16. Reproduction

16.3 Sexual reproduction in plants

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 **(a)** Fig. 5.1 is a diagram of an insect-pollinated flower.

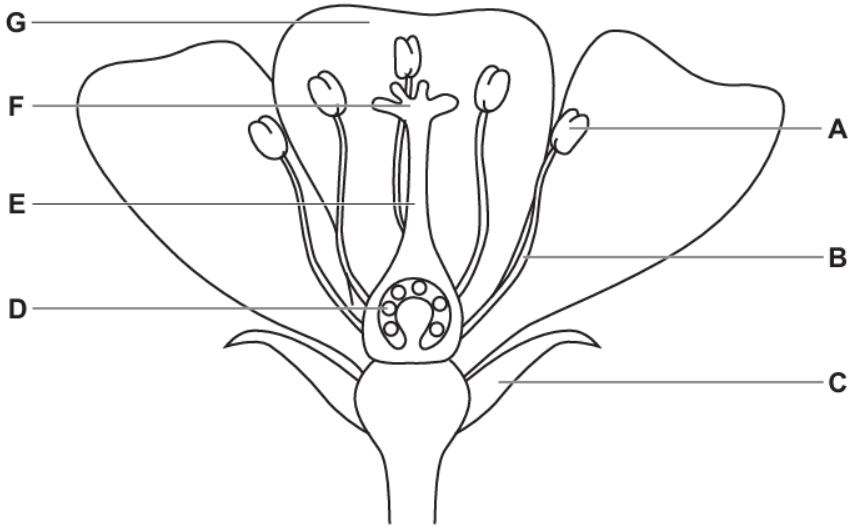


Fig. 5.1

(i) State the letters of the structures in Fig. 5.1 that make up the stamen.

..... and .....

[2]

(ii) State the letter of the structure in Fig. 5.1 where fertilisation takes place.

..... [1]

(iii) Explain how the part labelled **G** in Fig. 5.1 is adapted for its function.

.....

.....

.....

.....

..... [2]

(b) (i) Complete the sentence about pollination.

Pollination is the transfer of pollen grains from the ..... to the

..... .

[2]

(ii) State **three** ways that pollen grains from insect-pollinated flowers differ from pollen grains from wind-pollinated flowers.

1 .....

2 .....

3 .....

[3]

[Total: 10]

2 **(a)** A student investigated the conditions needed for the germination of cress seeds.

Fig. 5.1 shows the apparatus, conditions used and the results of the investigation.

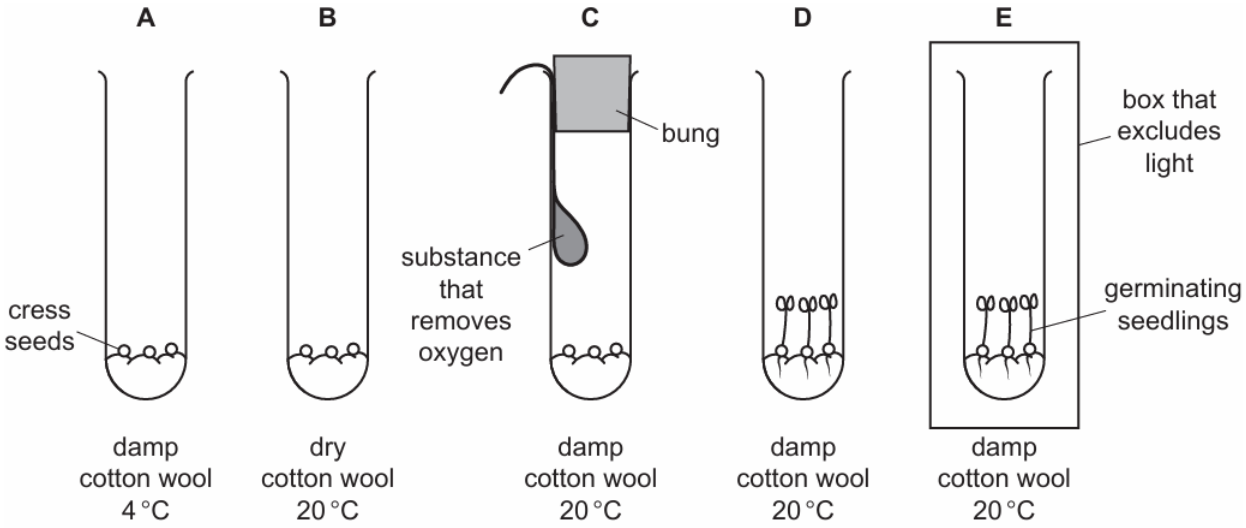


Fig. 5.1

(i) Identify the letters of the **two** test-tubes in Fig. 5.1 that show that oxygen is needed for germination.

