Science Scheme of Work
Perranporth C P School

Year 3 Autumn Term

	Autumn 1st Half	Autumn 2nd Half
Theme	**Through the Ages (Stone Age)**	**Tremors**
British Key Question	How has modern Britain been shaped by our Prehistoric ancestors?	Why live in Natural Disaster Hotspots? Would you?
Enhancements	Trip: Visit to a local hillfort – Castle An Dinas Iron Age Hill Fort, near St Columb Major? Walk: Minions/Hurlers on Bodmin Moor? Visitor Kresen Kernow	Trip: Launch at beach to search for rocks – have some rocks selectively hidden on location – this can be adapted for in school launch on field/in environmental area.
Books	The BFG - (Classic and novel study) Stone Age Boy- Satoshi Kitamura	The Firework Maker's Daughter, Philip Pullman (novel study)
Addressing Stereotypes	Satoshi Kitamura- looking at race, ethnicity and diversity	Lila wants to become a firework-maker, like her father Lalchand, who thinks this is an unsuitable job for girls.
British Values	**Democracy** – Explore the differences in democracy through time – what's changed? **Rule of Law** – difference between Stone Age and now – what laws have changed? **Individual Liberty** – difference between then and now – why the change? **Mutual Respect & Tolerance** – difference between then and now – why the change?	**Democracy** – Should I stay or go when a tremor strikes? **Rule of Law** – Why are evacuations enforced? **Individual Liberty** – Should evacuations be enforced even when people want to stay? **Mutual Respect & Tolerance** – Is respecting authority a must?
Science (All NC subject content covered)	**Forces and Magnets** **Pupils should be taught to:** • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing **Working Scientifically (WS):** During years 3, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative, and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes	**Rocks and Soils** **Pupils should be taught to:** • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter **Working Scientifically (WS):** During years 3, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative, and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.

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- using straightforward scientific evidence to answer questions or to support their findings.

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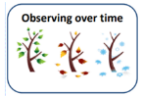
<tr><td>WS opportunities</td><td> 
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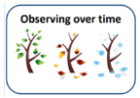
Which materials are magnetic, and which are not?</td><td> 

Which magnet is the strongest?</td><td> 

Which surface causes the most friction?

‘Which magnet is strongest?’</td><td> 

I can research the use of forces and magnets in real world contexts.</td><td> 
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I can compare, group, and classify rock samples – what type of rock did I find?</td><td> 
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Which soils are permeable? How do I know?

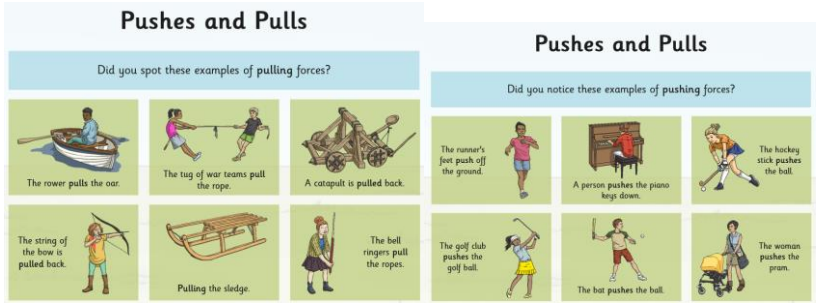
Are all rocks impermeable? I can identify which rocks are permeable and impermeable. Are these rocks permeable? How do I know?</td><td> 

Who is Mary Anning and why is her work important?</td></tr>
<tr><td>Key questions / knowledge and understanding to be explained
Key Knowledge and facts to be recalled</td><td colspan="5">

1. **Forces and Magnets Mind-map – what do I know already? What links can I make?**

2. **Pushes and Pulls**

A force is a push or pull acting on an object because of the object's interaction with another object.
Forces can make objects stop or start moving.



Children identify and recreate different actions and freeze frames to show pushes and pulls.

3. **WS: I can investigate the effects of friction on different surfaces.** Children carry out investigation into ‘Which surface causes the most friction?’ Children create and conduct an investigation to answer the question and make predictions beforehand. Children use the language of gravity, Newtons and friction to explain their findings.

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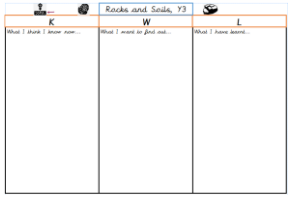
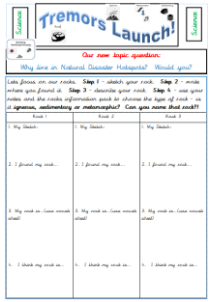
1. **Launch Day activity…children compare, and group rocks brought in from a range of locations (Home-learning task for October half term holiday).** Identify similarities and differences in shared discussion using a range of scientific vocabulary – sort and group rocks using scientific vocabulary/features.

2. **Rocks and Soils KWL grid – what do I know already? What links can I make? What do I want to find out?**



3. **(a) WS: Children describe their individual rocks brought in from home, sketch a labelled diagram and use research to identify the rock types.** Children know and can explain the three main rock types – igneous, sedimentary, and metamorphic.



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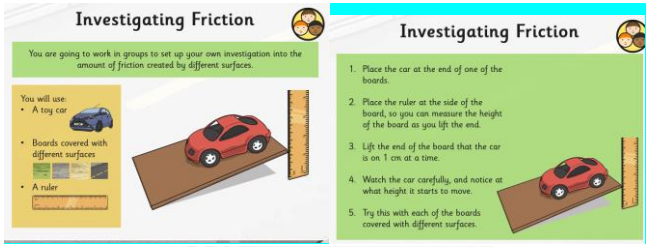
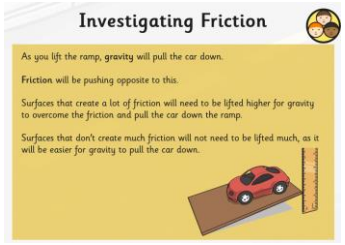
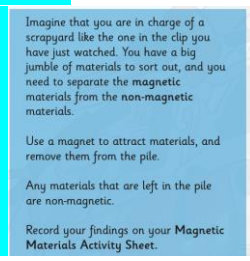




Do Different Materials Have Different Amounts of Friction?

