# Sexual Reproduction in Plants (2.4): Eduqas A Level Biology Exam Questions by Topic

23 questions · 54 marks · about 65 minutes. Answer in the spaces, then check the mark schemes at the end.

**Question 1 · A level Component 2 · June 2025 · Q2(c)(i) · 2 marks**

(c) Flowers may be insect or wind-pollinated. **Image 2.4** shows wheat flowers, which are wind-pollinated.

**Image 2.4**



(i) State **two** ways in which **the appearance** of wheat flowers might be different if they were insect-pollinated. [2]

I. .....

.....

II. .....

.....


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**Question 2 · A level Component 2 · June 2025 · Q2(c)(ii) · 2 marks**

(ii) In some plant species the stamen and stigma mature at different times. Explain the importance of this. [2]

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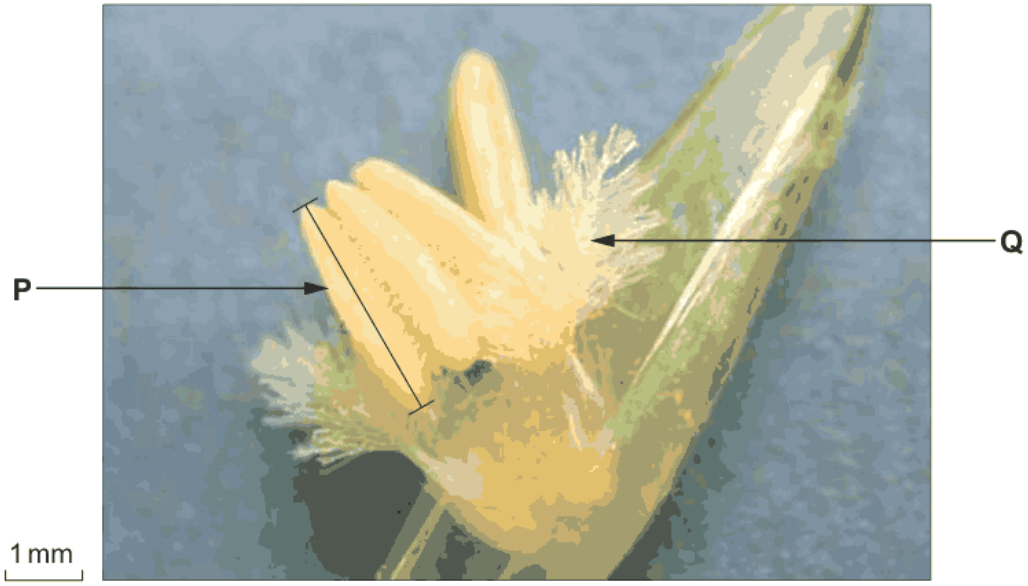
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**Question 3 · A level Component 2 · June 2018 · Q3(a)(i) · 1 mark**

**3.** *(a)* The photograph below shows a flower of the wheat plant, *Triticum aestivum*.




(i) Name the parts labelled **P** and **Q**. [1]

**P** .....

**Q** .....

**Question 4 · A level Component 2 · June 2018 · Q3(a)(iii) · 1 mark**

(iii) Describe **two** features of the flower shown in the photograph which suggest it is wind pollinated. [1]

.....

.....


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**Question 5 · A level Component 2 · Autumn 2020 · Q1(b)(i) · 2 marks**

Pea flowers are insect-pollinated and contain both female and male reproductive organs. In many of his experiments, Mendel prevented self-pollination and self-fertilisation by removing the male reproductive organs and cross-pollinating the flowers by hand. In other experiments he allowed plants to self-pollinate by preventing cross-pollination.

*(b)* (i) Name the male reproductive organs and explain how their removal would encourage cross-pollination. [2]

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.....

**Question 6 · A level Component 2 · Autumn 2020 · Q1(b)(ii) · 1 mark**

(ii) Suggest how Mendel could have prevented cross-pollination. Explain your answer. [1]

.....

.....

**Question 7 · A level Component 2 · June 2023 · Q6(a) · 3 marks**

**6.** The leaves of maize have characteristics that are controlled by genes. The leaves can be glossy or rough. They can also be green or green with white stripes.

