WJEC EDUQAS A-LEVEL BIOLOGY · COMPONENT 2

BIOLOGY



EXAM QUESTION PACK

2.4 SEXUAL REPRODUCTION IN PLANTS

SCORE	PERCENTAGE
/32	%

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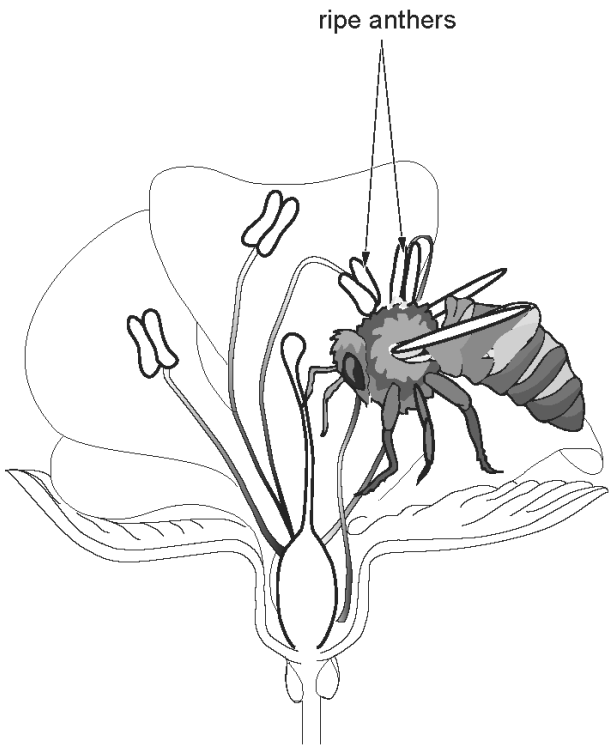
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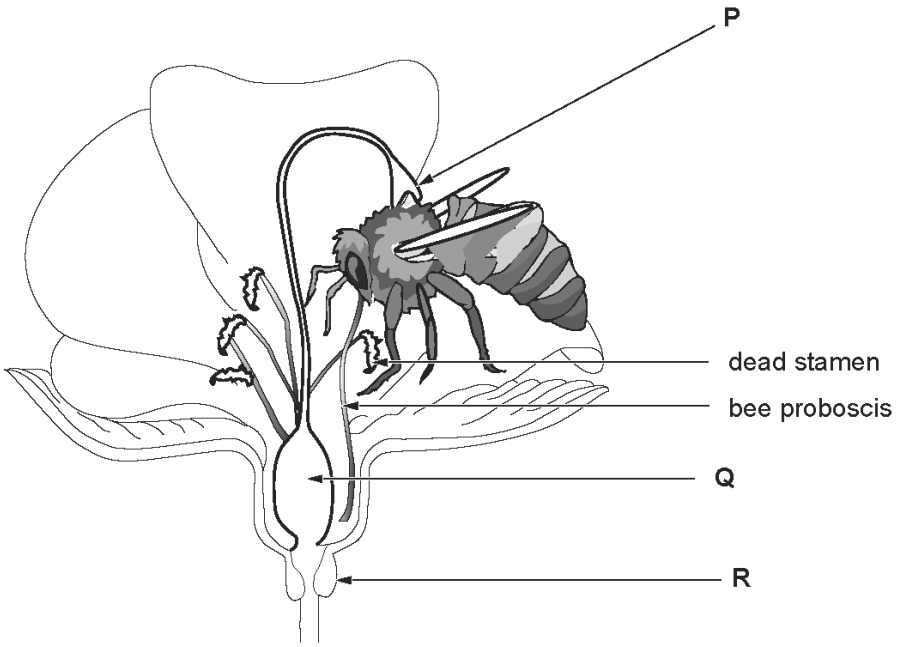
1.

The diagrams below show pollination in an insect-pollinated flower.

I



II



(a) (i) Name parts: [1]

P .....

Q .....

(ii) Name the substance produced by structure R. [1]

.....

(iii) What is the function of this substance? [1]

.....

.....

(b) Describe what happens to the pollen in diagrams I and II. [2]

I. .....

.....

.....

II. .....

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.....