..... and .....

[2]

(ii) A gardener wanted to store some cress seeds for a long time before using them.

Use the information in Fig. 5.1 to identify the ideal conditions to **prevent** germination.

Tick **two** boxes.

cold	
dry	
light	
low carbon dioxide concentration	
low pH	

[2]

3 A student carefully took a fuchsia flower apart.

Fig. 8.1 is a photograph of the parts of the flower.

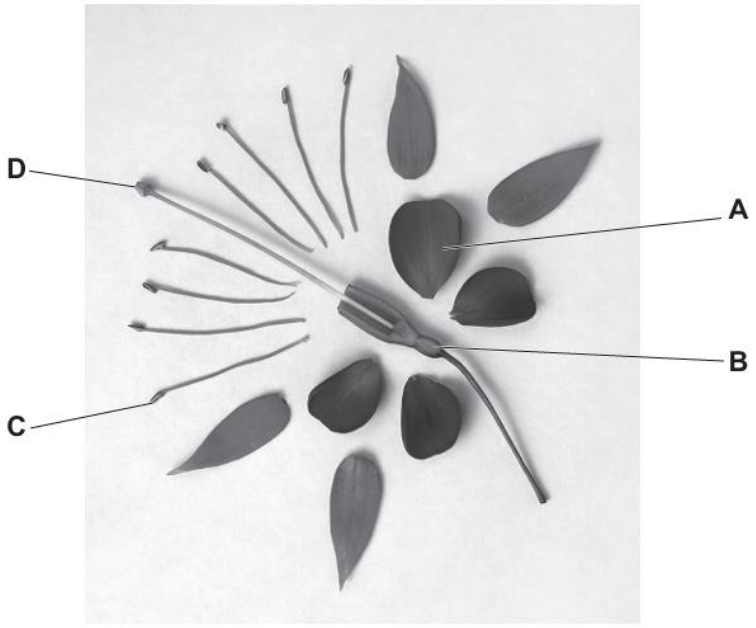


Fig. 8.1

State the function of each of the parts labelled **A** to **D** in Fig. 8.1.

A .....

.....

B .....

.....

C .....

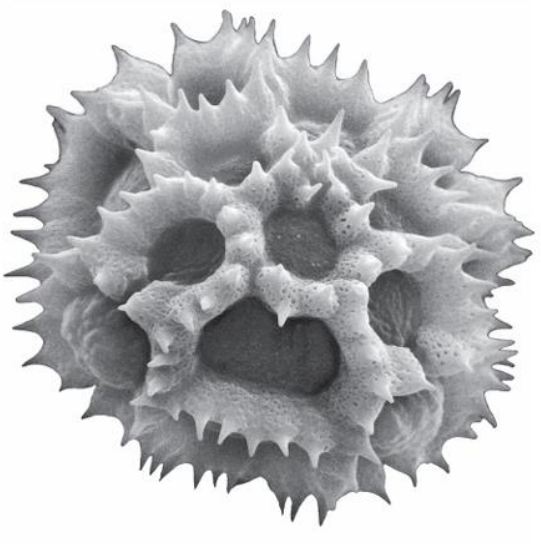
.....

D .....

.....

[4]

4 **(a)** Fig. 7.1 is a photomicrograph of pollen from an insect-pollinated plant.



magnification ×2500

Fig. 7.1

Describe **two** ways the pollen from a wind-pollinated plant differs from the type of pollen shown in Fig. 7.1.

1 .....

.....

2 .....

.....

[2]

(b) Fig. 7.2 is a diagram of a section through an insect-pollinated flower.

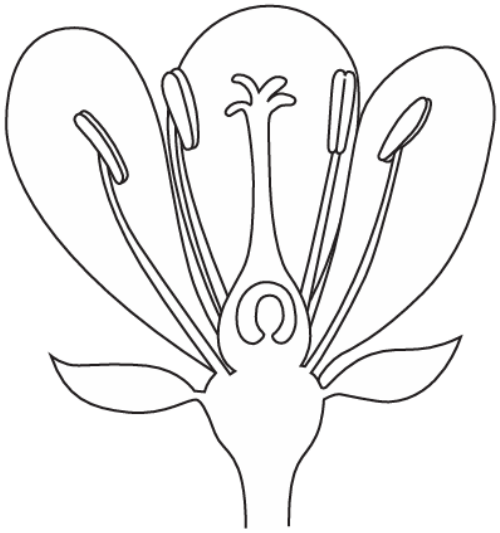


Fig. 7.2

On Fig. 7.2:

- draw an **X** to show where fertilisation occurs
- **circle** the part where pollination occurs
- draw a label line and label the part that produces pollen with the correct name.