Pollen from a pure-bred plant with glossy green leaves was transferred to the stigma of a pure-bred plant with rough striped leaves. All of the F1 generation had glossy green leaves.

(a) Give **three** practical precautions that should be taken to ensure that the offspring produced are only from the desired cross. [3]

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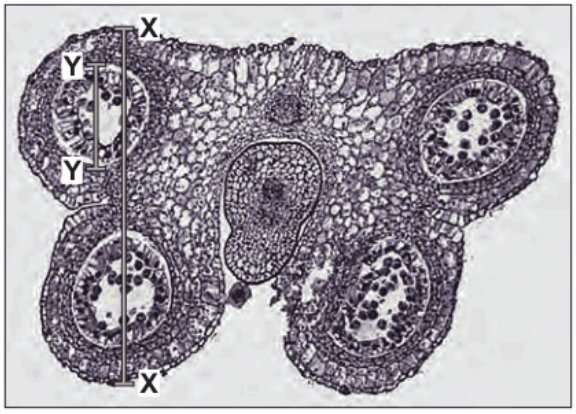
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**7.** A student examined the TS Anther shown in the photomicrograph in Figure 7.1 through a microscope and measured the dimensions indicated by lines **X-X** and **Y-Y** using a calibrated eyepiece graticule.

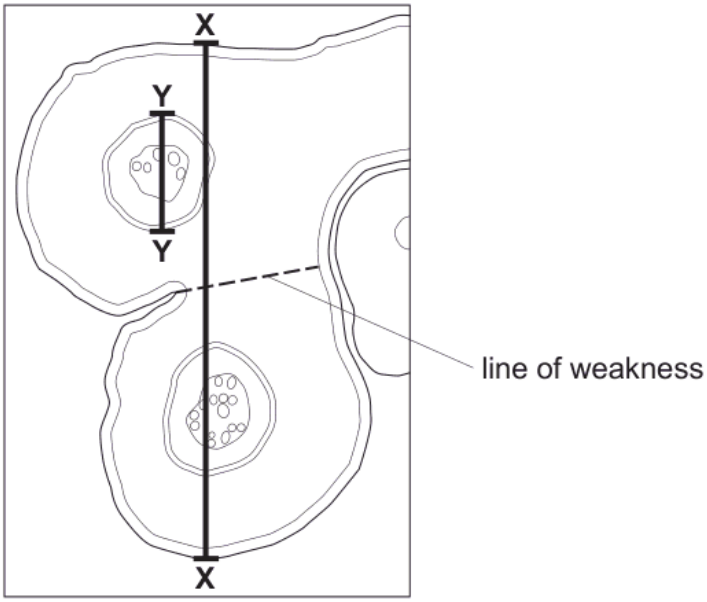
**Figure 7.1**

**X-X** measured 1080 µm; **Y-Y** measured 360 µm.




The low power plan drawing of a **representative portion** of the specimen is shown in Figure 7.2.

**Figure 7.2**




*(a)* (i) One structure is shown in the micrograph in Figure 7.1 but missing from the low power plan in Figure 7.2.
**Draw this structure** on the low power plan. Label it with its name and its function. [3]


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**Question 9 · A level Component 2 · June 2019 · Q7(c)(i) · 5 marks**

*(c)* (i) Describe the part played by **mitosis** and **meiosis** in the formation of the male gametes in flowering plants, explaining the biological significance of each type of cell division. [5]

**Question 10 · A level Component 2 · June 2019 · Q7(c)(ii) · 1 mark**

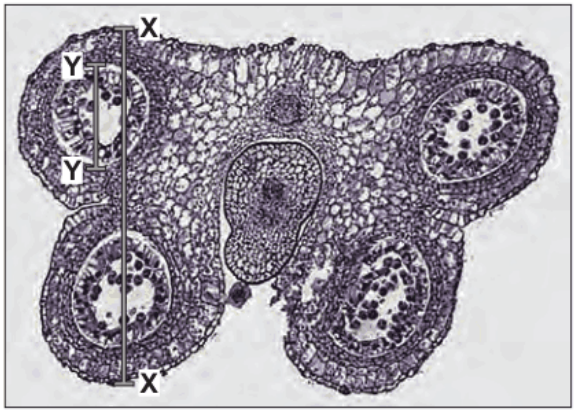
(ii) State the function of the tapetum. [1]


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**7.** A student examined the TS Anther shown in the photomicrograph in Figure 7.1 through a microscope and measured the dimensions indicated by lines **X-X** and **Y-Y** using a calibrated eyepiece graticule.

