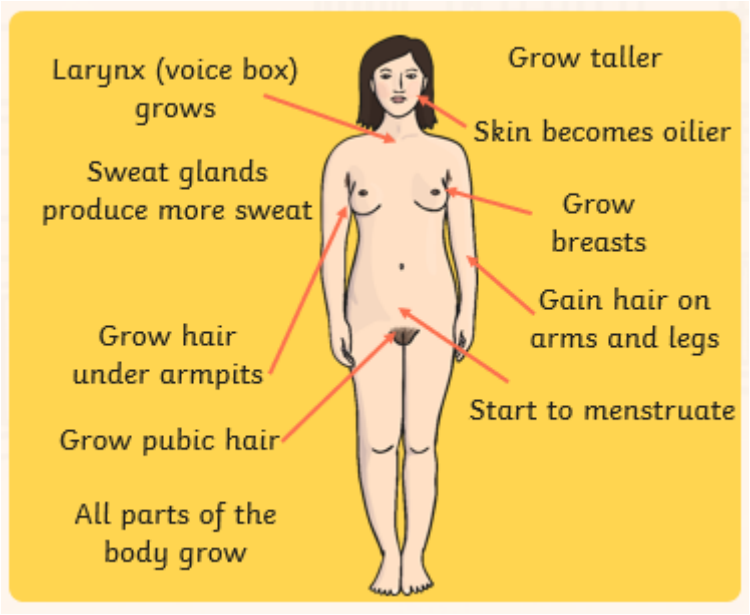
6. I can explain the effects of friction on a moving vehicle. I can investigate the effects of friction created by different materials. I can recognise and control variables in an investigation.

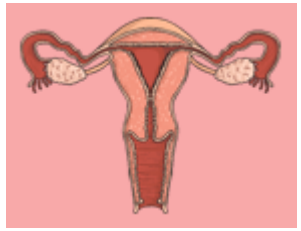
Review of Friction

Review the children's knowledge of friction before beginning the main input of this session.

Friction is a force that slows moving objects down. All surfaces create friction on an object moving over them. A by-product of friction is heat.

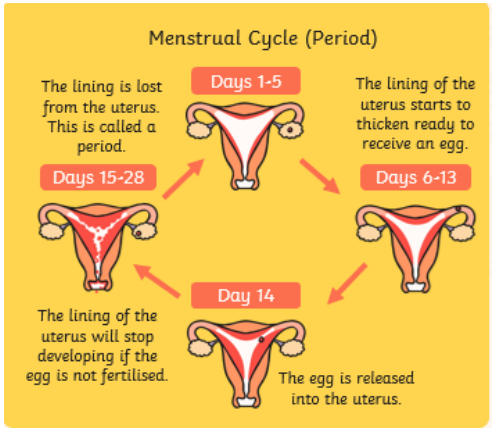
Puberty for Girls





Ovaries produce the hormones oestrogen and progesterone. They also produce eggs. All girls going through puberty start their periods – this means they have started to produce eggs.

Menstrual Cycle (Period)

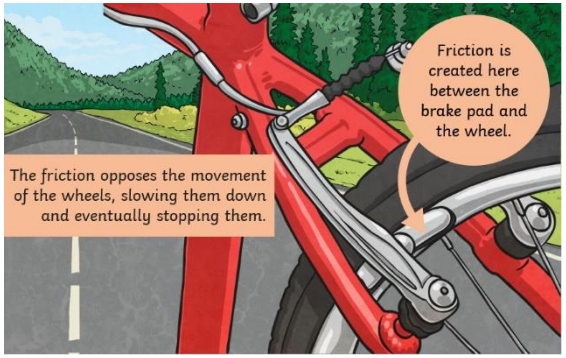


The hormones oestrogen and progesterone can also affect the emotions of girls during puberty. The hormones in your body that cause changes to occur during puberty may also affect your

Ask children to describe how friction affects the moving bike in this diagram. How is friction helpful with a bike?

Friction can also be disadvantageous: friction on a bike chain can make the bike harder to pedal.