[4]

(c) Plants grow from seeds.

State **two** conditions required for the germination of seeds.

1 .....

2 .....

[2]

5 Fig. 6.1 is a photograph of a section through a flower.

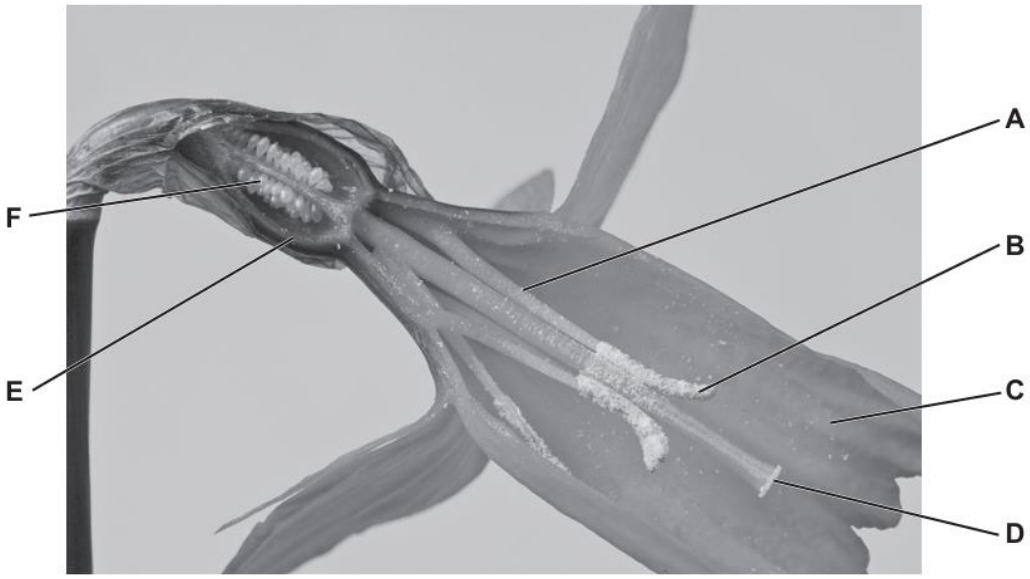


Fig. 6.1

(a) (i) State the names of the parts labelled **A**, **C** and **E** in Fig. 6.1.

A .....

C .....

E .....

[3]

(ii) State the function of the part labelled **B** in Fig. 6.1.

.....

..... [1]

(iii) State the letter of the part in Fig. 6.1 where pollination occurs.

..... [1]

(b) State **one** piece of evidence from Fig. 6.1 that shows this is an insect-pollinated flower.

.....

.....

..... [1]

(c) Describe the adaptations of the flower structure **and** pollen in a wind-pollinated flower.

.....

.....

.....

.....

.....

.....

..... [3]

(d) Living organisms are classified into kingdoms. The organism shown in Fig. 6.1 belongs to the plant kingdom.

State the name of **one** other kingdom.

..... [1]

[Total: 10]

6 **(b)** Seeds need certain factors for germination.

Circle **three** factors that are needed for germination.

carbon dioxide **iron** **nitrogen** **oxygen**

suitable temperature **water** **vitamin C**

[3]

7 **(d)** Describe how insect-pollinated flowers are adapted for pollination.

.....

.....

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.....

.....

.....

.....

.....

..... [4]

8 **(a)** A student investigated the conditions needed for germination of seeds.

Fig. 8.1 shows the apparatus and conditions used.

