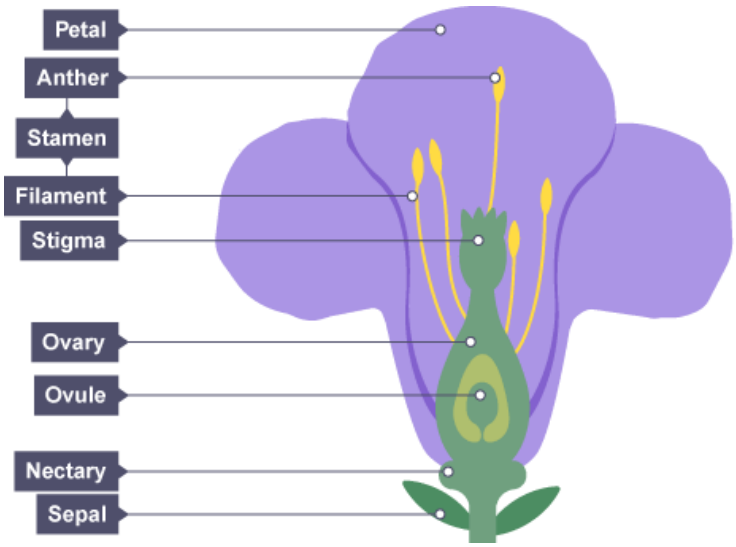
Knowledge Organiser: Plant Reproduction

The Structure of a Flower

Most plants reproduce by **sexual reproduction**.

The **flower** is the reproductive organ of many plants. They produce **male sex cells** (**pollen**) and **female sex cells (egg cells)**.



This table describes the main parts of a flower and their functions:

Structure	**Function**
Petal	Brightly coloured to attract insects.
Stamen	The male part of a flower (made up of an **anther** held up on a **filament**).
Anther	Produce male sex cells (**pollen grains**).
Stigma	The top of the female part of the flower which collects pollen grains.
Style	The stalk that supports the stigma and connects it to the ovary.
Ovary	Produces the female sex cell (**egg cell**), contained in the **ovules**.
Carpel	The female part of a plant (comprised of the stigma, style and ovary).
Nectary	Produce a sugary solution called **nectar**, which attracts insects.
Sepal	Protect the unopened flower.

What happens during pollination?

Pollination is the process of **transferring pollen** from the male part of the plant, the anther, to the female part of the plant, the stigma**.**

Insects can pollinate flowers, and so can the **wind**. Insect-pollinated flowers are different in structure from wind-pollinated flowers. This table describes some differences:

		
Feature	Insect-pollinated	Wind-pollinated
Petals	Large and brightly-coloured – to attract insects	Small, often dull green or brown – no need to attract insects
Scent and nectar	Usually scented and with nectar – to attract insects	No scent or nectar – no need to attract insects
Number of pollen grains	Moderate - insects transfer pollen grains efficiently	Large amounts – most pollen grains are not transferred to another flower
Pollen grains	Sticky or spiky - sticks to insects well	Smooth and light – easily carried by the wind without clumping together
Anthers	Inside flower, stiff and firmly attached - to brush against insects	Outside flower, loose on long filaments – to release pollen grains easily
Stigma	Inside flower, sticky - pollen grains stick to it when an insect brushes past	Outside flower, feathery – form a network to catch drifting pollen grains

We depend upon pollination by insects (including the honey bee) for many of our crops. Without them the security of our food would be threatened.