Friction in action:



WS Investigation (Comparative)

A company that makes tricycles and scooters wants to create a new set of brakes for their latest model. They need to make sure their tricycles and scooters slow down and stop safely for the young children using them.

They have asked you to help them find the **best material** for their brake pads. The best material will be the one that creates the **most friction** between the brake pad and the wheel.

You will need to test different materials and demonstrate the best choice.

To test the different materials for the brake pad, you will need a small tricycle or scooter, a piece of thick card (about the size of a playing card), different materials to wrap around the card and a stopwatch.

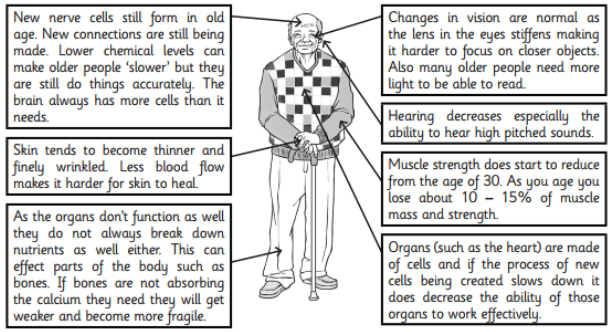
Work in groups. Spin the wheel of the tricycle or scooter, then carefully hold the piece of card with one material wrapped around it against the spinning wheel. Be careful not to put your fingers on the wheel. Use the stopwatch to time how long it takes for the wheel to stop completely.

Then wrap the card in a different material, and time how long that material takes to stop the wheel.

mood. You may have highs and lows and feel a bit more emotional especially near the time of your period.

5. I can identify and explain the changes that take place in old age.

Old age is the last stage of human development. There are some physical changes that take place for all older people. The body is made up of cells and these cells age over time. All cells die because they are programmed to do so. They then get replaced by new cells. However, in old age this process of generating new cells slows down for all people but the extent to which aging leads to ill health or problems does vary from person to person.



Things to help remain healthy in old age

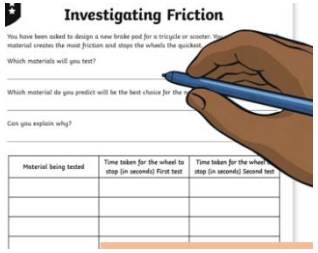
Skin	The amount your skin wrinkles is affected by how well you look after it throughout your life and not just in old age. Spending too much time in the sun over your lifetime will eventually leave you with deeper wrinkles, skin blotches and skin reddening. Always use sun protection creams and avoid sun burn.
Muscles	All adults suffer muscle loss but if you exercise throughout your life, including when you are older, you can ensure that muscles remain strong and healthy.
Organs	The fact is that a normal heart will function well throughout your lifetime. Still, it is easier for younger hearts to pump blood around the body than older hearts. So, while an older person may not be able to outrun a younger person – it does not mean they can't run or be healthy. It is important to be active throughout your life.
Brain	The brain develops throughout your whole life. It is important to avoid activities that will damage brain cells as this damage can be permanent whatever your age. Some people do become senile due to age and due to factors, they can't control. However, people who stay active and healthy can reduce the risk of such diseases when they are older.

6. WS INVESTIGATION, RESEARCH, I can report findings in oral form. I can report findings in written explanations. I can choose how best to report my findings.

Complete this with each different material.

Controlling Variables

When scientists carry out investigations, it is important that they control all the variables to get reliable results. In this investigation, the variable that is being tested is the type of material the brake pad is made from. This will be changed each time. The variable to be measured is the time it takes for the wheel to stop spinning.



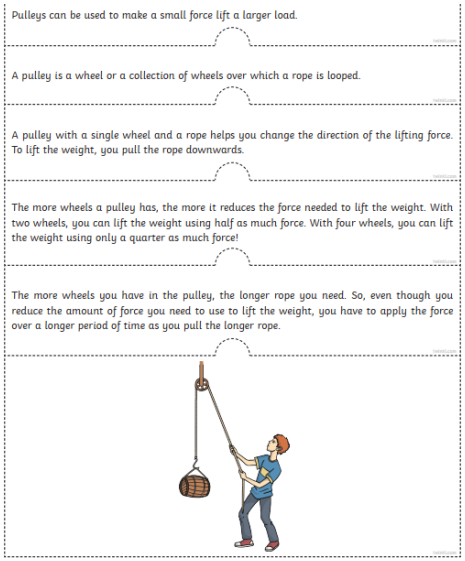
All the other variables in the investigation will need to be kept the same each time.