(c) Using the diagrams opposite, explain how these flowers are adapted to ensure that;

(i) there is effective pollen transfer between two flowers of the same species, [1]

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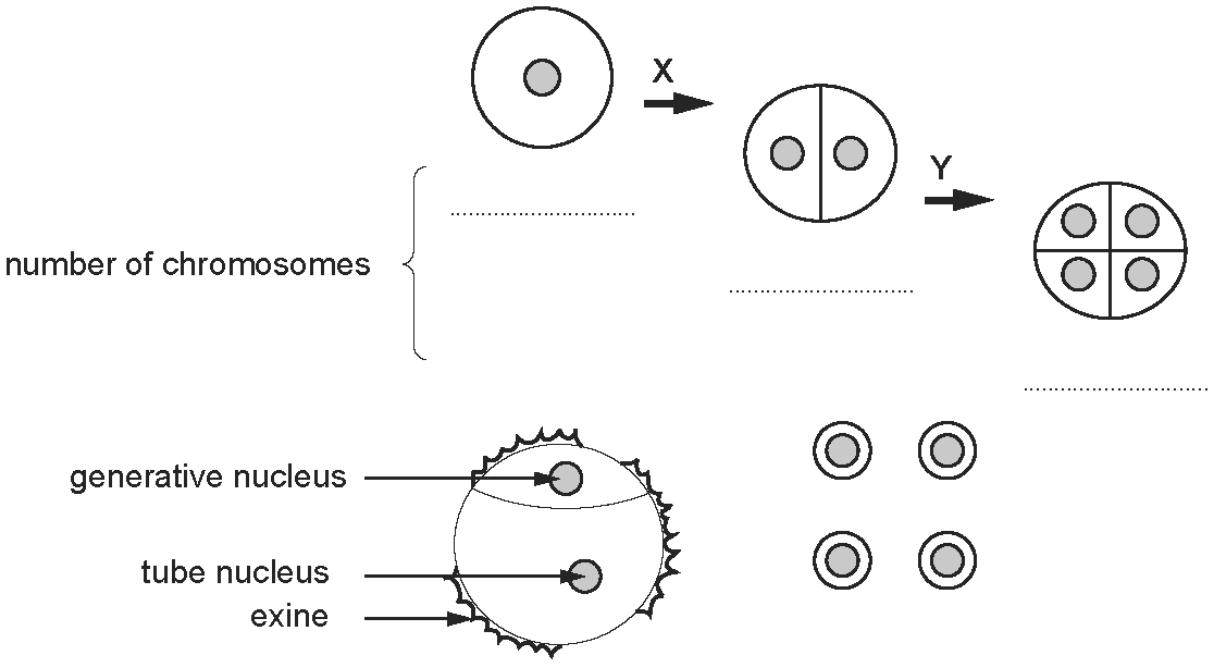
(ii) self-pollination is avoided. [1]

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(d) The diagrams below show the formation of pollen grains.



(i) In which floral part does this take place? [1]

.....

(ii) Name the cell process represented by arrows **X** and **Y**. [1]

.....

(iii) The diploid number of this species is 10, underneath **each** structure indicated above, write the number of chromosomes in **each** nucleus. [1]

(iv) Give the functions of:

I. the generative (male) nucleus; [1]

.....

.....

.....