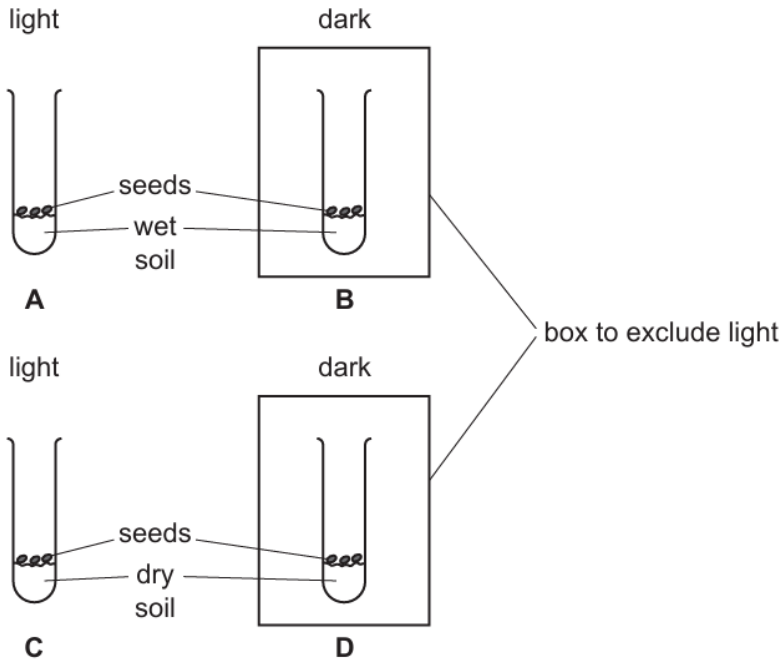

Fig. 8.1

The seeds in test-tubes **A** and **B** germinated but the seeds in test-tubes **C** and **D** did not germinate.

(i) Use the information in Fig. 8.1 to state **one** condition required for germination.

..... [1]

(ii) Use the information in Fig. 8.1 to state **one** condition **not** required for germination.

..... [1]

(iii) The investigation was repeated with seeds that had been boiled for 10 minutes and then cooled.

Predict **and** explain the effect of boiling on the results.

.....

.....

.....

.....

..... [2]

9 **(a)** Pollination occurs when pollen is transferred from one flower to another.

Fig. 7.1 is a diagram of part of a flower.

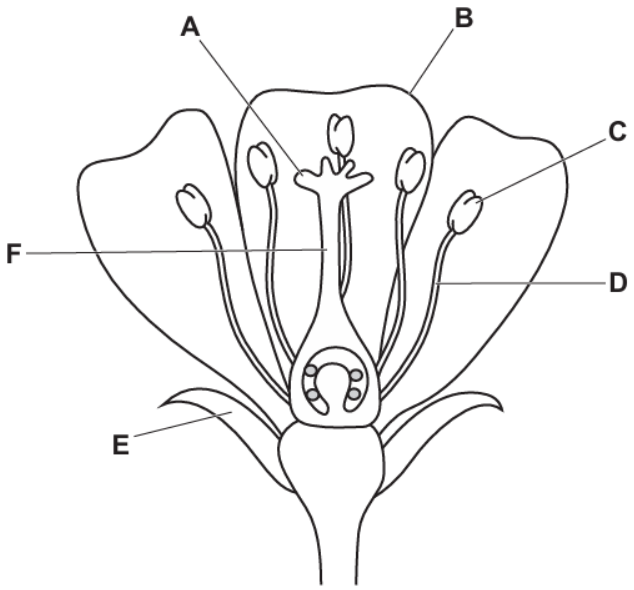

Fig. 7.1

(i) State the letter from Fig. 7.1 that identifies the structure which:

attracts insect pollinators .....

produces pollen .....

receives the pollen during pollination .....

[3]

(ii) Draw a label line and the letter **X on** the flower in Fig. 7.1 to show where fertilisation occurs. [1]

(iii) State the name of the part labelled **E** in Fig. 7.1.

..... [1]

(b) The flower shown in Fig. 7.1 represents an insect-pollinated flower.

Describe **two** ways the pollen from an insect-pollinated flower differs from the pollen from a wind-pollinated flower.

1 .....

.....

2 .....

.....

[2]

10 **(a)** Fig. 5.1 is a photograph of part of a flower.

Some of the outer structures have been removed to show the internal parts.

Fig. 5.1

(i) Label these structures on Fig. 5.1 with a label line and the name:

- anther
- petal
- stigma.

[3]

(ii) Describe **two** features visible in Fig. 5.1 that suggest that this is an insect-pollinated flower.

1 .....

.....

2 .....

.....

[2]

11 **(a)** A student investigated the conditions required for germination.

Seeds were placed on cotton wool in Petri dishes and exposed to different conditions.

The conditions used are shown in Table 3.1.

Table 3.1

Petri dish	temperature /°C	condition of cotton wool	access to light
A	20	damp	yes
B	3	damp	yes
C	20	dry	yes
D	20	damp	no

Seeds in **two** of the Petri dishes did not germinate.

Predict in which Petri dishes the seeds did not germinate.

Give reasons for your answer.

Petri dishes .....

reasons .....

.....

.....

[3]

(b) In another investigation, the germination ratio of the seeds was calculated.

60 cress seeds were used in the investigation.

20 seeds germinated and 40 seeds did not germinate.

Calculate the ratio of the seeds that germinated to the seeds that did not germinate.

ratio ..... : ..... [1]

12 **(a)** The boxes on the left contain the names of flower parts.