	Amount of Friction (N)		
Material	Test 1	Test 2	Test 3
Table top			
Carpet			
Corridor floor			
Hall floor			
Playground floor			

4. WS: I can sort magnetic and non-magnetic materials. Children carry out an investigation into 'Which materials are magnetic, and which are not?' Children create and conduct an investigation to answer the question and make predictions beforehand. Children use the language of invisible force to describe magnetism and identify that not all metals are magnetic. Children elicit that iron, cobalt and nickel are magnetic metals.

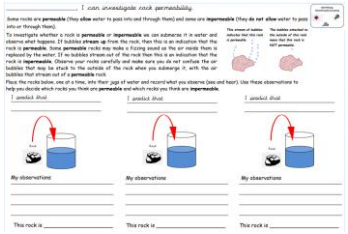


5. WS: I can investigate magnet strength. Children carry out an investigation into 'Which magnet is strongest?' Children create and conduct an investigation to answer the question and make predictions beforehand. Children identify if the size or shape of the magnet effects its strength. Children create a chart(s) of their results and use this to answer the investigation question.

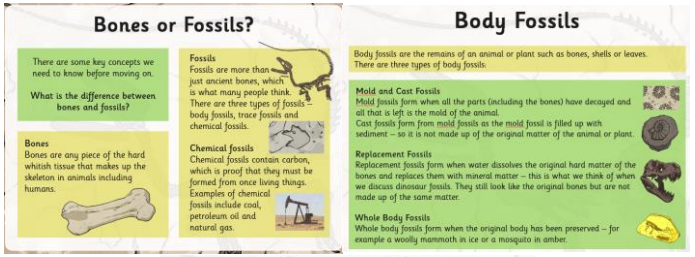
3. (b) WS: Children undertake an investigation into rock permeability. Children understand that pockets of air inside the rock will be released into the water as bubbles if the rock is permeable. Non-permeable rocks will not have these bubbles.

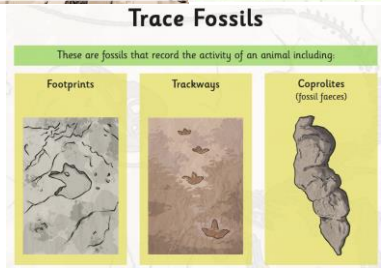
Children understand that

- Permeable means that liquids flow through it.
- Impermeable means that liquid cannot flow through it.

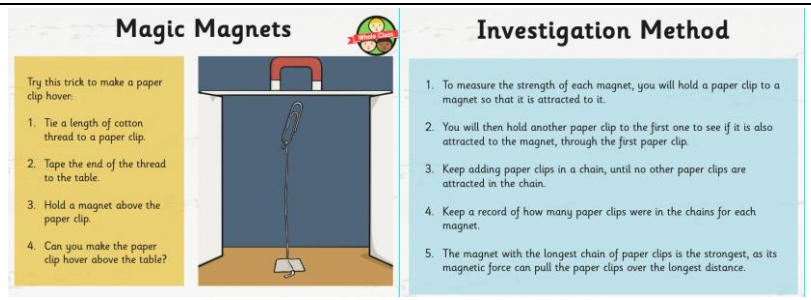


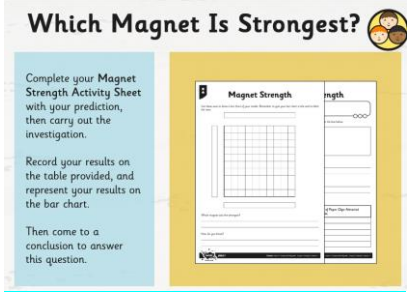
4. (a) Children learn about what a fossil is and how it helps scientists understand about the past. Children know there are a variety of fossil types.





4. (b) Children can explain the fossilisation process.



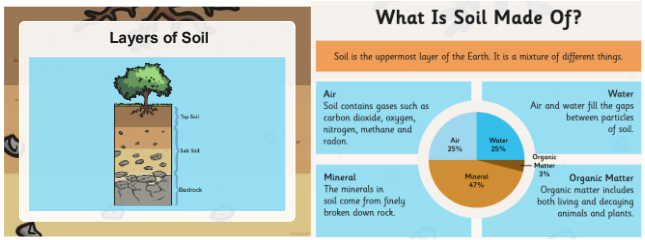


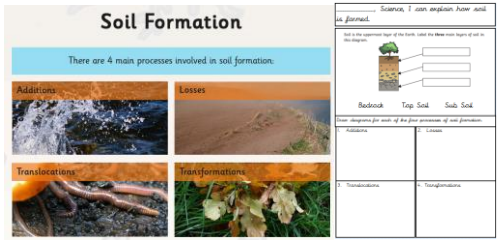
6. (a) WS: I can explore magnetic poles. Children know that the same poles repel, and opposite poles attract. Children can name the poles (North and South) of a magnet and describe whether they will attract or repel. Children understand that magnetism of the Earth is why a compass will always point North – South.

6. **(b) WS:** I can use my knowledge of magnets and forces and apply this to real world contexts. Children use research tools to identify the use of forces in real life contexts. They use vocabulary learnt over the topic, including gravity, friction, attraction, repel and magnetism.

