

UNDERSTAND, DESCRIBE AND EXPLAIN: KEY KNOWLEDGE

To understand the functions of different parts of flowering plants	<i>Plants</i>		<i>Flowering</i>		<i>Non-flowering</i>		<i>Water</i>		<i>Nutrients</i>		<i>Soil</i>	
	<i>Photosynthesis</i>		<i>Chlorophyll</i>		<i>Absorb</i>		<i>Heat</i>		<i>Energy</i>		<i>Sun</i>	
	<i>Root</i>		<i>Stem</i>		<i>Leaves</i>		<i>Flower</i>		<i>Reproductive organ</i>		<i>Fertilisation</i>	
	<i>Sepal</i>	<i>Petal</i>	<i>Stamen</i>	<i>Filament</i>	<i>Anther</i>	<i>Pistil</i>	<i>Stigma</i>	<i>Style</i>	<i>Ovary</i>	<i>Carpal</i>		
	<i>Pollen</i>		<i>Ovary</i>		<i>Ovule</i>		<i>Seed</i>		<i>Pollination</i>		<i>Seed Formation</i>	
	<i>Seed Dispersal</i>		<i>By wind</i>		<i>By animal (internal)</i>		<i>By animal (external)</i>		<i>By explosive action/self-propelled</i>			

To understand the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Learning links:
Geography:
Y5: Rainforest/Biomes
Absorbing CO2/
Photosynthesis/
Plant reproduction

Learning links:
Gardening:
Y3-6: Flowering plants and their growth

Learning links:
Computing :
Y3-6: time lapse

The parts of flowering plants and their functions:

The Roots: are very important for the plant because they *suck the water and nutrients* up out of the *soil* and into the plant.

The Stem: The *stem* is the part of the plant that *holds up other structures* such as the leaves and flowers. *Stems* also *carry water* and *minerals* up *from the roots* to the leaves to help with *photosynthesis* and *take food back down* to be stored and distributed to the plant as it has need.

The Leaves: The *leaves* of a tree (or plant) are where *photosynthesis* happens because the *chlorophyll* in the leaves is what makes photosynthesis possible. *Chlorophyll* it is what makes *leaves green*. The *leaves soak up/absorb heat* and *energy* from the sun to *make food*.

Photosynthesis is the *process* trees (and plants) use to *make their food*. *Absorbing energy* from the *Sun*, *water* from the *ground*, and *carbon dioxide* from the *air*, they make *glucose* (sugar) to feed on so they can *grow into strong, healthy plants*.

The Flower: Flowers are the *reproductive organs* of the *flowering plant*.

The main structures of a flower include:

Sepal - is a *support structure* for the petal. It is *typically green* and helps to *protect and hold up* the petal.

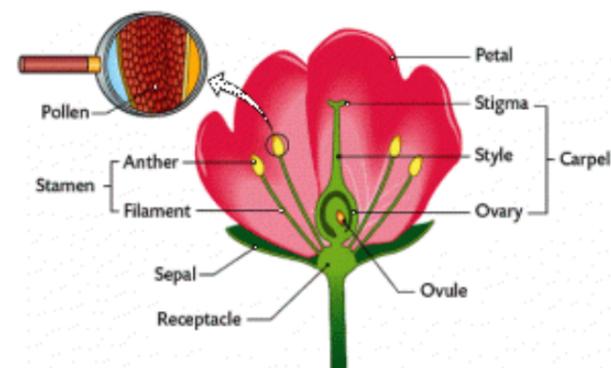
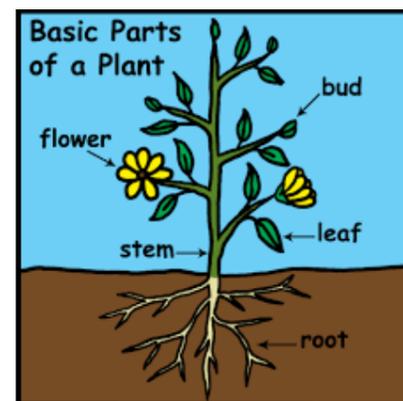
Petals - are *bright and colourful* in order to *attract insects* that help with *pollination*.

Stamen - is the *male part* of the flower that *produces pollen*. There are **2 main parts of the stamen**: the *filament and anther*.

- **Filament** - is the *stalk* that *holds the anther*.
- **Anther** - is made up of *lobes that attach to the filament*. These lobes *hold sacs* which *contain pollen*.

Pistil - is the *female part* of the flower. It contains the *carpel and the stigma*.

- **Stigma** - is the area where *pollen is received*. The stigma may be located at the *end of a stalk* called the *style*.
- **Carpel** - is the *ovary* of the flower and *contains ovules* which are *potential seeds*.