II. the tube nucleus. [1]

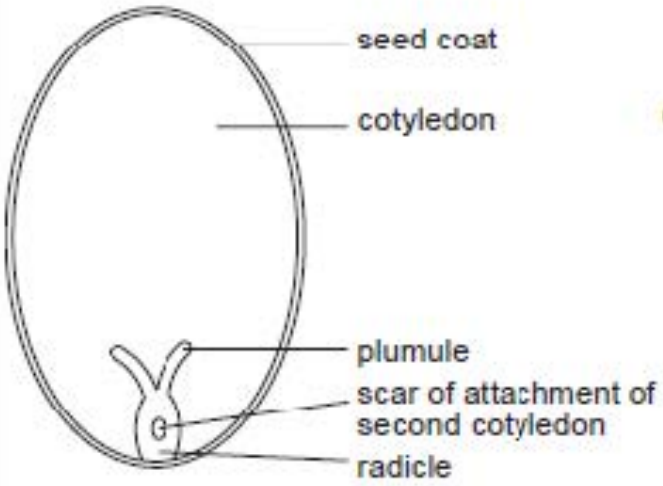
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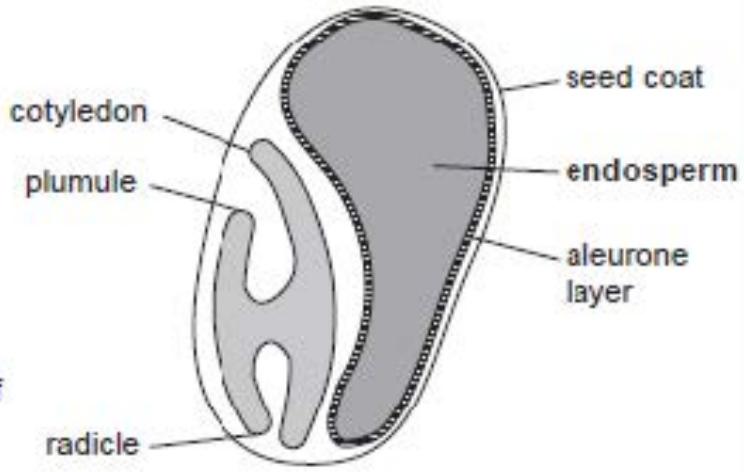
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2. The diagrams below show a peanut seed *(Arachis hypogaea)* and a barley seed *(Hordeum vulgare)*.



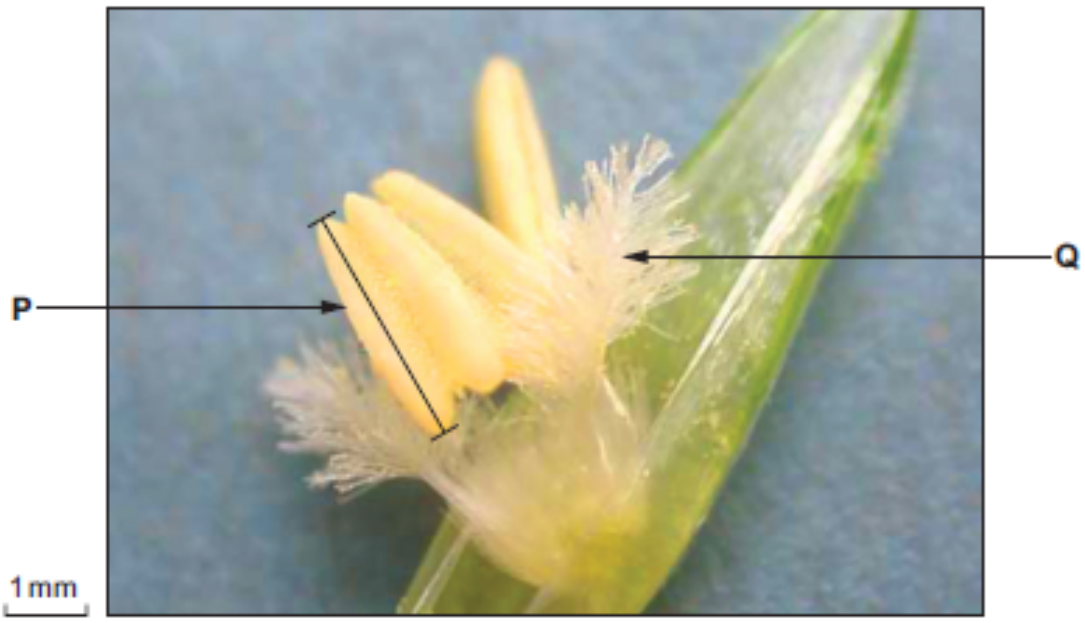
Peanut seed *(Arachis hypogaea)*



Barley seed *(Hordeum vulgare)*

State and explain the conditions required for germination to take place. Describe the germination of the peanut and barley seeds shown above. [9 QER]

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 .....