The boxes on the right contain descriptions of the functions of the flower parts.

Draw **one** straight line from each box on the left to **one** box on the right to link the flower part to its function.

Draw **five** lines.

flower part	**function**
anther	attracts insects
ovary	place where pollen has to land
petal	produces ovules
sepal	produces pollen
stigma	protects the flower bud
	transports water

[5]

(b) Pollen grains from wind-pollinated flowers and insect-pollinated flowers are different.

State **two** ways in which a pollen grain from a wind-pollinated flower is different to a pollen grain from an insect-pollinated flower.

1 .....

2 .....

[2]

(c) Complete the sentences about seeds.

Use words from the list.

Each word may be used once, more than once, or not at all.

asexual	**carbon dioxide**	**gravity**	**hormones**
light	**mineral ions**	**oxygen**	**sexual**
vitamins	**water**		

Plants produce seeds as a result of ..... reproduction. Seeds germinate if they have the correct conditions. These conditions include a suitable temperature and also ..... and ..... .

The germinating seed produces a young root which grows downwards in response to ..... .

The young root absorbs ..... and ..... from the soil as well as keeping the young plant in a stable position.

[6]

[Total: 13]

13 Some students investigated the conditions needed for the germination of maize seeds. They used maize seeds from a packet of seeds they had purchased in a shop.

Three dishes were used, each containing cotton wool and the same number of maize seeds, as shown in Fig. 2.1.

Fig. 2.1

Table 2.1 shows the conditions provided for each dish.

Table 2.1

conditions	dish		
	A	**B**	**C**
treatment of cotton wool	damp	dry	damp
temperature / °C	20	20	3
light or dark	light	light	dark

The seeds were left for five days and then observed.

The results are shown in Table 2.2.

Table 2.2

dish	results
A	all seeds germinated
B	no seeds germinated
C	no seeds germinated

(a) (i) Explain why the seeds in dishes **B** and **C** did not germinate.

Dish **B** .....

.....

Dish **C** .....

.....

[2]

(ii) In a second investigation, maize seeds were placed in a dish containing damp cotton wool.

This dish was left in the dark for five days at 20 °C.

Predict and explain the results.

prediction .....

.....

explanation .....

.....

.....

[2]

(b) A student gathered 70 maize seeds from plants growing in a field. The seeds were placed in dishes containing damp cotton wool.

After five days only 64 seeds had germinated.

(i) Calculate the percentage of seeds that germinated.

Show your working.

Give your answer to the nearest whole number.

.....%

[2]

(ii) Suggest a reason why some of the seeds did not germinate.

.....

.....

.....[1]

[Total: 7]

14 Fig. 7.1 shows sections of two flowers, **K** and **L**, from the same species.

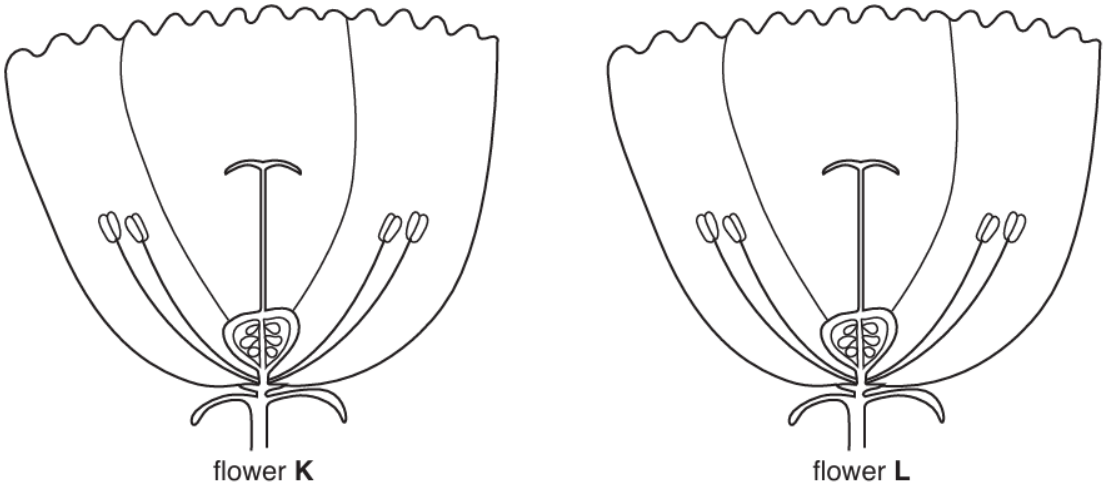

Fig. 7.1

(a) **(i)** On flower **L** in Fig. 7.1, identify and label an ovule and a petal.