4. (c) WS: Children research Mary Anning and understand her significance in the science of fossil exploration.

5. I can explain that soil is composed of different things. I can describe the four processes of soil formation.



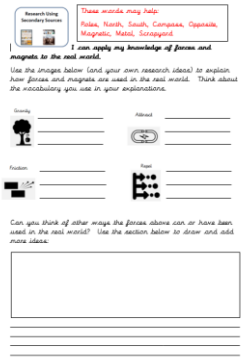
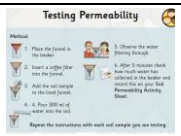


6. Children investigate soil permeability.

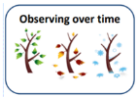
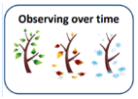
Children learn that just like rocks, soils differ in terms of how permeable they are and that this matters as permeability affects how well plants and crops grow and how likely floods are. Children understand that:

- Permeable means that liquids flow through it.
- Semi-permeable means that some liquid manages to flow through it.
- Impermeable means that liquid cannot flow through it.

Children carry out an investigation into soil permeability using careful observations and recording their results to explain what they have found out about the sample soils tested.

		 **7. KWL and Real-World Application – which soil would be best to stop flood water?**
Vocabulary	Force Push pull Repel Magnet Attract repel Magnetic Poles North South Opposites Surface(s) Air Resistance Gravity Friction Metal Non-metal	Appearance Properties Grains Crystals Hard soft Shiny dull Rough smooth Absorbent non absorbent Rock Soils Organic Matter Fossils Human Made Natural Igneous Sedimentary Metamorphic
Outdoor Learning		

Year 3 Spring Term

	Spring 1st Half	Spring 2nd Half
Theme	**Predators**	**Charity - Shelterbox**
British Key Question	Are (Britain's) predators under threat?	What is charity and what can we do to help?
Enhancements	Visit from animal expert – national marine aquarium, Falmouth	**Visit from a ShelterBox/RNLI representative** **Beach and town safety audit**
Books	Classic Literature – The Lion, The Witch and The Wardrobe, CS Lewis.	Mousehole Cat and other Cornish myths and legends, including St Piran.
Addressing Stereotypes	David Attenborough, Steve Backshall – where are the female natural scientists? Look at the great work of Jane Goodall.	Should charity begin at home? – Explore the need for charity and aid abroad as well as at home. What support do the people of Perranporth need? Foodbanks etc
British Values	**Democracy** – Is the lion the king of the jungle or should other animals have a say? **Rule of Law** – Should we test on animals? **Individual liberty** – Are zoos fair? **Mutual Respect and Tolerance** – Are dangerous dogs or owners to blame?	**Democracy** – Charity – should we give to the UK or elsewhere, who decides? **Rule of Law** – Do we have a responsibility to share with others? **Individual Liberty** – would you live near a natural disaster? **Mutual Respect & Tolerance** - Give to the UK or elsewhere, who decides?
Science (All NC subject content covered)	**Animals including Humans** **Pupils should be taught to:** • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement **Working Scientifically (WS):** During years 3, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative, and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	**Researching Real Life Scientists**
Key Art & Design Skills to be Taught		 Which foods give the best nutrition?	 Does the length of femur affect the distance/height someone can jump?		 What are Endoskeletons,					 What and how can I find out about these scientists? How can I

		Which foods can just humans/animals eat? Which foods can both humans and animals eat? why?	Foods that are high in fat are always high in salt too Fruit snacks contain no sugar at all. Foods that are high in fat are always high in saturated fat. Foods which have 3g or more of fibre for every 100g are always low or medium in sugar content. Foods with more than 5g of protein for every 100g are always high in fat.		Exoskeletons and Hydrostatic Skeletons? How do they protect and support movement?					trust the information I find?

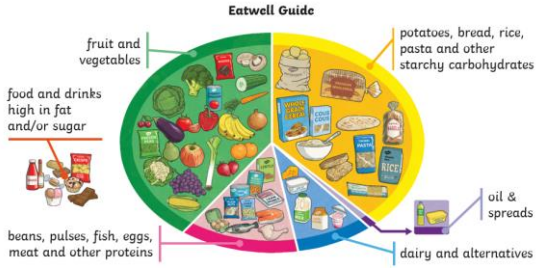
Key questions / knowledge and understanding to be explained
Key Knowledge and facts to be recalled

1. **KWL** – Children to reply to a letter from Alli the Alien, who asks what children know about living things on Earth. Children use pictures and words to reply.

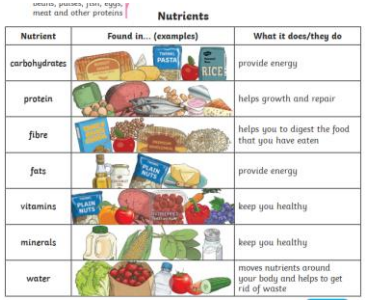
2. **Nutrition**

Children understand that all living things need food (and other elements) to survive, but that humans (animals) cannot produce food for themselves like plants can through photosynthesis. Animals must hunt, gather and/or grow their food to survive and water is also vital to their survival.

Children introduced to the five main food groups of **fruit and vegetables, starchy carbohydrates, proteins, dairy and oils and spreads (fats).** Children can name foods in each category and recognise the importance of a balanced diet:



Children also able to name nutrients, give examples and explain what they do:



1. **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

Marie Curie did lots of important work in science. When Marie lived in Poland girls were not allowed to go to university, so her parents had to send her in secret. She later moved to Paris to study. She discovered radioactivity. During World War One, she helped to put x-ray machines in ambulances. This helped doctors to see where bullets were in the body of a soldier. Marie married another scientist, Pierre. They worked together to find out about the tiny parts, called elements, that make up everything in our Universe. They discovered a new element that gave off rays of heat and light - they called this radium. They studied the light and heat it gave off and called this radioactivity. They were given the most important prize in the world for science: the Nobel Prize. Marie was the first woman ever to receive this!