(ii) Calculate the actual length of structure P. [2]

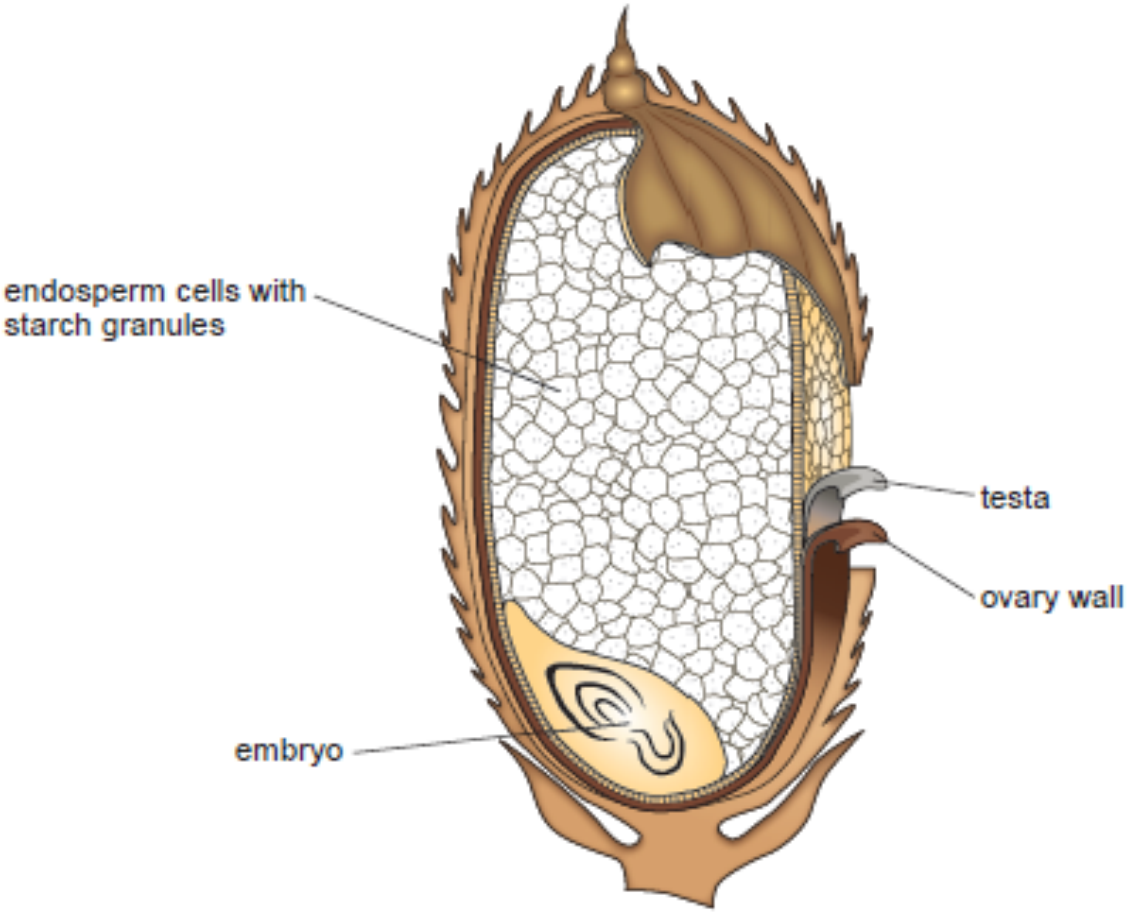
Size = ... mm

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

.....

.....

(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]

……

……

……

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

……

……

……

4. *(a)* Complete the table to show **four** differences between insect and wind pollinated plants. [4]

Insect pollinated	*Wind pollinated*

(b) Some flowers can self pollinate. What is the main **disadvantage** of self pollination? [1]

.....

.....

.....

(c) State how the production of pollen grains has enabled flowering plants to adapt to terrestrial life. [3]

.....

.....

.....

.....

(d) On the following diagram of a broad bean pod (drawn in section), show which parts of the flower have developed into the labelled structures. [4]

(b) Some flowers can self pollinate. What is the main **disadvantage** of self pollination? [1]

.....

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.....