Pollination, seed formation and seed dispersal:

Pollination and Seed Formation:

In order for an *ovary* to *become a seed*, it must *receive pollen*. Insects and birds can play an important role in *pollinating plants*. When an insect or bird is *attracted to a flower* by its bright colour, *pollen* sticks on their fur/feathers. As they *move from plant to plant*, they *transfer the pollen* from one plant to another - **POLLINATION**. The *pollen travels down the style to the ovule*, it *fertilises* it and *develops in to a seed*. This *seed* is now ready to *become a new plant* – **SEED FORMATION**.

Seed Dispersal:

Seeds are *dispersed* away from each other and from the *parent plant* so that there is *less competition*. The *most common methods* of *seed dispersal* are:

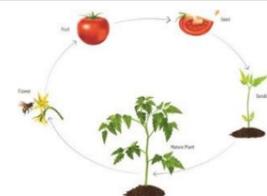
- **Wind:** *Sycamore fruits* are *light* and have *extensions* which *act as parachutes* or *wings* to *catch the wind*.
- **Animal internal:** Tomato, plum, raspberry and grape plants have *brightly coloured* and *succulent fruits* which *contain seeds* with *indigestible coats* which allow the *seeds* to *pass through* the *animal* undamaged.
- **Animal external:** Goose grass and burdock fruits have *hooks* which *attach themselves* to the *fur of passing animals*.
- **Explosive/Self-propelled:** Pea pods *burst open* when ripe *projecting the seeds* away from the plant.

EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

How seeds are formed and dispersed:

Over the length of the term of study, children can observe the plant life cycle of a tomato plant. Take photographs of the different stages of life and reproduction, label and write explanation statements for each. Identify the different parts of the tomato plant and their function.



Flowering Plant Dissection:

Dissect different flowers into their parts (petals, stigma + Style + ovary, anther + Filament) stick them on a sheet observing the pollen if it falls off. Discuss similarities/differences. Cut up an ovary and describe what is inside.

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

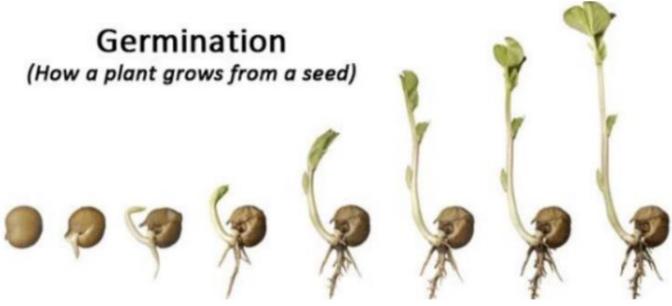
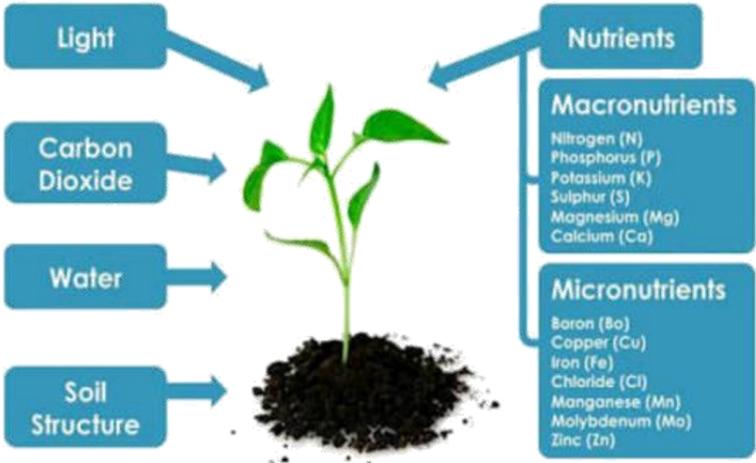
EXS:

- What do all plants have in common? How are different flowers pollinated?
- What would happen to plant populations if there wasn't any wind?
- What would happen to a flowering plant if you took one part of it away?
- Is a plant a living thing? Prove it.
- As a children's author or comic strip designer, describe the process of pollination, seed formation and seed dispersal of a chosen plant.

GDS:

- Could a plant survive without a stem?
- As a gardener's apprentice, where would you suggest planting different types of plants for them to best flourish and reproduce? Explain your choices. If you wanted to grow more of a specific plant, how could you encourage this?
- Why do flowers change over time?
- How can we prove that stems transport water?
- Are all soils the same? Do plants grow better in certain types? Do plants need soil at all? How could you check?