Types of Pollination

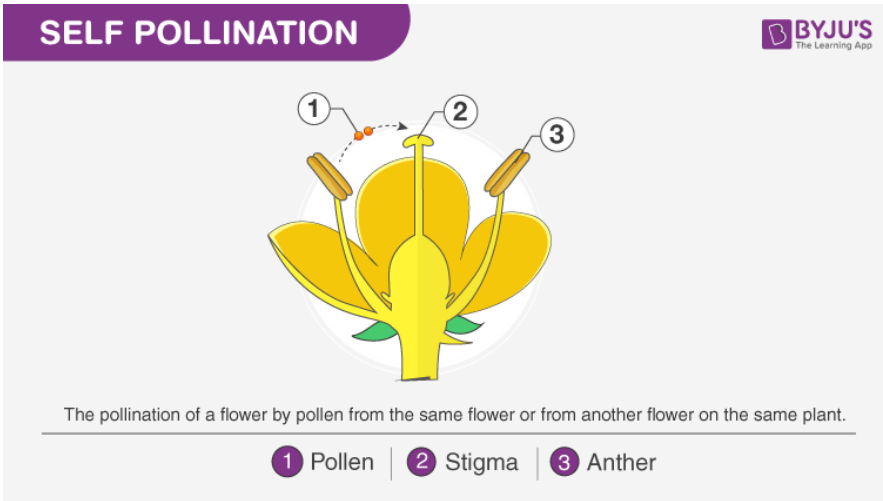
There are two types of pollination:

1. Self Pollination

In this process, the **pollen grains transfer from the anther to the stigma of the same or genetically similar flower**. The self-pollination can be seen in legumes like sunflowers, orchids, peanuts, oats, peas, potatoes, wheat, peaches, and more.

This type of pollination **reduces genetic diversity** (there are **less differences between flowers** as the genes being bred are similar).

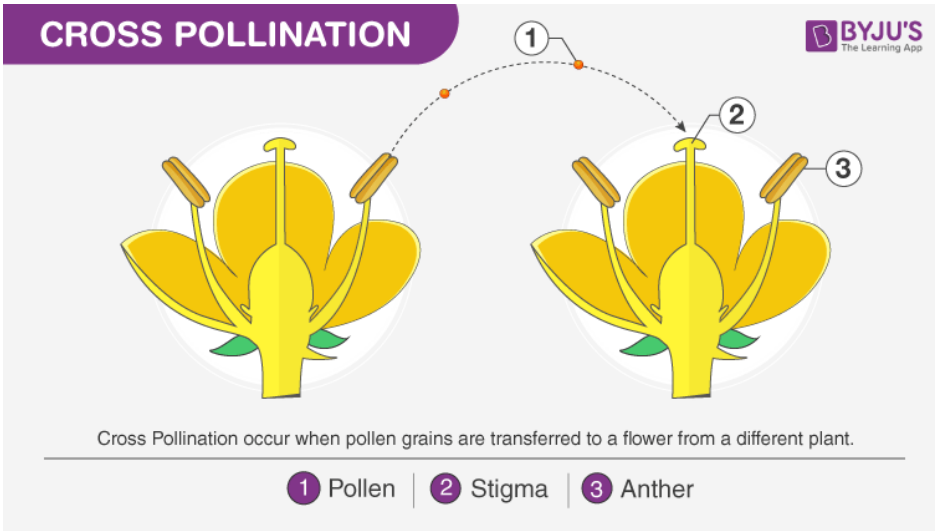
Flowers will prevent self-pollination by either having **stigma above the stamen** or by having **stamen and stigma mature at different times**.