(c) State how the production of pollen grains has enabled flowering plants to adapt to terrestrial life. [3]

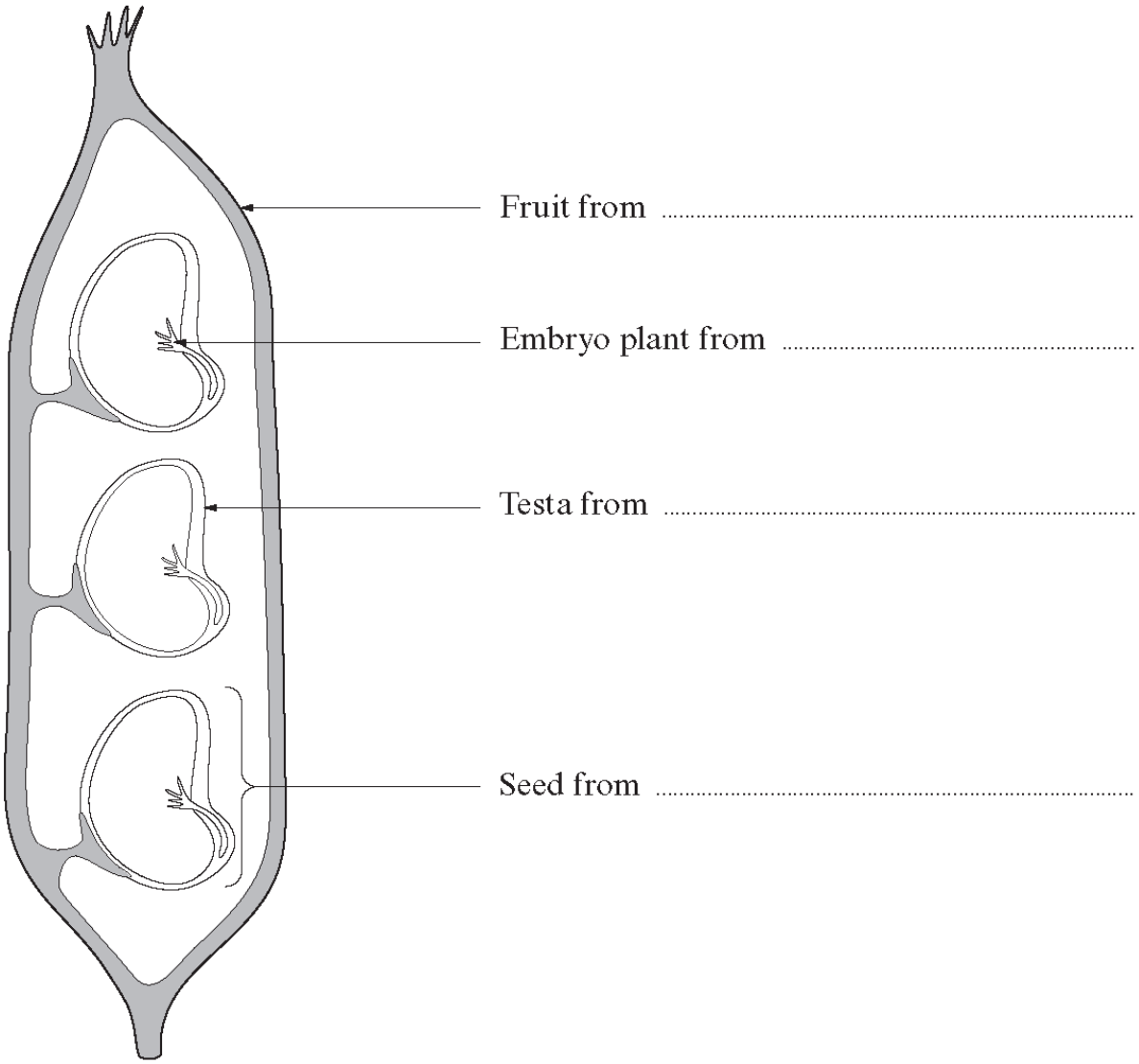
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(d) On the following diagram of a broad bean pod (drawn in section), show which parts of the flower have developed into the labelled structures. [4]



(Total 12 marks)

1.