[2]

(ii) State the names of the parts in Fig. 7.1 that:

produce ovules .....

protect the bud of the flower .....

[2]

(b) On Fig. 7.1, draw an arrow to represent the transfer of pollen from flower **K** to flower **L** during pollination.

[2]

(c) A student said, *"Flowers **K** and **L** are pollinated by insects."*

Describe **two** structures in flowers **K** and **L** that support this statement.

Use features that are visible in Fig. 7.1.

1 .....

.....

2 .....

.....

[2]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

15 **(a)** Fig. 4.1 shows a diagram of two flowers from different plants of the same species.

(i) Describe what is meant by the term species.

.....

.....

.....

.....

..... [2]

(ii) Complete the diagram in Fig. 4.1 to show self-pollination and cross-pollination by: **(extended only)**

- drawing **one** arrow to show the pathway of pollen during self-pollination **and** labelling this arrow self-pollination
- drawing **one** arrow to show the pathway of pollen during cross-pollination **and** labelling this arrow cross-pollination
- labelling the names of the structures involved in pollination. [3]

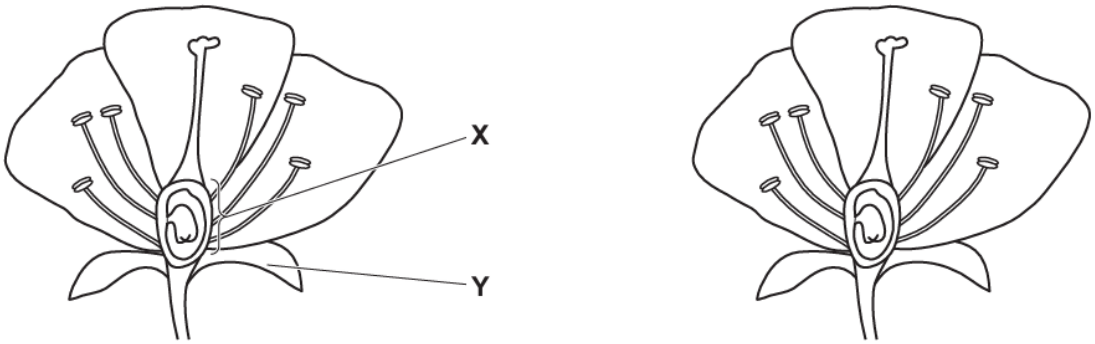

Fig. 4.1

(iii) State the function of the parts labelled **X** and **Y** in Fig. 4.1.

X .....

.....

Y .....

.....

[2]

16 Johnson grass, *Sorghum halepense*, is wind-pollinated.

(a) Fig. 4.1 shows some Johnson grass flowers.