2. (b) Scientist 2

George Washington Carver was born in 1864 on a small farm in Diamond Grove, Missouri. His mother Mary was a slave owned by Moses and Susan Carver. George Washington Carver was known throughout the south as the "farmer's best friend". His work on crop rotation and innovative products helped many farmers to survive and make a good living. His interest was in science and helping others, not in getting rich. He didn't even patent most of his work because he considered his ideas as gifts from God. He thought they should be free to others.

2. (c) Scientist 3

Mary Anning was born on 21 May 1799. She lived in the English seaside town of Lyme Regis in Dorset. Her family were very poor, which meant she didn't get to attend school much. Instead, she mainly taught herself to read and write. Mary would spend her time searching the coast looking for what she called 'curiosities'. Later in her life, as she developed a better understanding of her finds, she realised they were fossils. Over the course of her life, she made many incredible discoveries. This made her famous among some of the most important scientists of the day. They would visit her for advice and to discuss scientific ideas about fossils. Today, Mary is remembered as one of the greatest fossil hunters to have ever lived.

2. (d) Scientist 4

3. Food labels

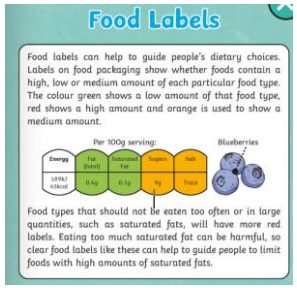
Children learn that animals and their nutritional needs are different to humans and can be split into three groups:

- **Carnivores -** eat meat and get their energy from protein.
- **Herbivores -** eat plants which are not full of carbohydrate, protein, or fat, so many herbivores spend most of their day eating!
- **Omnivores -** eat meat and plants so have more flexibility with their nutritional needs and eat what is available.

They also learn that there is a large range of nutritional needs within each group depending on the specific animal species.

Food labels and Human Nutrition

Humans are omnivores, although some humans choose to eat only plants (vegetarians) and some choose not to eat any animal products at all (vegans). Children know that food labels give information on nutrients in each food and are usually labelled per serving or per 100g. Some labels use a traffic light system to show Green, Amber and Red nutritional information, which helps us eat healthily.



WS into patterns in Nutrients in food:

Children carry out an investigation(s) using a range of food labels from everyday shopping to answer the following statements:

- Foods that are high in fat are always high in salt too
- Fruit snacks contain no sugar at all.
- Foods that are high in fat are always high in saturated fat.
- Foods which have 3g or more of fibre for every 100g are always low or medium in sugar content.
- Foods with more than 5g of protein for every 100g are always high in fat.

William Smith became interested in the local fossils and began collecting them as a child**.** In later life, he became known as the founding father of British Geology and identified that the same types of fossils could be found in the same locations and depth. In 1799 Smith produced the first large scale geologic map of the area around Bath, Somerset and this was later developed into the geological maps of Britain and the world that are now commonplace.

2. (d) Scientist 5

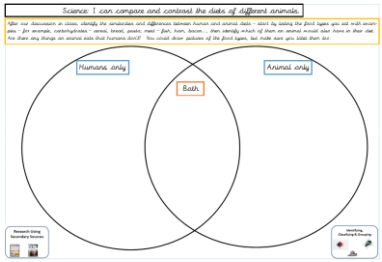
Inge Lehmann (13 May 1888 – 21 February 1993) was a Danish seismologist and geophysicist. In 1936, she discovered that the Earth has a solid inner core inside a molten outer core. Before that, seismologists believed Earth's core to be a single molten sphere.

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?

Children can also explain similarities and differences between human and animal diets in the form of a Venn Diagram and articulate that humans and animals need different nutrition to be healthy.



4. (a) WS: Skeletons

Children know the difference between a **vertebrate (animal with a backbone)** and **invertebrate (animal without a backbone)** and can give examples of each. Children know that mammals (**humans)**, amphibians, reptiles, birds, and fish are **vertebrates** and molluscs (slugs and octopuses) and arthropods (spiders and insects) are **invertebrates.**

Children can name the types of skeletons in animals and begin to explain how this helps them move and offer protection:

- **Vertebrates** have an **Endoskeleton** which grows inside the body.
-
- **Invertebrates** have either an **Exoskeleton**, which grows on the outside of the body or **Hydrostatic Skeleton**, which is a fluid filled compartment inside their body.

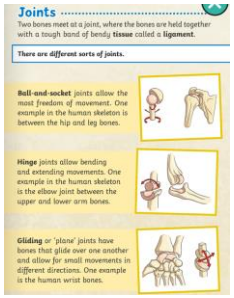
4. (b) WS: Human Skeleton

The main functions of a skeleton are:

1. **Protection of internal organs**
2. **Allow movement**
3. **Provide support and stop humans from falling**

There are 206 bones in the human body, with 56 in the hand and wrists to allow movement of our fingers and hands. Children can label a simple human skeleton:

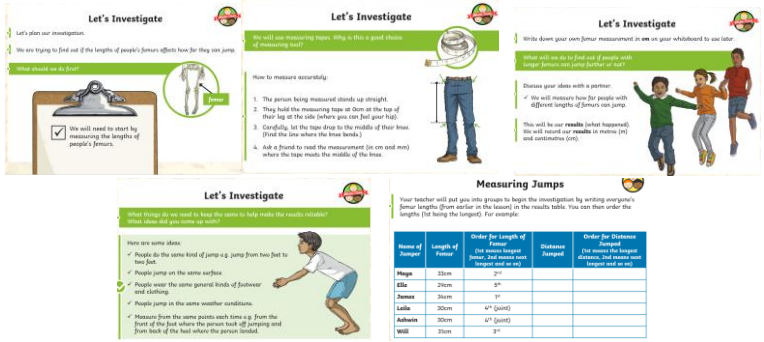
Children also know the main joint types in a human skeleton and how they allow different planes of movement:



Children understand that **cartilage** sits between bones to allow movement and prevent injury. They also know that bones can heal if broken and link this to real life experience.