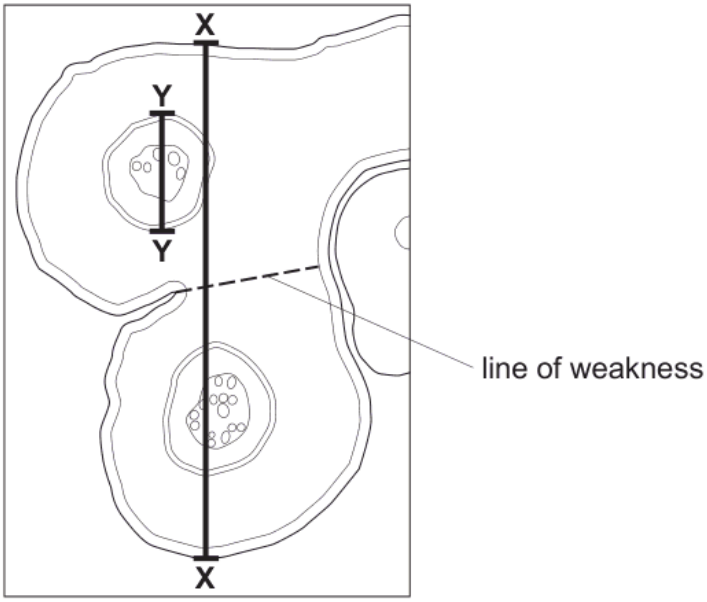
**Figure 7.1**

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**Figure 7.2**



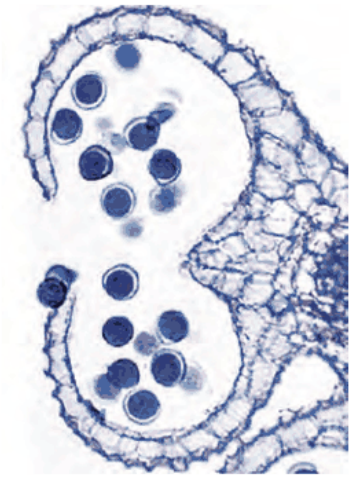


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**Question 11 · A level Component 2 · June 2019 · Q7(d) · 3 marks**

Figure 7.3 shows an anther undergoing dehiscence.

**Figure 7.3**



*(d)* Use the photomicrograph in Figure 7.3 and the low power plan in Figure 7.2 to suggest the significance of a line of weakness in the position shown on the drawing. [3]

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**Question 12 · A level Component 2 · Autumn 2020 · Q3(a) · 2 marks**

**3.** Many plants, especially those which have been selectively bred to produce food for humans are polyploid, with several complete sets of chromosomes. For example, wild strawberries, are 2n = 14 but those grown commercially are octoploid, with eight sets of chromosomes.

*(a)* State how many chromosomes would be in the following cells during different stages of the life cycle of a commercially grown strawberry plant. [2]

a cell in the ovary wall .....

a pollen tube nucleus .....

a primary endosperm nucleus .....


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**Question 13 · A level Component 2 · June 2018 · Q3(b)(ii) · 2 marks**

(ii) Explain why the events taking place in the embryo sac of a wheat flower are described as a double fertilisation. [2]