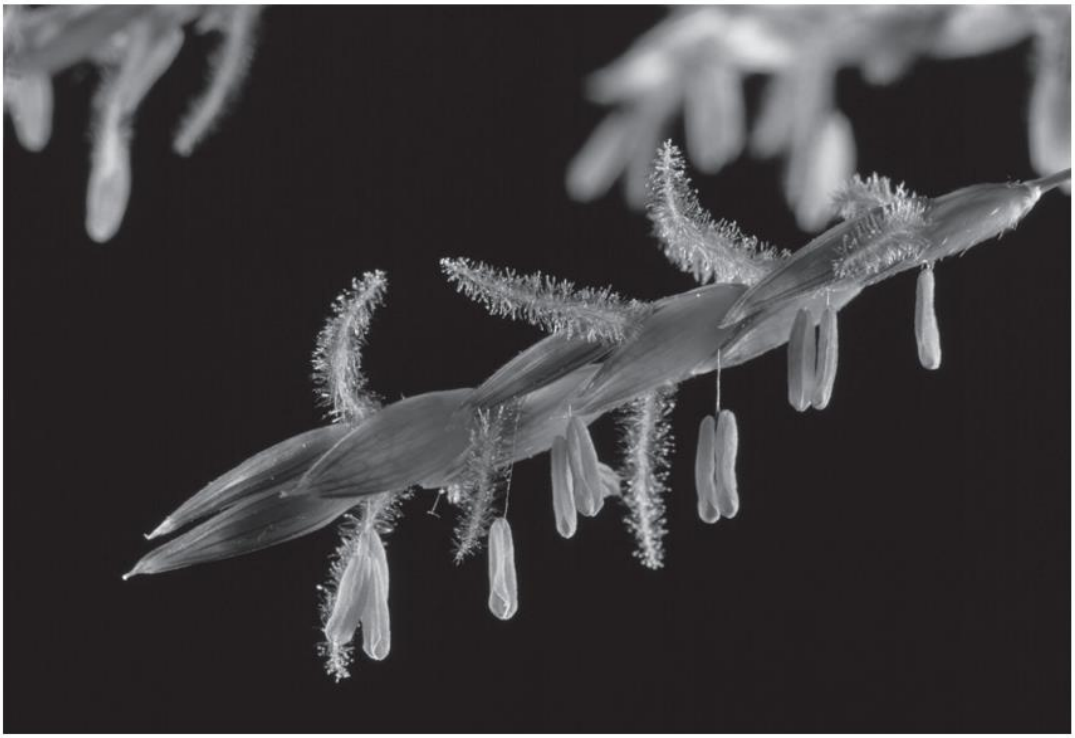

Fig. 4.1

(ii) Describe **two** features **visible in Fig. 4.1** that show that Johnson grass flowers are adapted for wind-pollination.

1 .....

.....

2 .....

.....

[2]

(b) Fig. 4.2 shows a section through a carpel shortly after pollination.

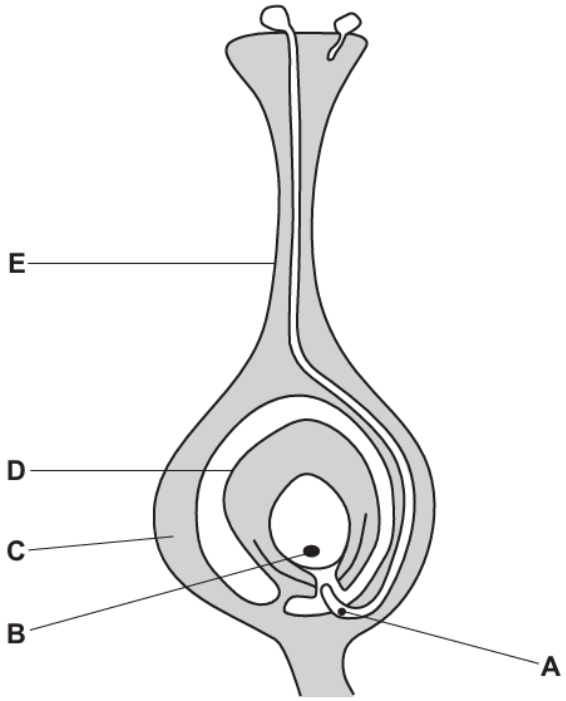

Fig. 4.2

(i) State the names of the parts of the carpel labelled **C**, **D** and **E**.

C .....

D .....

E .....

[3]

17 **(a)** Fig. 4.1 shows a bee with pollen on its legs.

Fig. 4.1

Bees are insects that pollinate some flowering plants. They are attracted to the flowers by their colour, scent and nectar.

(i) Describe other ways in which flowers and pollen grains are adapted for insect pollination.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State where pollen is produced in a flower.

..... [1]

(b) **(i)** Describe how the pollen that is carried by an insect to another flower results in the formation of a plant embryo. **(extended only)**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(ii) Describe the advantages of cross-pollination. **(extended only)**

.....

.....

.....

.....

..... [2]

18 **(b)** Fig. 6.2 shows a method of reproduction that some potato farmers use to produce more potato plants.