Children complete a WS investigation to answer the following question:

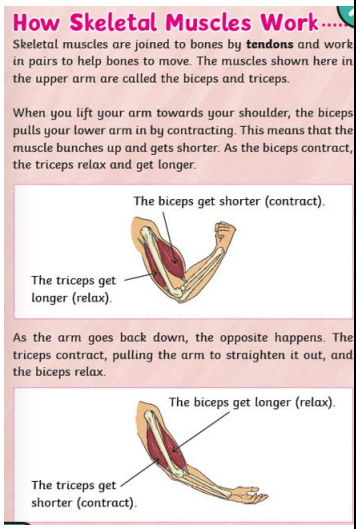
Can people with longer femurs jump further?



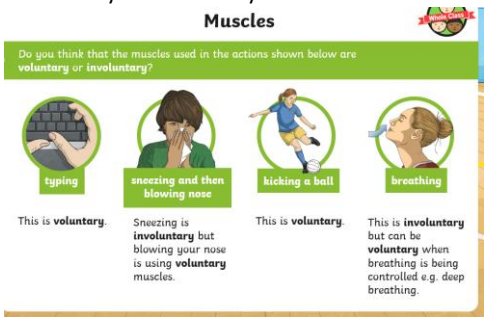
5. Muscles

Voluntary muscles	Involuntary muscles	
Skeletal muscles	**Smooth muscles**	**Cardiac muscle**
These muscles are attached to bones. The brain sends a message to the muscles to cause them to move. Skeletal muscles can pull but not push.	These muscles are in the walls of some internal **organs** and help them to work. There are smooth muscles that move food through the **intestines**.	This is the heart muscle, which makes up most of the mass of the heart and works to pump blood around the body.

The face has 43 muscles – these allow us to show expressions!

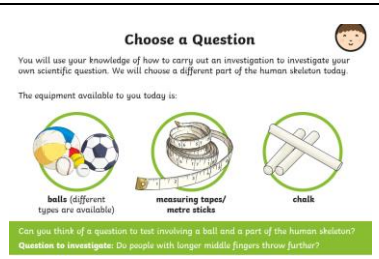
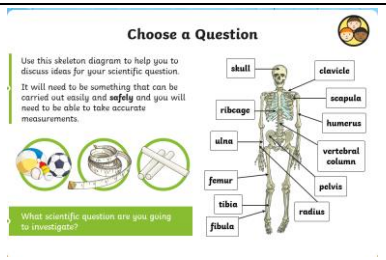


Children can identify involuntary and voluntary muscle movements:

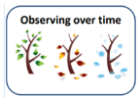
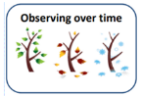


Children use the following vocabulary to describe the movement of the arm:
Word Bank: **contract, shorten, relax, lengthen, biceps, triceps:**
As the arm flexes, the **biceps contract**. The **triceps relax**. When the arm is lengthened, the opposite happens.

6. **Creating and conducting my own investigation question on human skeletons.**

	  **7. KWL and Real-World Application**	
Vocabulary	**Nutrition** Nutrients carbohydrates Protein fats fibre water Vitamins minerals **Skeleton** Support protection movement Endoskeleton exoskeleton Hydrostatic skeleton Vertebrate Invertebrate bones **Joints** Ball joint socket joint hinge joint Gliding joint **Muscles** relax contract pairs	
Outdoor Learning		Cornish landscape group project on Perranporth Beach and/or the School Field.
Other Provision		

Year 3 Summer Term

	Summer 1st Half	Summer 2nd Half
Theme	**Gods and Mortals**	**Flow**
British Key Question	What impact did the Ancient Greeks have on modern democracy?	Are rivers and the sea, the place to be?
Enhancements	Athens Vs Sparta Battle as a launch Sports Day inspired Olympics	Local River Study – River Menalhyl, St Mawgan. Perranporth Beach visit – flood defence and plastic mini-project
Books	Percy Jackson and the Lightning Thief Selection of Ancient Greek Myths and Legends – Pandora, Theseus, Trojan Horse.	Journey to the River Sea (novel study), Eva Ibbotson The River, Valerie Bloom
Addressing Stereotypes	Universal suffrage/right to vote (his) Comparing the rights of men/women in Athens/Sparta/Modern Britain (his)	Maia, female (young girl) lead character in novel study text.
British Values	Democracy – Were there equal rights for all? Rule of Law – Were slaves covered by the same laws as everyone else? Individual Liberty – Could a Spartan become a philosopher? Mutual Respect & Tolerance – What if a Spartan refuse to fight?	Democracy – Should you pay to fish in the river/slash? Rule of Law – Should we limit the number of people who visit a beach? Individual Liberty – Can water be stolen? Mutual Respect & Tolerance – Can you harm a river?
Science (All NC subject content covered)	**Light** **Pupils should be taught to:** • recognise that they need light to see things and that darkness is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change **Working Scientifically (WS):** During years 3, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative, and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	**Plants** **Pupils should be taught to:** • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal **Working Scientifically (WS):** During years 3, pupils should be taught to use the following practical scientific methods, processes, and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative, and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying, and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements, and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.
Key Art & Design Skills to be Taught	    	    

			How Do Shadows Change When the Distance Between the Light Source and the Object Changes?	Which material is the best reflector? Which material is the best at blocking light?		One plant, 30 photos – weekly photos of the same plant or tree – similarities and differences?	Are all flowers the same?	The larger the seed, the larger the plant?	What does a plant need to grow? How is water transported in plants?	What are the different parts of a flower?