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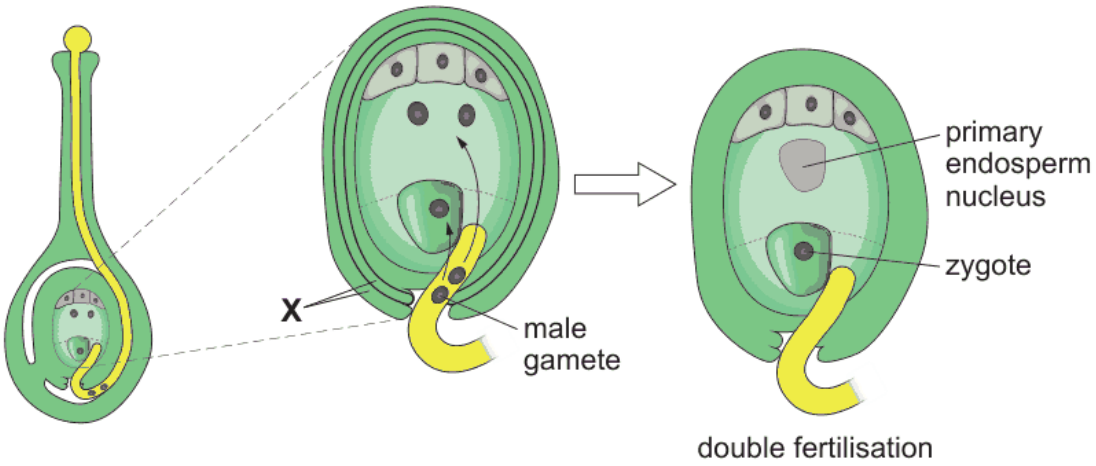
(b) **Image 3.1** shows specimens of *Colchicum autumnale*.

**Image 3.1**



**Image 3.2** is a drawing of a section through a carpel of *Colchicum autumnale* undergoing double fertilisation. The diploid chromosome number of *Colchicum autumnale* is 16.

**Image 3.2**




(i) Complete **Table 3.3** to state how many chromosomes are present in the following structures shown in **Image 3.2** and explain how the structures are formed. [6]

**Table 3.3**

| Structure | Number of chromosomes | Explanation of how the structure is formed |
|---|---|---|
| male gamete | ..... | ..... ..... |
| primary endosperm nucleus | ..... | ..... ..... |
| zygote | | ..... |


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**Question 15 · A level Component 2 · June 2023 · Q3(b)(iii) · 1 mark**

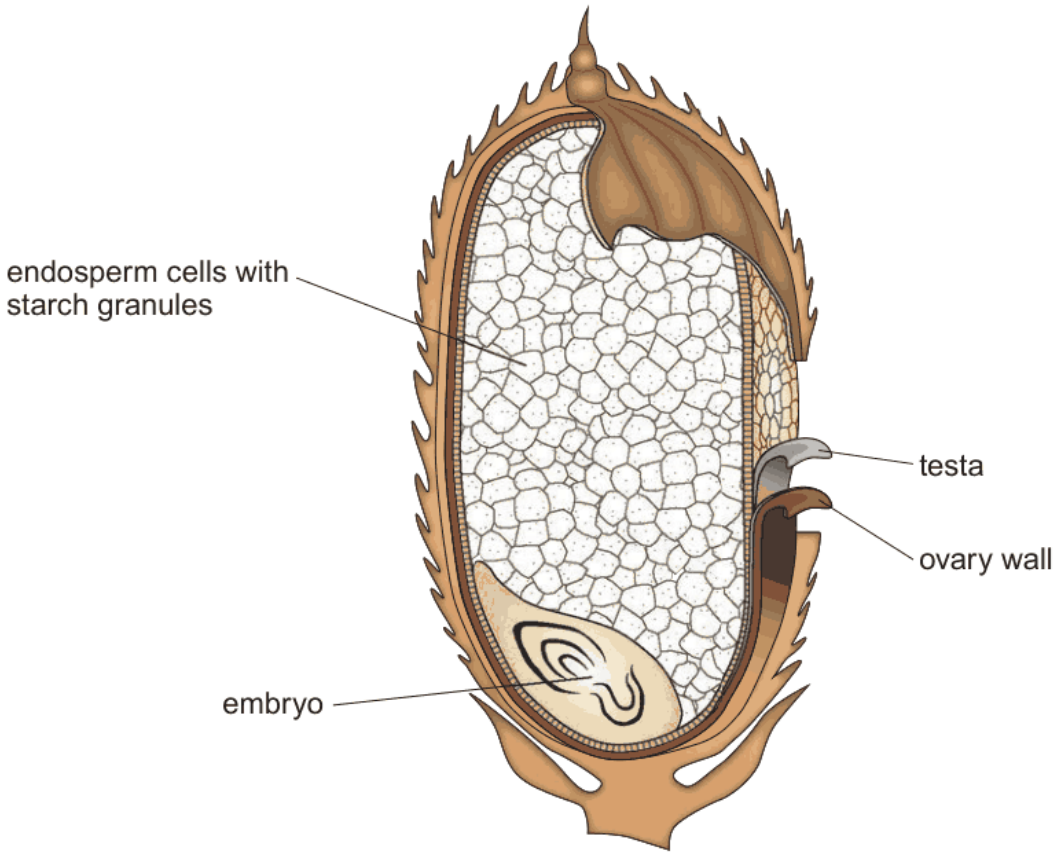
(iii) Describe what happens to the structures labelled **X** in **Image 3.2** after fertilisation. [1]

.....

