

Solutions

Each answer shows the steps, then the **result**.

2.1

- the **anther** makes pollen grains
- the **stigma** receives them

2.2

- the **sepals** protect the flower while it is a bud
- the **petals** are large and brightly coloured, to **attract insects**

2.3

- any **two** differences, each with its reason:
- a wind-pollinated flower has **small, green petals** or none – it does not need to attract insects
- its **anthers hang outside** the flower – so the wind can shake the pollen out and carry it away
- its **stigma is large and feathery** and hangs outside – so it catches pollen carried in the air
- other acceptable pairs: no nectar; smaller, lighter, smoother pollen grains, produced in far greater numbers

2.4

- **pollination** is the transfer of a pollen grain from an **anther to a stigma**
- **fertilisation** is the fusion of a **pollen nucleus with a nucleus in an ovule**, which happens later, after the pollen tube has grown

2.5

- pollen is transferred from the anther to the stigma of the **same flower**
- or to the stigma of a different flower **on the same plant**

2.6

- **water**
- **oxygen**
- a **suitable temperature**

3.1 C

- anthers hanging outside let the **wind** shake the pollen out and carry it away
- **A, B and D** are all ways of attracting an insect and getting pollen onto it, so they belong to an insect-pollinated flower

3.2

(a)

- pollen is transferred from the **anther of one plant** to the **stigma of a flower on a different plant**
- of the **same species**

(b)

- the two parents have different **alleles**, so there is more **genetic variation** among the offspring
- a varied population is more likely to contain individuals that can **survive a change in the environment**, such as a new disease or a change in climate

(c)

- cross-pollination depends on a **pollinator** – here the bees – to carry the pollen between trees
- if few bees are present, few flowers are pollinated, whereas a self-pollinating plant needs no pollinator at all

3.3

(a)

- tube **A**
- it has **all three** conditions, so it shows that the seeds are alive and able to germinate; without it, a tube in which nothing germinated would prove nothing

(b)

- the only difference between A and B is the **water**
- seeds germinated in A but not in B, so **water is needed** for germination

(c)

- **boiling** drives the dissolved **oxygen** out of the water
- the **oil** layer stops oxygen from the air dissolving back in, so the seeds have no oxygen

(d)

- a little dissolved oxygen may have been left in the water, or the oil layer may not have covered the surface completely
- so that one seed had just enough oxygen to respire and begin to germinate

(e)

- 4 °C is **too cold**, so the seed's **enzymes** work far too slowly
- the stored food is not digested quickly enough to supply the growing seedling, so germination does not happen in a week

(f)

- **light was not a variable** in the investigation: every tube was kept in the same light
- to test light she would need two tubes alike in every other way, one in the light and one in the dark, so these results give no evidence about light at all