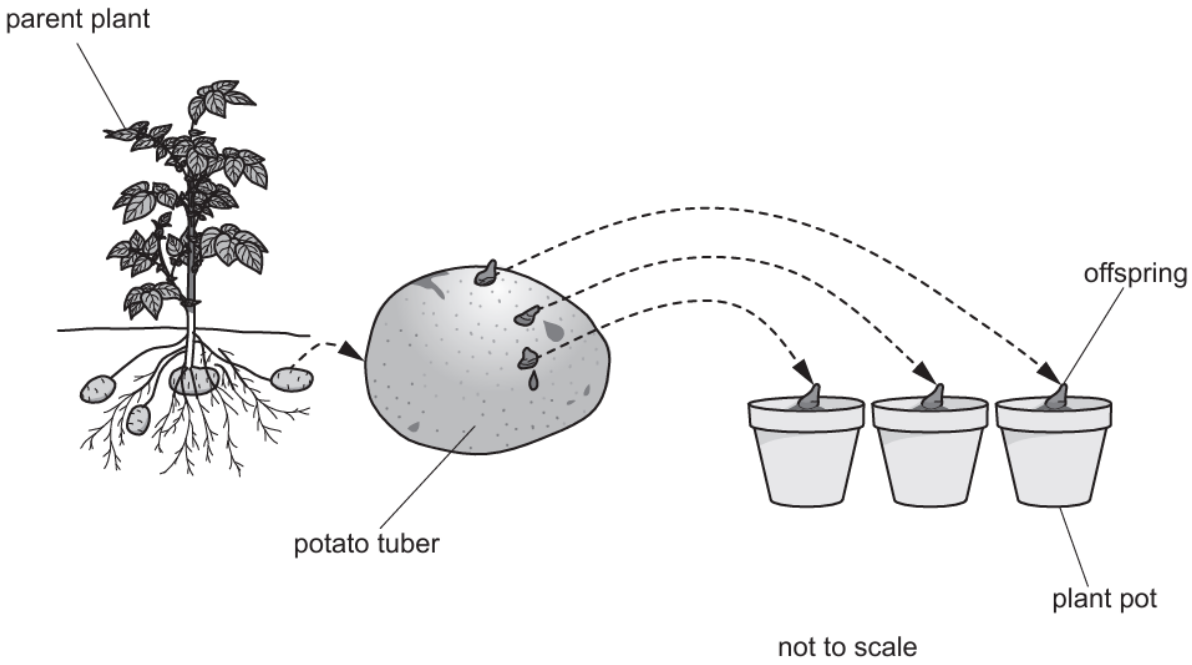

Fig. 6.2

Describe the advantages of the type of reproduction shown in Fig. 6.2 in crop production. **(extended only)**

.....

.....

.....

.....

.....

.....

..... [3]

19 Grass plants are wind-pollinated. Fig. 5.1 shows a flower from a species of grass plant.

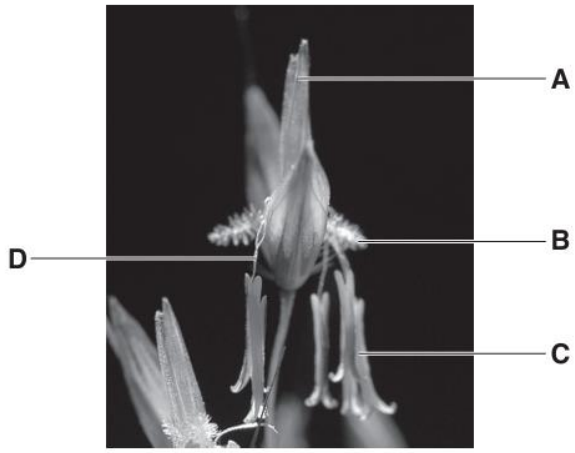

Fig. 5.1

(a) (i) Describe **and** explain how the features of the flower shown in Fig. 5.1 are adaptations for wind-pollination.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Wheat has flowers similar to those in Fig. 5.1, but reproduces by self-pollination.

Explain the consequences of self-pollination for a population of plants. **(extended only)**

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.....

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.....

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.....

..... [4]

20 **(d)** Fig. 2.3 shows how several strawberry plants can be formed from one parent plant.

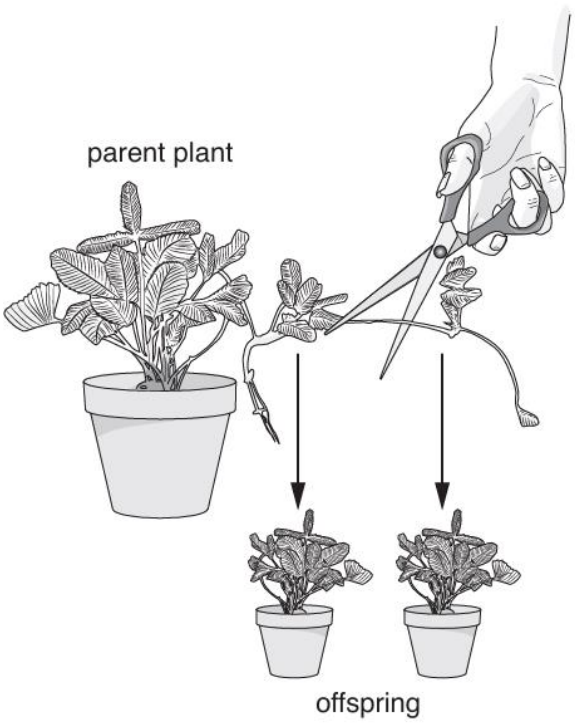

Fig. 2.3

(i) Explain the type of reproduction that produces plants by the method shown in Fig. 2.3.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Explain the **disadvantages** of the type of reproduction shown in Fig. 2.3. **(extended only)**

.....

.....

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.....

..... [3]