UNDERSTAND, DESCRIBE AND EXPLAIN:

	<i>Germination</i>	<i>Seed</i>	<i>Growth</i>	<i>Roots</i>	<i>Shoots</i>	<i>Temperature</i>	<i>Warmth</i>	<i>Light</i>
To understand 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	<i>Air</i>	<i>Carbon Dioxide</i>	<i>Water</i>	<i>Nutrients</i>	<i>Soil</i>	<i>Transportation</i>	<i>Transpiration</i>	<i>Evaporation</i>
To understand the way in which water is transported within plants	<p>Germination: When seeds are planted, they first grow roots. Once these roots take hold, a small plant will begin to emerge and eventually break through the soil. When this happens, we say that the seed has sprouted. The scientific name for this process is germination.</p> <p>After the seed has made it to a new location and is covered with dirt, it can begin germination. Germination is the process of seeds developing into new plants. First, the right conditions must trigger the seed to grow. Usually, this is decided by how deep the seed is planted, water availability, and temperature. When water is plentiful, the seed fills with water. The water activates proteins that begin the process of seed growth. First the seed grows a root to access water underground. Next, the shoots, or growth above ground, begin to appear. The seed sends a shoot towards the surface, where it will grow leaves to harvest energy from the sun. The leaves continue to grow towards the light source.</p> <p>Plant requirements: A plant must have the following things if it is to successfully grow in to an adult plant:</p> <p>Warmth and light: A seed will not produce a plant at all if it is kept too cold. The seed needs warmth to germinate and start to grow into a healthy plant. Light is used as energy for making food, a process called photosynthesis.</p> <p>Air: Plants take in carbon dioxide from the air for making food (photosynthesis).</p> <p>Water and nutrients: Like humans and animals, plants need both water and nutrients (food) to survive. Plants use water to carry moisture and nutrients back and forth between the roots and leaves.</p> <p>Room to grow: Both the roots and foliage (leaves) need room to grow. Without enough room, plants can become stunted or too small.</p> <p>Water transportation (movement of water) and Transpiration (evaporation from the leaf):</p> <p>Transpiration: The movement of water in plants is driven by a process called transpiration. This is where water evaporating from the leaves of a plant causes the plant to draw up more water from the roots. Water moves from the roots, up the stem, to the leaves (transportation).</p> <p>The stem is made of lots of tubes. It is their job to from the transport water from the roots to the leaves and flowers.</p> <p>This is repeated in a cycle to continuously deliver fresh water and nutrients from the soil to the leaves.</p>							
Learning links:	 <p style="text-align: center;">Germination (How a plant grows from a seed)</p>							
Geography:								
Y3 & Y5: Water Cycle Evaporation								
Y5: Rainforest/Biomes Plant requirements								
Learning links:								
Gardening:								
Y3-6: Plant requirements and growth								

EXPLORE AND INVESTIGATE:

HYPOTHESISE ENQUIRE TEST RECORD REPORT CONCLUDE	<p>How will plant growth differ in different conditions? Ensuring the same type of plant, soil, amount of water and location of planting, add different ingredients to the water being given to each plant to observe any differences in plant growth: height, colour, appearance of health etc. Each day provide each plant with the same amount of water but add the following ingredients to the water:</p> <table border="1"> <thead> <tr> <th>Water (Control)</th> <th>Vinegar (Acid rain)</th> <th>Aspirin</th> <th>Orange juice</th> <th>Miracle Grow Solution</th> </tr> </thead> <tbody> <tr> <td colspan="5">Observe and measure the growth of the plants – is there any observable difference between them and the control? Report and conclude findings.</td> </tr> </tbody> </table>	Water (Control)	Vinegar (Acid rain)	Aspirin	Orange juice	Miracle Grow Solution	Observe and measure the growth of the plants – is there any observable difference between them and the control? Report and conclude findings.				
	Water (Control)	Vinegar (Acid rain)	Aspirin	Orange juice	Miracle Grow Solution						
	Observe and measure the growth of the plants – is there any observable difference between them and the control? Report and conclude findings.										
<p>How is water transported in plants? In two pots/vases, place a strong mixture of coloured water. In Pot A, place white carnations and in Pot B place celery (with leaves still on). Leave the plants in a hot place (preferably outside) to aid transpiration/evaporation from the leaves. Observe the coloured water travelling up the xylem tubes in the stem and through the capillaries in to the leaves and petals. Take photographs, label and write explanation statements of the process of water transpiration and transportation.</p>											

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

<p>EXS:</p> <ul style="list-style-type: none"> Identify and name the key requirements for plants to grow and live. Describe the process of germination How can water get all the way up to the top of a tall tree? How can you prove that stems transport water? As a scientist, writing in a children's encyclopaedia, describe the life cycle of a flowering plant using the correct scientific vocabulary (germination, roots & shoots, nutrition, water transportation & transpiration). Add in some top tips as to how to encourage better, healthier growth. 	<p>GDS:</p> <ul style="list-style-type: none"> Without a mouth or teeth, how do plants not starve or die from dehydration? As a gardening expert, explain to Mr Smith why his plants are unhealthy. He has planted 5 different plants in a small, locked shed with a small, locked window. He put them in good soil and waters them everyday but can't understand why they aren't growing healthily. Can you work out by looking at a seed, how it is dispersed? How could you show if water temperature affects absorption?
--	---