.....

**Question 16 · A level Component 2 · June 2018 · Q3(b)(i) · 2 marks**

*(b)* The diagram below shows a wheat grain.




(i) Use information shown in the diagram to explain why the grain is more correctly described as a fruit rather than a seed. [2]

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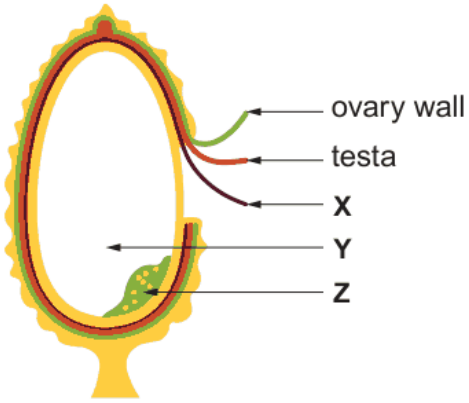
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**4.** Rice, *Oryza sativa*, is a staple food crop for over half of the world's population. It provides most of the carbohydrate intake for people in many countries. **Image 4.1** shows the structure of a rice grain.

**Image 4.1**




During processing of rice grains for consumption, most rice is 'polished' leaving only starch-containing tissue. This is called white rice. Brown rice retains fibre and protein-containing tissues.

*(a)* (i) Using the letters **X**, **Y** and **Z**, identify the following: [3]

I. the structure that would stain blue-black on application of iodine solution.

.....

II. the source of gibberellins during germination of a rice grain. .....

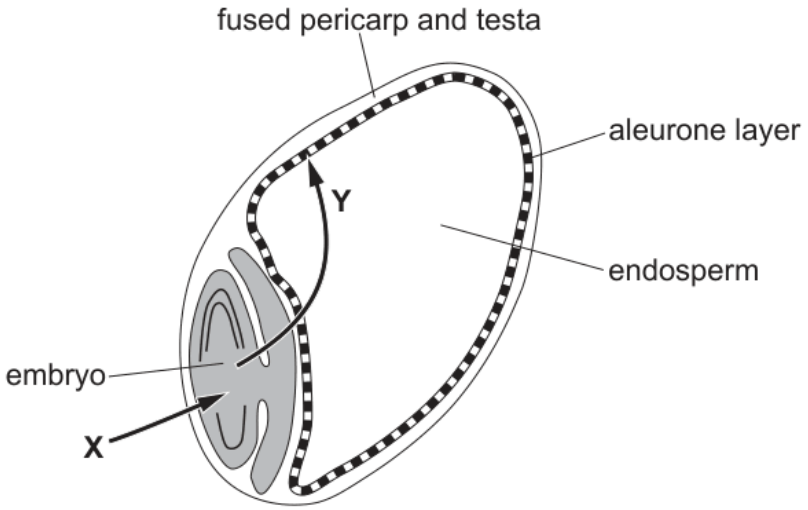
III. the main source of amino acids for a germinating rice grain. .....


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**Question 18 · A level Component 2 · June 2025 · Q4(a)(i) · 1 mark**

4. **Image 4.1** shows a section through a barley grain starting the process of germination.

**Image 4.1**




(a) (i) Name substance **X** which enters the barley grain in order to start germination. [1]

.....

**Question 19 · A level Component 2 · June 2025 · Q4(a)(ii) · 2 marks**

(ii) Name substance **Y** and state how it moves to the aleurone layer. [2]

.....

.....

.....


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**Question 20 · A level Component 2 · June 2022 · Q2(a)(i) · 4 marks**

**2.** Students carried out an investigation to determine how amylase activity in barley seeds changes during germination. The method followed is outlined below.