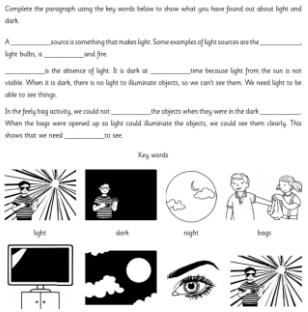
Key questions / knowledge and understanding to be explained Key Knowledge and facts to be recalled

1. **KWL**

2. **Light and Dark**

Light comes from a light source and without light humans cannot see. Children identify light sources and can explain why the moon, windows, and mirrors (amongst others) are not light sources, because they do not create their own light. We can see the moon because light from the sun reflects off it (bounces off it) back to the earth; a window is not a light source. It is an opening that lets the light from the sun or other light source into the room. A mirror is not a source of light because it does not make its own light. It reflects light from other sources.

Dark is the absence of light. If there is no light from a light source, it will be dark. We need light to see things.


Complete the paragraph using the key words below to show what you have found out about light and dark.

A _____ source is something that makes light. Some examples of light sources are the _____, light bulbs, a _____ and fire.

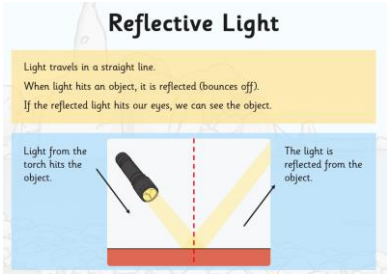
_____ is the absence of light. It is dark at _____ time because light from the sun is not visible. When it is dark, there is no light to illuminate objects, so we can't see them. We need light to be able to see things.

In the feely bag activity, we could not _____ the objects when they were in the dark _____. When the bags were opened up so light could illuminate the objects, we could see them clearly. This shows that we need _____ to see.

Key words

light dark night bags

3. **(a) Reflective Surfaces**



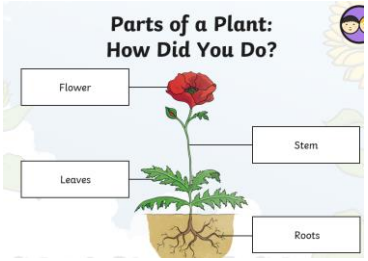
Some surfaces and materials reflect light well. Other materials do not reflect light well. Reflective surfaces and materials can be very useful:

- Reflective strips on coats or bags mean you can be seen at night. They are also useful for fire-fighters or builders who may work in a dark and dangerous environment.
- 'Cat's Eyes' help drivers see the road by reflecting light from headlamps.

1. **KWL**

2. **Parts of a Plant**

Children label simple parts of a part and explain their functions:



Roots
They grow underneath a plant, below the surface of the soil. Roots are usually long and are covered in small hairs. The roots anchor the plant in the ground. They absorb water and nutrients from the soil.

Stem or Trunk
Branches, leaves and flowers grow from the stem or trunk. A trunk is woody, and often has a layer of bark around it. The stem or trunk holds the plant up. It also carries water and nutrients from the roots to the leaves.

Leaves
The leaves make food for the plant using sunlight and carbon dioxide from the air. This is called **photosynthesis**.

Flowers
Flowers are brightly coloured to attract insects and birds. The insects carry pollen to other flowers. Flowers use the pollen to make seeds to grow new plants.

3. **(a) WS: What does a plant needs to grow?**

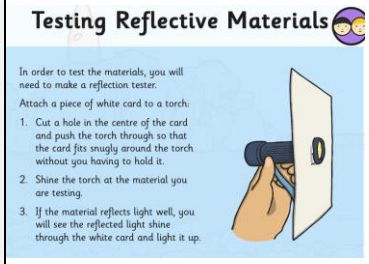
3. **(b) WS: What does a plant need to grow?**

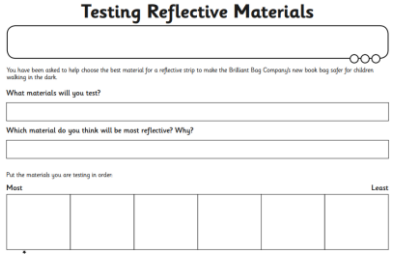
4. **(a) WS: Water transport in plants – comparative investigation**

The process of water transportation is the way water moves through a plant. The roots absorb water from the soil. The stem transports water to the leaves. Water evaporates from the leaves. This evaporation causes more water to be sucked up the stem. The water is sucked up the stem like water being sucked up through a straw.

- Mirrors let us see ourselves, and are also useful in cars, to allow drivers to see behind them.
- Retroreflectors are used for road signs so that drivers can see the signs from their car.

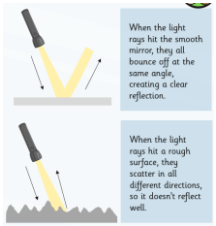
Children conduct a **WS investigation** to identify materials that are good reflectors, applying this to real life by suggesting a suitable material to add to a school book-bag:





3. (b) Marvellous Mirrors

Some surfaces reflect light better than others. The surfaces that reflect light best are smooth, shiny and flat. This is because the light rays bounce off these surfaces at the same angle.