2. **Cross Pollination**

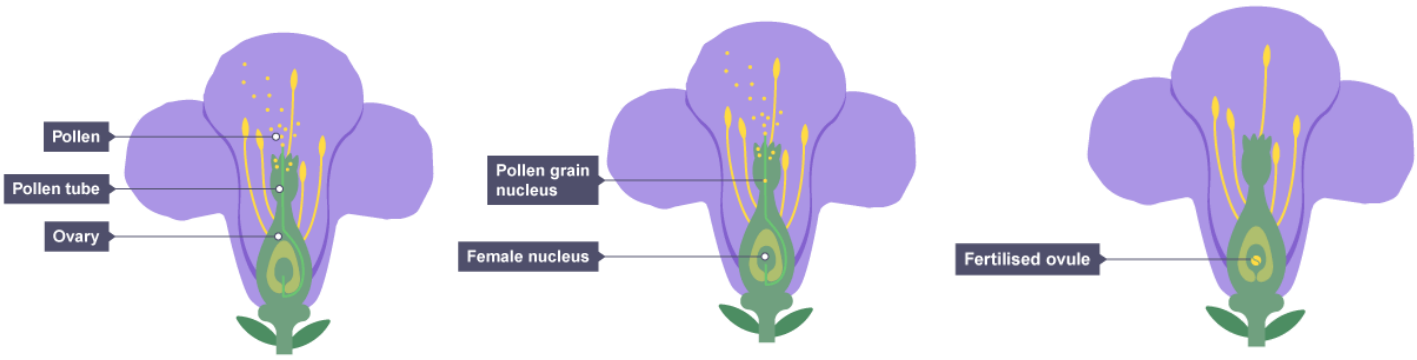
This is the transfer of pollen grains from the **anther of one flower** to the **stigma of a different flower**. Commonly, the process is done pollinators that are insects and wind. By insects, the process takes place in several plants like tulips, grapes, plums, apples, pears, strawberries, daffodils, raspberries and others. While, by wind for different grasses, maples trees, dandelions, catkins, and others.

This type of pollination **increases genetic diversity** (there are **more differences between flowers** as different genes are being mixed).



What happens during fertilisation?

1. A pollen grain is **transferred from one flower to another**. It starts to grow if it lands on the stigma of a flower of the correct species.
2. A **pollen tube** grows from the stigma to the ovary (through the style).
3. The **nucleus of the pollen grain** (male gamete) passes through the pollen tube and **joins with the egg cell** (female gamete) inside an **ovule** in the ovary.
4. The fertilised egg cell develops into an **embryo**.



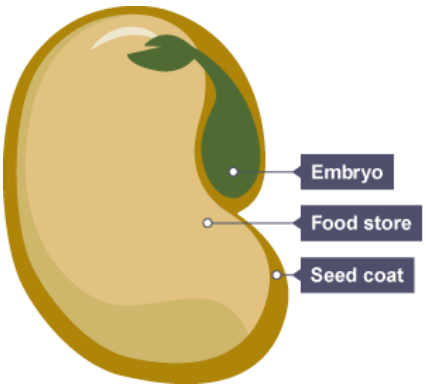
After fertilisation, the **female parts** of the flower develop into a **fruit**:

- the **ovules** become seeds
- the **ovary wall** becomes the rest of the fruit

Seeds

A seed has three main parts:

- **embryo** – the young root and shoot that will become the adult plant
- **food store** – **starch** for the young plant to use until it is able to carry out **photosynthesis**
- **seed coat** – a **tough protective outer covering**



How are seeds dispersed?

Plants compete with each other for factors such as:

- light
- water
- space
- minerals in the soil

Seeds must be dispersed or **spread away** from each other and from the parent plant. This is to **reduce competition** between the parent plant and the new plants, and between the new plants.

The table describes the most common methods of seed dispersal:

Method	Detail	Examples
Wind	Seeds have lightweight parts, wings or parachutes	Dandelion, sycamore
Animals (inside)	Brightly coloured and tasty fruits contain seeds with indigestible coats, so that the seeds pass through the animal's digestive system undamaged	Tomato, plum, raspberry, grape
Animals (outside)	Fruits have hooks that attach them to the fur of passing animals	Goose grass, burdock
Self-propelled	Have a pod that bursts open when ripe, throwing the seeds away from the plant	Pea pod

Investigating dispersal

Seeds dispersed by the wind are easier to investigate than seeds dispersed by other methods. For example, you could release **sycamore seeds** and measure the distance they travel. Factors that could affect the distance travelled by a sycamore seed include:

- the height from which it is released
- the surface area of the wings
- the mass of the seed
- the wind speed