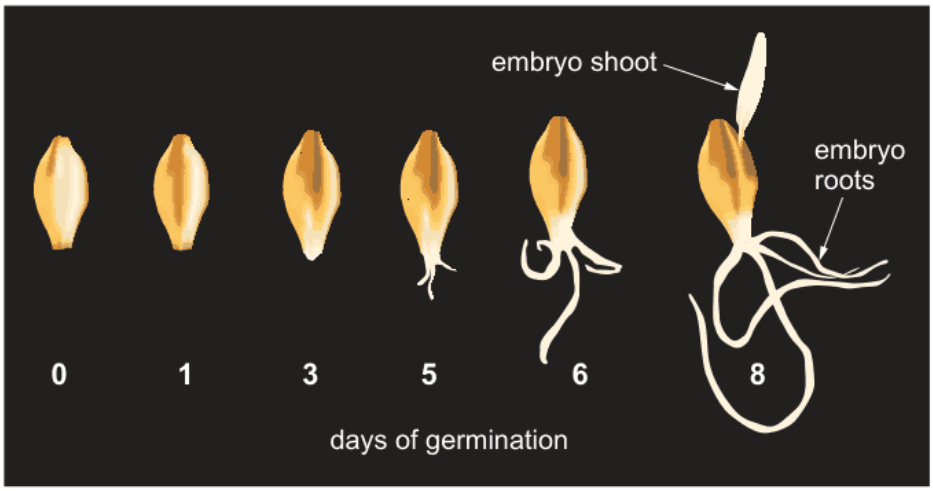
1. 100 barley seeds were soaked in 50 $cm^3$ of distilled water for 24 hours. They were then removed from the water and allowed to germinate.
2. After one day of germination, 10 of the barley seeds were homogenised in 5 $cm^3$ of distilled water.
3. Three discs of filter paper were soaked in the barley seed extract and placed on the surface of a starch agar plate.
4. The plate was incubated for 24 hours at 25 °C.
5. The paper discs were removed and the surface of the agar covered with iodine / potassium iodide solution.
6. The maximum diameter of the clear area around each disc was measured and the mean diameter calculated.
7. Steps 2 to 6 were repeated for barley seeds after 2, 4, 5, 8, 9 and 10 days of germination.

(a) (i) Describe how the production of amylase was triggered in the barley seeds. [4]


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(c) **Image 2.3** shows barley grains at different stages of germination.

**Image 2.3**




Using the information provided and your own knowledge and understanding of germination in endospermic seeds, suggest a reason for the decrease in amylase activity after eight days of germination. Explain your answer. [3]


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**Question 22 · A level Component 2 · June 2025 · Q4(c)(ii) · 2 marks**

(ii) The grains were then soaked in water and allowed to germinate. During the first four days of germination there was a 44% decrease in total dry mass. Explain why the dry mass of grains decreased during germination. [2]

**Question 23 · A level Component 2 · June 2024 · Q5(c)(i) · 2 marks**

(c) When a forest fire occurs, the heat stimulates the black wattle seeds to germinate. The heat results in the rapid expansion of the seed coat, causing it to crack.

(i) Explain **one** way that the cracking of the seed coat allows the seed to begin to germinate. [2]


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## Mark schemes

**Question 1 · A level Component 2 · June 2025 · Q2(c)(i) · 2 marks**

| | | | | | |
|---|---|---|---|---|---|
| *(c)* | (i) | **Any two (x1) from**<br>Petals present / Increased petal size / {brightly coloured / colourful} {petals / flowers / corolla} (1)<br>Anthers / stigma {inside (flower) / not exposed} (1)<br>Stigma is {not feathery / or description of} (1)<br>Reject {inside / outside} plant<br>Reject nectaries / scent | 2 | 2 | 2 |

**Question 2 · A level Component 2 · June 2025 · Q2(c)(ii) · 2 marks**

| | | | | |
|---|---|---|---|---|
| | (ii) | {Ensures / increases chance of / owtte} {cross-pollination takes place } /<br>{reduces chance of / prevents} {self-pollination / self-fertilisation} / Prevents inbreeding (1)<br>Leads to greater genetic {variation / diversity} (1) | 2 | 2 |

