WJEC (Wales) Biology A-level

Unit 4.2 - Sexual reproduction in plants

Flashcards

What is a dicotyledon?

What is a dicotyledon?

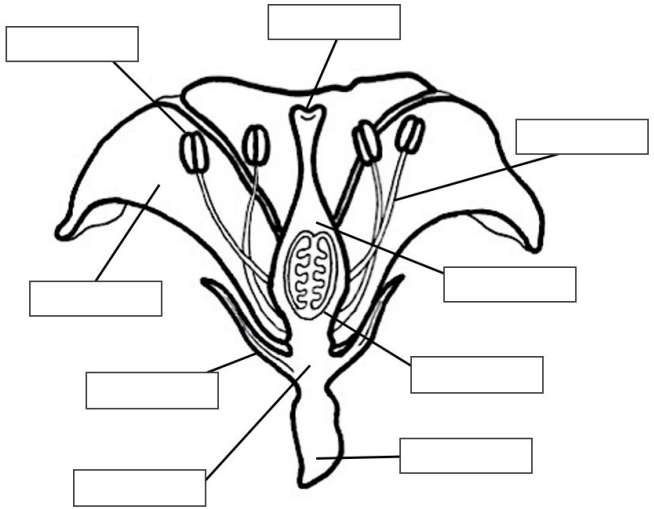
A plants that produces seeds that contain two cotyledons; they have two primary leaves.

What is an insect-pollinated flower?

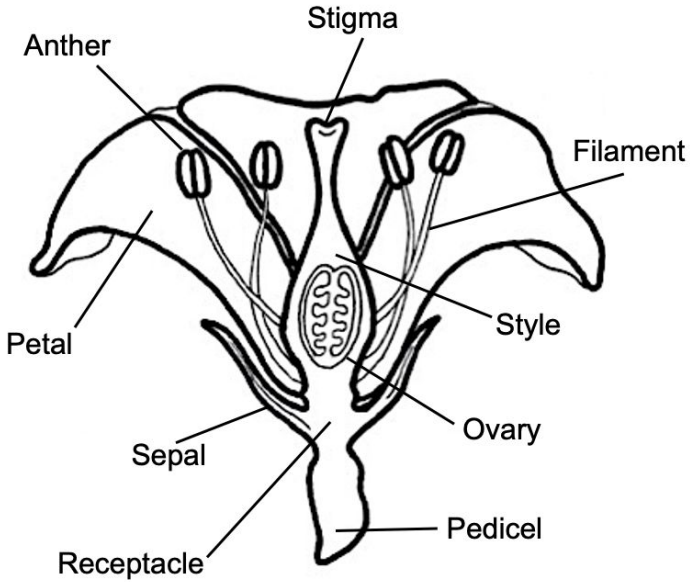
What is an insect-pollinated flower?

A type of flower that relies on insects to transfer pollen grains between flowers.

Label the diagram of the insect-pollinated flower below.



Label the diagram of the insect-pollinated flower below.



What is the calyx?

What is the calyx?

- The first part of the flower that is formed
- Consists of leafy structures that protect the flower during development

What is the corolla?

What is the corolla?

All of the petals of a flower.

What is the carpel?

What is the carpel?

The **female** part of the plant consisting of a **stigma**, a **style** and an **ovary**.

What is the stamen?

What is the stamen?

The **male** part of the plant consisting of an **anther** and a **filament** that is involved in the production of male gametes in the form of pollen grains.

Describe the adaptations of insect-pollinated plants.

Describe the adaptations of insect-pollinated plants.

- **Internal anthers** and **small stigma** directly touch insects
- **Large, bright petals** and **nectar** from glands attract insects
- May produce **chemicals** to the mimic scent of female insects or to intoxicate insects
- Grow **individually**
- **Large pollen grains**, sometimes with projections that attach to insect

What is a wind-pollinated plant?

What is a wind-pollinated plant?

A type of flower that relies on wind to transfer pollen grains between flowers.

Describe the adaptations of wind-pollinated plants.

Describe the adaptations of wind-pollinated plants.

- **External anthers** optimise pollen dispersal
- **Excess pollen** compensates for wind wastage
- **Feathery stigma** catches pollen from the air
- **Small**, **dull petals** (no need to attract insects)
- Grow **densely** over large areas
- **Light pollen grains**

How does a pollen grain form in the anther?

How does a pollen grain form in the anther?

- Large numbers of pollen mother cells produced by mitosis
- Meiosis of diploid mother cells in the anther forms four haploid microspores
- Haploid microspores mature into pollen grains via mitosis

Describe the role of the tapetum in pollen grain development.

Describe the role of the tapetum in pollen grain development.

- Specialised layer of cells in the anther
- Provides nutrients to developing pollen grains

Describe the structure of mature pollen grains.

Describe the structure of mature pollen grains.