Question			Marking details	Marks Available
1				
	(a)	(i)	P – stigma, Q – ovary (wall) BOTH for **1 mark**	1
		(ii)	Nectar;	1
		(iii)	attracts {insects / named insects};	1
	(b)	I	{Pollen / it} deposited on insect;	1
		II	{Pollen / it} transferred to stigma;	1
	(c)	(i)	Anther and stigma touch same part of bee;	1
		(ii)	Anthers and stigma mature at different times / protandry;	1
	(d)	(i)	Anther;	1
		(ii)	Meiosis; correct spelling	1
		(iii)	10-----5-----5;	1
		(iv)	I fertilisation / it is the gamete / formation of the endosperm; II controls the growth of the pollen tube (through the style); Accept produce enzymes (to digest the style) NOT contain / hold enzymes (to digest the style)	2
			Question 1 Total	**[12]**

2.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2				Indicative content **Conditions required for germination** • Water + oxygen + suitable temperature *Water* • Cotyledons swell/ testa softens • Transport – dissolve substances/fluid medium for enzymes *Oxygen* • (Aerobic) respiration – • energy/ATP for metabolism *Suitable temperature* • Speeds up rate of diffusion • Increases enzyme activity **Germination of Peanut** • Non endospermic/endosperm absorbed(into cotyledons)/no endosperm • Amylase digest starch in cotyledons to maltose • {Proteins/fats} broken down into {amino acids/fatty acids and glycerol} • Move to {plumule/radicle/meristem/sink} (Can apply to peanut or barley) • For {mitosis/growth/cell division} (Can apply to peanut or barley) **Germination of barley** • Endospermic/endosperm present • Starch/ proteins/fats in endosperm • Embryo produces {gibberellic acid/gibberellin} • Gibberellic Acid {moves into/stimulates} aleurone layer • Gibberellic Acid causes enzymes to break down protein into amino acids • Amino acids used to synthesise enzymes such as amylase • Amylase breaks down starch in the endosperm into maltose	3	6		9		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				7-9 marks Indicative content All three parts covered in details *The candidate constructs an articulate, integrated account, correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses scientific conventions and vocabulary appropriately and accurately.* **4-6 marks** Indicative content Two parts covered in detail *The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate usually uses scientific conventions and vocabulary appropriately and accurately.* **1-3 marks** Indicative content Only one part of the question is addressed. *The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate has limited use of scientific conventions and vocabulary.* **0 marks** *The candidate does not make any attempt or give a relevant answer worthy of credit.*						
				Question 2 total	**3**	**6**	**0**	**9**	**0**	**0**

3.

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		P – anther , Q - stigma	1			1		
		(ii)		30/10 (1 mark) = 3 (2 marks)		2		2	2	2
		(iii)		Any **two** for **1 mark** from, large anthers/ anthers outside flower/ feathery stigmas/ stigmas outside flower/ absence of petals/ not coloured/green colour Accept reverse argument for insect pollinated	1			1		
	(b)	(i)		Fruit retains ovary wall/ovary wall and testa are fused (1) seed would only have a testa (1)		2		2		
		(ii)		One (nucleus) fuses with the {ovum/egg/female gamete} and the other fuses with (two) polar nuclei (1) The first forms the zygote and the second forms the endosperm nucleus (1)	2			2		
				Question 3 total	**4**	**4**	**0**	**8**	**2**	**2**

4.	**(a)**	Large petals, small insignificant petals/no petals;	
		Brightly coloured, dull/brown/green; (not: not coloured)	
		Scented, not scented;	
		Nectar, no nectar;	
		Small amount of pollen, large amount of pollen;	
		Pollen sticky/sculpted, pollen smooth/not sticky/air sacs;	
		Pollen large/heavy, pollen small/light;	
		Anthers/stigma outside flower, enclosed within petals;	
		(Large) feathery stigmas, small/round stigmas;	
		Any 4. One comparison from each pair matched boxes.	**4**
	(b)	lack of/less genetic variation/inbreeding/increased risk of genetic faults/ ref. homozygous recessive. (not: no variation)	
			1
	(c)	pollen tube delivers male gametes to egg/ovule/do not need motile (gametes)/ no water needed/pollen grains transferred by wind or insects;	**1**
		stops risk of dehydration of gametes;	**1**
		Tough exine/outer wall;	**1**
	(d)	*Fruit from fertilised* ovary; (not: ref. ovary wall/pericarp)	**1**
		Embryo plant from zygote; (not: fertilized egg cell)	**1**
		Testa from integuments;	**1**
		Seed from ovule; (not: ovum)	**1**