**Question 3 · A level Component 2 · June 2018 · Q3(a)(i) · 1 mark**

| | | | | | | |
|---|---|---|---|---|---|---|
| **3** | (a) | (i) | P – anther , Q - stigma | 1 | 1 | |

**Question 4 · A level Component 2 · June 2018 · Q3(a)(iii) · 1 mark**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | (iii) | | Any **two** for **1 mark** from,<br>large anthers/<br>anthers outside flower/<br>feathery stigmas/<br>stigmas outside flower/<br>absence of petals/<br>not coloured/green colour<br>Accept reverse argument for insect pollinated | 1 | 1 | |

**Question 5 · A level Component 2 · Autumn 2020 · Q1(b)(i) · 2 marks**

| | | |
|---|---|---|
| (b) | (i) | stamens / anthers (removed) (1)<br>pollen has to come from another {flower / plant}/ no pollen available from same flower/ impossible to self-pollinate (1) |

| | | | |
|---|---|---|---|
| 1 | 1 | 2 | 1 |

**Question 6 · A level Component 2 · Autumn 2020 · Q1(b)(ii) · 1 mark**

| | | | | |
|---|---|---|---|---|
| (ii) | {enclose/ isolate} the flower (in a bag) to prevent transfer of pollen from another flower (1) | 1 | 1 | 1 |


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**Question 7 · A level Component 2 · June 2023 · Q6(a) · 3 marks**

| | | | | | |
|---|---|---|---|---|---|
| 6 | (a) | **Any three (x1) from**<br>{Anthers/ stamen} removed (1)<br>Pollen transferred by hand (1)<br>(Recipient) flower is isolated/ method of isolation e.g. in a bag (1)<br>The male and female parts are separated (1) | 3 | 3 | 3 |

**Question 8 · A level Component 2 · June 2019 · Q7(a)(i) · 3 marks**

| | | | | | |
|---|---|---|---|---|---|
| 7 | *(a)* | (i) | Marked in correct position(1)<br>Vascular bundle/ strand/ xylem + phloem (1)<br>{Supply/ transport} {water/nutrients/ sucrose} (to anther)(1)<br>MP1 must be correct to access MP2 and/or 3 | 3 | 3 |

**Question 9 · A level Component 2 · June 2019 · Q7(c)(i) · 5 marks**

| | | | | | |
|---|---|---|---|---|---|
| | *(c)* | (i) | Any **five** (×1) from:<br>A. Mitosis produces diploid pollen mother cells (1)<br>B. Meiosis produces {a tetrad of/ four} haploid cells from the pollen mother cell (1)<br>C. Mitosis splits {(haploid) nucleus into the generative + pollen tube nuclei/ generative nucleus into two gametes} (1)<br>D. Mitosis is significant {because retains chromosome number/ daughter {cells/ nuclei} are genetically identical/ large numbers of pollen produced/ allows double fertilisation}(1)<br>E. Meiosis is significant because it halves chromosome number to {create the correct number /offset doubling} at fertilisation (1)<br>F. Meiosis increasing genetic variation (1) | 5 | | 5 |

**Question 10 · A level Component 2 · June 2019 · Q7(c)(ii) · 1 mark**

| | | | | | |
|---|---|---|---|---|---|
| | (ii) | | {It provides nutrition/ It produces a {waterproof coat/ outer layer}} for the pollen grain | 1 | | 1 |

**Question 11 · A level Component 2 · June 2019 · Q7(d) · 3 marks**

| | | | | | |
|---|---|---|---|---|---|
| | *(d)* | Allows walls of {anther/ pollen sacs} break/open (1)<br>when mature (1)<br>releases pollen (1) | | 3 | 3 |


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**Question 12 · A level Component 2 · Autumn 2020 · Q3(a) · 2 marks**

| | | | | |
|---|---|---|---|---|
| **3** | (a) | ovary wall 56<br>pollen tube nucleus 28<br>primary endosperm nucleus 84<br>All ✓= 2; 2 or 1 ✓= 1; 1 or 0 ✓= 0<br>Allow 1 mark for 2n, n, 3n (1) | 2 | 2 |