If light hits a rough surface, the light rays all bounce off at different angles, meaning the light is scattered. It does not reflect well.

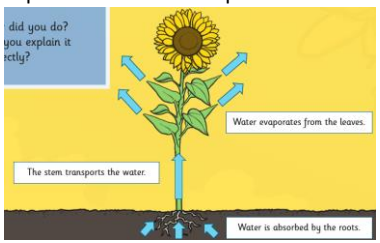
What Is a Mirror?

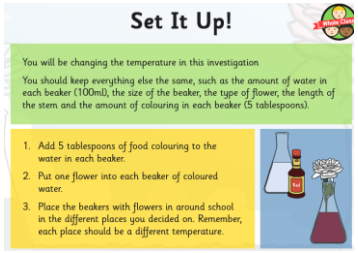
The most familiar type of mirror is a plain mirror, which has a flat surface. Plain mirrors are commonly made of a flat, polished piece of glass with a shiny metal backing, such as silver or aluminium. The light reflected by a mirror preserves most of the characteristics of the original light, so it creates a clear image. An image in a mirror appears to be reversed. For example, if you look in a mirror and raise your right hand, the mirror image appears to raise its left hand.

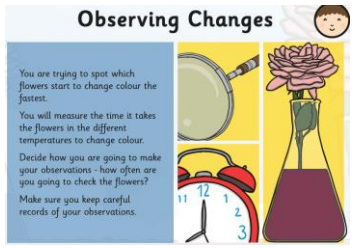
4. Sun Safety

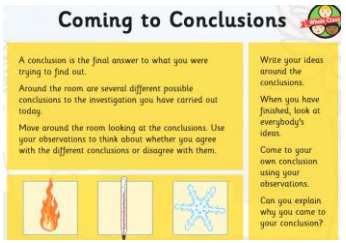
Children discuss and identify positives and negatives of the sun and sunlight:

Investigation: (How) does temperature affect the speed of water transport in plants?









4. (b) WS: Water transport in plants – comparative investigation

Investigation: (How) does light affect the speed of water transport in plants? Children conduct their investigation using the same process and equipment as in **4. (a)**, using a light and dark location for two plants.

5. Children can name the different parts of a flower and explain their role in pollination and fertilisation.

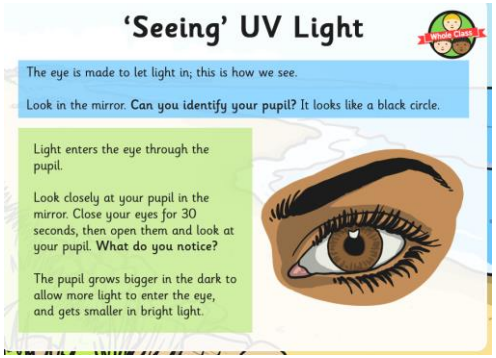
The flower's job is to create seeds so that new plants can be grown. Flowers are made up of lots of parts that work together to make seeds. All flowers have the same parts, but they may not look identical from plant to plant.

The sun emits (gives out) rays of light. We can't see all the types of light that come from the sun. The visible spectrum is the name for the light that we can see, and is made up of the colours of the rainbow:

Some **Ultra-Violet (**UV) rays are blocked by the ozone layer, but most of the UV light from the sun reaches us on earth. The amount of UV light that reaches us depends on different things:

- It is stronger at midday and in the summer.
- If there are no clouds there is more UV light.
- It also gets stronger nearer to the equator.
- The location can make a difference too - water, sand and snow all reflect UV light, making it stronger.

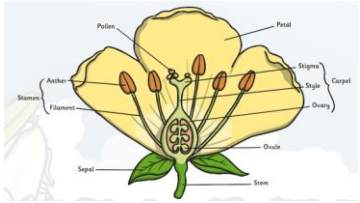
UV light causes sun burn, wrinkles and skin cancer, damages the eyes and can change the colour of some materials.



The Eye:

If too much light comes through the pupil, it can damage the retina. It causes pain, so that you instantly close your eyes, or turn away from a bright light. It is very important that you never look directly at the sun, as the light can damage your eyes very quickly. Bright lights indoors can also damage your eyes, so you should never look at them, or shine lights into anyone's eyes.

WS investigation: children dissect a range of flowers and identify the component parts as per the labelled diagram below. They then label their own flower diagram.



The job of a flower:

Pollination occurs when pollen from the anther is transferred to the stigma. Insects like bees and butterflies are attracted to the bright colours of the petals and the sweet scent of the flower. They visit the flower to drink a sweet liquid called nectar. When an insect goes into the flower to drink the nectar, some grains of pollen brush off the anthers onto their body. When the insect visits another flower for more nectar, the grains of pollen transfer from the insect's body to the sticky stigma of the new flower. **This is pollination.**

1. The pollen on the stigma then travels down the style towards the ovary.
2. Once it reaches the ovary, the pollen joins with an ovule.
3. The ovule can then grow into a seed. **This is known as fertilisation.**

6. **I can understand and order the stages of the life cycle of a flowering plant.**

The life cycle of a flowering plant shows the changes that happen to the plant over the course of its lifetime. The main stages of the life cycle of a flowering plant are:

1. Germination

Germination is when a seed begins to grow.

2. Growing and flowering

Once the seed has germinated the plant grows bigger and then forms flowers.

3. Pollination

Pollination occurs when pollen from the anther is transferred to the stigma, often by an insect.

4. Fertilisation and seed formation

Fertilisation happens when the pollen travels from the stigma down the style to the ovary. The pollen joins with an ovule to form a seed. The seed forms inside the ovary.