- **Generative cell** (haploid nucleus) produces two male gametes via mitosis
- **Pollen tube cell** (also has its own nucleus) elongates to penetrate ovule
- **Outer protective coating**

Define dehiscence.

Define dehiscence.

The splitting of the anther resulting in the release of pollen grains.

How does the ovule form in the ovary?

How does the ovule form in the ovary?

- Meiosis of megaspore cell produces **four haploid megaspores**
- Growth and development (involving **three mitotic divisions**) of one of the megaspores
- **Embryo sac** forms containing **eight haploid nuclei**

Describe the structure of the embryo sac.

Describe the structure of the embryo sac.

- **Two polar nuclei** form endosperm
- **Ovum** forms zygote
- **Two synergids** help generative nucleus of pollen grain to reach ovum
- **Three antipodal cells**
- Outer protective coating

Define pollination

Define pollination

The deposition of pollen onto a stigma from an anther.

Name the two types of pollination.

Name the two types of pollination.

- Cross-pollination
- Self-pollination

What is cross-pollination?

What is cross-pollination?

A type of pollination in which pollen is transferred from an anther of one plant to a stigma of a **different** plant.

What is self-pollination?

What is self-pollination?

A type of pollination in which pollen is transferred from an anther of a plant to a stigma of the **same** plant.

Compare the genetic diversity produced by cross- and self-pollination.

Compare the genetic diversity produced by cross- and self-pollination.

Cross-pollination results in plants with greater genetic diversity whereas self-pollination produces plants with less diversity.

Outline the adaptations of flowers that promote cross-pollination.

Outline the adaptations of flowers that promote cross-pollination.

- Maturation of pollen and ovary at different times
- Physical features prevent self-pollination, e.g. heterostyly, male and female flowers on different parts of the plant

Where does double fertilisation occur?

Where does double fertilisation occur?

Embryo sac of ovule.

How do the male nuclei reach the embryo sac?

How do the male nuclei reach the embryo sac?

- Pollen grain from one plant lands on the stigma of another
- Mitosis of pollen grain to form a **pollen tube nucleus** and **two male gametes**
- Pollen tube grows from the grain down to the ovule via the digestion of the style
- Pollen tube delivers two male gametes

How does the pollen tube enter into the embryo sac?

How does the pollen tube enter into the embryo sac?

Via the micropyle

Define micropyle.

Define micropyle.

- Pore in the integument of an ovule through which the pollen tube enters the embryo sac
- Remains as a pore in the testa (seed coat)

What happens during double fertilisation?

What happens during double fertilisation?

In the embryo sac of ovule:

- One sperm cell fertilises an ovum to form a **diploid zygote**
- One sperm cell fuses with **two polar nuclei** to form a **triploid primary endosperm**

What happens to the ovule following double fertilisation?

What happens to the ovule following double fertilisation?

Develops into the seed.

How is the diploid embryo formed following double fertilisation?

How is the diploid embryo formed following double fertilisation?

Diploid zygote undergoes mitosis to form diploid embryo.

How is the endosperm formed?

How is the endosperm formed?

Nucleus of triploid endosperm divides by mitosis to form endosperm.

What is the function of the endosperm?

Why is the function of the endosperm?

Acts as a nutrient source for the embryo.

What structure forms the testa?

What structure forms the testa?

Integuments develop into the testa.

What happens to the ovary following double fertilisation?

What happens to the ovary following double fertilisation?

It develops into a fruit wall surrounding the seed.

What is the plumule?

What is the plumule?

The part of a plant embryo that develops into the primary shoot.

What is the radicle?

What is the radicle?

The part of a plant embryo that develops into the root.

What is the hilum?

What is the hilum?

A scar on the testa as a result of separation from its funicle.

Define germination.

Define germination.

The process by which a plant grows from a seed.

Give an example of a non-endospermic seed.

Give an example of a non-endospermic seed.

Broad bean (*Vicia faba*)

Describe the stages of germination in a non-endospermic seed.

Describe the stages of germination in a non-endospermic seed.

- Seed absorbs water through the micropyle causing swelling of the cotyledon, enzyme activation and the rupture of the seed coat
- Food reserves from the cotyledons are hydrolysed
- Provides energy for the growth of the plumule and radicle, as well as respiration

Describe the stages of germination in an endospermic seed.

Describe the stages of germination in an endospermic seed.

1. Seed absorbs water, activating the embryo to secrete the cell-signalling plant growth factor, gibberellin
2. **Gibberellins** induce the synthesis of amylase
3. Amylase diffuses to the endosperm layer and causes the hydrolysis of starch to glucose

State the factors affecting seed germination.

State the factors affecting seed germination.

- Water availability (trigger secretions of gibberellin)
- Temperature
- Availability of O_2 for respiration
- Use of fertiliser provides extra nutrients for growth