**Question 13 · A level Component 2 · June 2018 · Q3(b)(ii) · 2 marks**

| | | | |
|---|---|---|---|
| (ii) | One (nucleus) fuses with the {ovum/egg/female gamete} and the other fuses with (two) polar nuclei (1)<br>The first forms the zygote and the second forms the endosperm nucleus (1) | 2 | 2 |

**Question 14 · A level Component 2 · June 2023 · Q3(b)(i) · 6 marks**

| | | | | | |
|---|---|---|---|---|---|
| (b) | (i) | **Male gamete**<br>8 (1)<br>Formed by meiosis of pollen mother (grain)/<br>{generative/ pollen grain} nucleus divides by mitosis (1)<br><br>**Primary endosperm nucleus**<br>24 (1)<br>Formed by fusion of 3 haploid nuclei/<br>(one) male {nucleus/ gamete} fuses with (two) polar nuclei (1)<br><br>**zygote**<br>16 (1)<br>Formed by fusion of {2 haploid nuclei/<br>male and female gamete} (in embryo sac before fertilisation) (1) | | 2<br><br>2<br><br>2 | 6 |

**Question 15 · A level Component 2 · June 2023 · Q3(b)(iii) · 1 mark**

| | | | | |
|---|---|---|---|---|
| (iii) | | (integuments) forms the {testa/ seed coat} | 1 | 1 |

**Question 16 · A level Component 2 · June 2018 · Q3(b)(i) · 2 marks**

| | | | | | | |
|---|---|---|---|---|---|---|
| | (b) | (i) | Fruit retains ovary wall/ovary wall and testa are fused (1)<br>seed would only have a testa (1) | 2 | 2 | |


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**Question 17 · A level Component 2 · Autumn 2020 · Q4(a)(i) · 3 marks**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **4** | (a) | (i) | I<br>II<br>III | **Y** (endosperm) (1)<br>**Z** (embryo) (1)<br>**X** (aleurone layer) (1) | | 3 | | 3 | | |

**Question 18 · A level Component 2 · June 2025 · Q4(a)(i) · 1 mark**

| | | | | | |
|---|---|---|---|---|---|
| **4** | (a) | (i) | Water / $H_2O$ | 1 | 1 |

**Question 19 · A level Component 2 · June 2025 · Q4(a)(ii) · 2 marks**

| | | | |
|---|---|---|---|
| (ii) | Gibberellin / gibberellic acid (1)<br>Diffusion (1) | 2 | 2 |

**Question 20 · A level Component 2 · June 2022 · Q2(a)(i) · 4 marks**

| | | | | | |
|---|---|---|---|---|---|
| **2** | (a) | (i) | A. {Absorption/entry} of water / imbibition (1)<br>B. Gibberellins (released by embryo)/ {proteins/food reserves} {hydrolysed/mobilised} (1)<br>C. Caused release of amino acids from aleurone layer / triggers {transcription and translation/ protein synthesis}/ to release amino acids (1)<br>D. (Amino acids) used to synthesise amylase (1) | 4 | 4 |

**Question 21 · A level Component 2 · June 2022 · Q2(c) · 3 marks**

| | | | |
|---|---|---|---|
| (c) | **Any three (x1) from:**<br>A. {Leaves/ shoot} appears {at 8 days/ above soil} (1)<br>B. Which are able to photosynthesise (1)<br>C. So plant can produce its own glucose (1)<br>D. Therefore less starch needs to be broken down / most starch already broken down (1) | 3 | 3 |


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**Question 22 · A level Component 2 · June 2025 · Q4(c)(ii) · 2 marks**

| | | | | |
|---|---|---|---|---|
| | (ii) | **Any two (x1) from**<br>• Uses the {glucose / starch / oil} (1)<br>• For {respiration / production of ATP} (1)<br>• So $CO_2$ lost (1) | 2 | 2 |

**Question 23 · A level Component 2 · June 2024 · Q5(c)(i) · 2 marks**

| | | | | |
|---|---|---|---|---|
| (c) | (i) | allows {imbibition / water to enter} (the seed) (1)<br>for aqueous reactions to take place / mobilisation of enzymes (1)<br>OR<br>Allows oxygen into the seed (1)<br>for (aerobic) respiration / to make ATP (1)<br>MP2 linked to MP1 | 2 | 2 |


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