Children need to consider any variables in this investigation that may be tricky to keep the same every time. They should also ensure they take repeated measurements for more accurate, reliable results.

7. I can explain how different mechanisms work. I can investigate a simple mechanism. I can design my own mechanism for a given purpose. *This session could be combined at an alternative time within a DT project.

Mechanism Facts

Pulleys



Gears/Cogs

Comparing Gestation Periods

Gestation is defined as the time between conception and birth. Though it can focus on human gestation, this term applies more broadly to all mammals. A fetus grows and develops in the womb during gestation.

Here is a list of animals and their gestation periods.

Children use this and their research skills to look for links and patterns between animal gestation periods and length of life, type of animal, habitat of animals, etc.

Animal	Gestation Period
human	9 months
lizard	3 – 4 months
salmon	40 days
snake	2 – 3 months
parrot	3 – 4 weeks
frog	1 week
whale	12 – 16 months
goldfish	2 – 7 days
protozoa	1 – 2 weeks

Use the Classification of Animal Types Poster to help you with your task.
You will be comparing vertebrates and invertebrates.

Prediction:

Predict the length of time of gestation for the following animals. Order the animals on the line from the shortest gestation period to the longest. Under the name of the animal write the type of animal they are (i.e. mammal, crustacean).

Animals:

Human, protozoa, frog, worm, goldfish, salmon, ladybird, lizard, starfish, snail, jellyfish, snake, parrot, spider, lobster, whale, flatworm, centipede.

Shortest Gestation Period — Longest Gestation Period

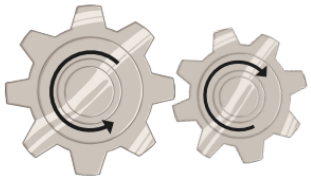
Now use the Animal Gestation Periods Table to order them.

Shortest Gestation Period — Longest Gestation Period

Were your predictions correct? _____

"Animals who live in the water have shorter gestation periods that animals who live on land."
Is this statement correct? Give reasons for your answer.

7. Refer to initial KWL grid from lesson 1 and expand with knowledge learnt and retained. Make links to real world context.

	Gears or cogs can be used to change the speed, force or direction of motion. Gears are wheels with teeth, or indentations, which lock together and turn one another. If you connect two gears together, and the first gear is larger than the second, the second gear will turn much faster than the first. This way you can increase the speed of the motion. If the second wheel in a pair of gears is larger, it will turn much more slowly than the first, but with more force. When two gears are connected, they always turn in opposite directions to each other. This is how gears can change the direction of motion.  The gears inside a watch or clock move the hands around the clock face.  **Levers** Levers can be used to make a small force lift a larger load. A lever always rests on a pivot. A lever has three parts - the place where you apply a pushing or pulling force, the point where it pivots and the place where the work, usually lifting, is done. The distance between the pivot and the place where the person pushes affects how easy or hard it is to lift a load with the lever. Levers were used in ancient Egypt to lift stones to construct the pyramids.  **8. Refer to initial KWL grid from lesson 1 and expand with knowledge learnt and retained. Make links to real world context.**	
Vocabulary	As previous plus: • Gravity • Air resistance • Water resistance • Friction • Surface • Force • Effect • Move • Accelerate • Decelerate • Stop • Change direction • Brake • Mechanism • Pulley • Gear • Spring • Theory of gravitation • Galileo Galilei • Sir Isaac Newton	As previous plus: • puberty • life cycle • gestation • growth • reproduce • foetus • baby • fertilisation • toddler • child • teenager • adult • old age • life expectancy • adolescence • adulthood • early adulthood • middle adulthood • late adulthood • childhood