5. Seed dispersal

Once the seeds are fully formed, the plant needs to disperse them. This means that the plant needs to move or transport the seeds away from the parent plant in some way so that they don't all try to grow in the same place. There are lots of different ways that seeds can be dispersed:

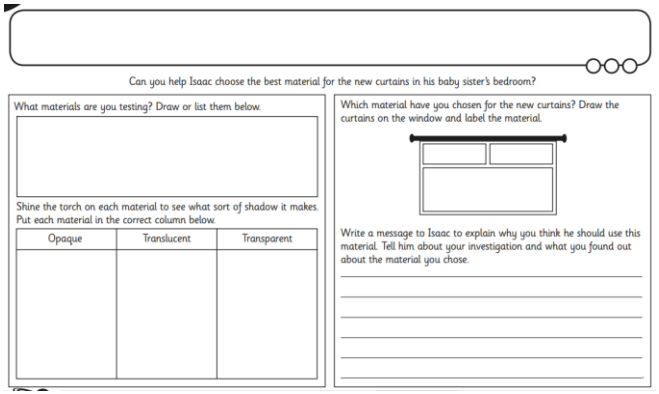
5. (a) Making Shadows

Light is a beam of energy that travels in a wave from a source. A wave of light can only travel in a straight line. Waves of light are called light rays.

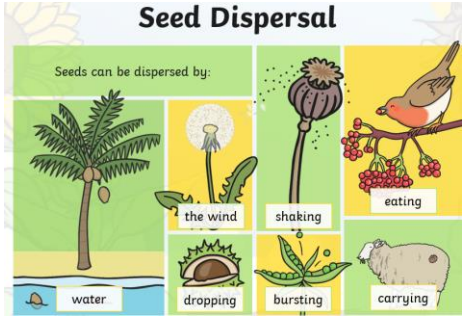
- Some objects, like the card, block light well and don't let any get through. These objects are called **opaque**.
- Other things let some light through but scatter the light so we can't see through them properly. These things are called **translucent**.
- **Transparent** objects let light travel through them easily.

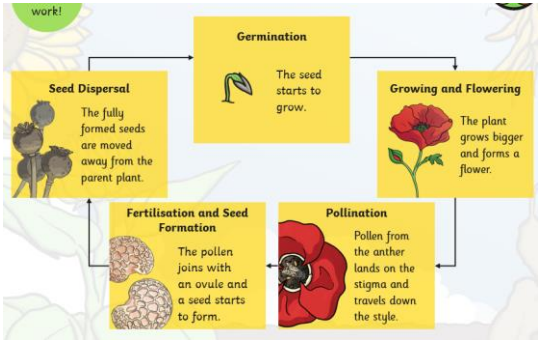
Opaque objects do not let any light through. They completely block the light and stop it travelling any further. These objects create **shadows**. **Shadows** are areas of darkness where light has been blocked.

Children conduct a WS investigation to find the best material to use as curtains.

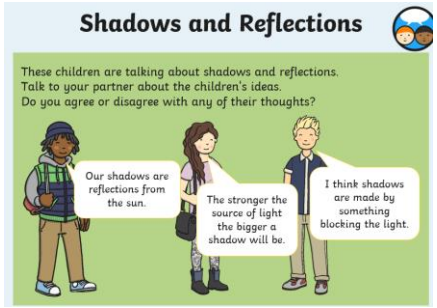


5. (b) Changing Shadows





7. KWL and Real-World Application

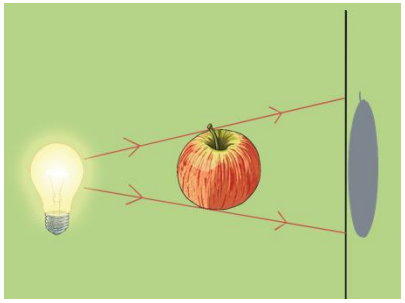


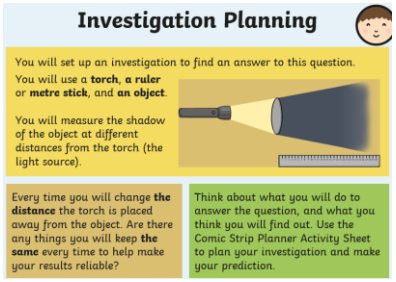
Shadows are created when an opaque object blocks light. The light cannot go through or around the object, so a darker patch of less light is created behind the object. **Shadows are not reflections!** Reflection is when light bounces off an object. **A shadow is caused by light being blocked.**

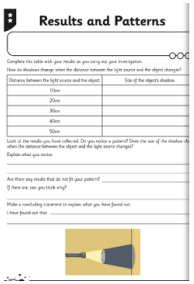
WS Investigation into shadow formations:

Children investigate how shadows change when the distance between the light source and object changes.

Children look at the picture below and discuss what they notice about the shadows.







The closer an object is to the light source, the more light it blocks. This means the shadow created is bigger. But if an object is far away from the light source, it does not block out much light, so the shadow is smaller.

6. **KWL and Real-World Application -Real world application elicited during unit and WS investigations.**

Vocabulary	Light See Blocked Dark Reflect Surface(s) **Natural**: Star Sun **Artificial** Torch Candle Lamp Shadow block Sunlight Dangerous Protect eyes	**Common** Wild plants Garden plants Deciduous Evergreen **Tree** Deciduous Evergreen Trunk Branches Leaf Root **Plant** Leaf leaves Root bud Flowers blossom Petals root Stem Fruit Vegetables Bulb Seed

		Suitable: Conditions Water Light Temperature Healthy Grow Germinate Reproduce
Outdoor Learning	Sparta v Athens battle launch and Olympic Sports Festival Legacy.	Local river study at topic launch, Perranporth Beach visit for flood defence research and plastic investigation.