Mark scheme

Reproduction in plants

Biology 0610 · Questions from Paper 3, Paper 4 and Paper 6

Total marks

94

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
4	6	7	6	10	13	11	11	13	13	**94**

Question 1 [4]

1	**A** attracts, insects / (named) pollinator **;** **B** produces / contains, female sex cells, female gametes / ovules **;** **C** produces / contains / releases, male sex cells, male gametes / pollen **;** **D** receives pollen (grains) / site of pollination or description **;**	4	**A** site of fertilisation / where seeds develop

Question 2 [6]

2	**(a)**	asexual + sexual; gamete + gamete; fertilisation;	[3]	both correct for 1 mark both correct for 1 mark
	(b)	(potatoes have) tubers; idea of tubers growing into plant; photosynthesising; plant produces more tubers; mitosis;	max [3]	
			[Total: 6]	

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Question 3 [7]

3	**(a)**	wind ; animal ; water ;	[max 1]	**A** any named animal / type of animal
	(b)	colonise new habitats ; prevent overcrowding / have more space ; reduce competition (with other plants of same species) ;	[max 1]	**A** grow in a new / different place **A** to move the seeds away from the plant
	(c)	*how fruits are dispersed:* wind / idea of blown about ; *reason:* fruits / seeds easily detached ; large surface area to catch wind ; light weight idea ; hairs act as parachute ;	[max 2]	1 mark for method of dispersal and 1 mark for reason
	(d)	water / moist / damp ; oxygen ; warmth / suitable temperature ;	[3] **[Total: 7]**	**R** light **R** minerals / food / nutrients **A** suitable pH

Question 4 [6]

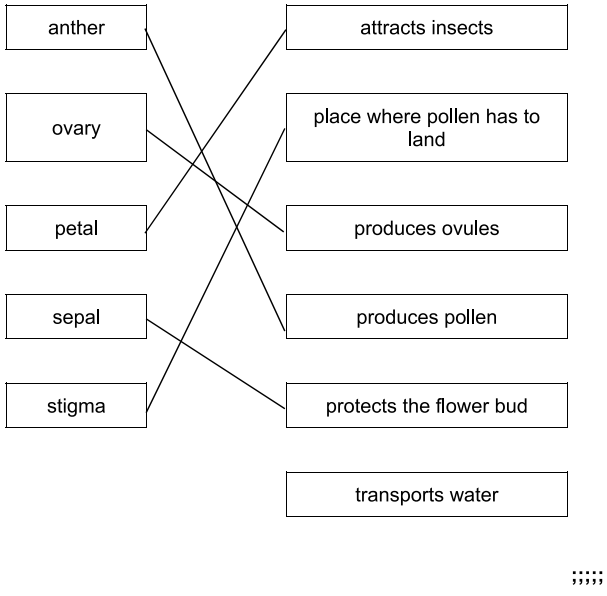
4	*independent variable:* 1 at least two different volumes of water added ; *dependent variable:* 2 number of seeds germinated / time taken for seeds to germinate ; *3, 4, 5 method ;;;* • method of maintaining temperature • watering at regular intervals • reference to placing seeds in trays / petri dish / test-tube / planting in soil • check seeds at regular intervals / at a set time period • AVP, e.g. calculation of rate described *6, 7 constant variables ;;* • temperature • type of seeds • oxygen concentration • pH • type / amount of, soil / growing medium • light (intensity) 8 repeat at least two times (three trials) ;	**6**	

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Question 5 [10]

5	(a) (i)	**A** filament ; **B** anther ; **C** style ; **D** stigma ;	[4]	
	(ii)	**B** ;	[1]	
	(iii)	**D** ;	[1]	
	(iv)	large petals / honey or nectar guides ;	[1]	
	(b)	**20** ; actual length = length of pollen grain in diagram ; / magnification actual length = **0.1** ;	[3]	
			[Total: 10]	

Question 6 [13]

6(a)	 ;;;;;	**5**	one mark for each correct line
6(b)	small(er) ; light(er) / less mass ; smooth(er) / not rough / not spiky / AW ; not sticky ; have, wings / extensions / air bladders or sacs ;	**2**	
6(c)	sexual ; oxygen ; water ; gravity / light ; water / oxygen / mineral ions ;;	**6**	mp2 and mp3 in either order

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Question 7 [11]

7	**(a)**	*Lilium* ;	1	
	(b)	**A** stigma ; **B** anther ; **C** petal ; **D** style ;	4	
	(c)	parallel veins / AW ; narrow / AW, leaves ; flower parts in, 3s / 6s ;	max 2	**A** non-branching veins / no mid-rib **A** long and thin **A** for any named part **R** one cotyledon

(d)

one mark per box – ignore any neutral comments

type of reproduction in flowering plants	advantages	disadvantages
asexual	only one, parent / plant ; fast ; (potential) rapid spread ; less energy required / no gametes needed ; if parent well adapted, offspring will be adapted to surroundings ; **max 1**	competition ; little / no, variation ; less evolution / less able to adapt to change ; may all be killed by same disease ; converse of MP5 for asexual ; **max 1**
sexual	variation ; evolution / formation of new species ; (seed) dispersal ; colonization / able to adapt to change ; **max 1**	may need two plants / pollinating agent; slow ; much pollen / many seeds wasted ; fertilization may not happen; loss of lots of energy ; **max 1**

[Total: 11]

Question 8 [11]

8(a)

process / event	letter from Fig. 6.1	name of the organ
meiosis to produce pollen grains	**C**	anther
pollination	**D**	stigma
development of seeds	**E**	ovary
protection of flower in the bud	**A**	sepal

;;;; **4** *one mark per row*

8(b)(i)	image size ÷ magnification ;	**1**	
8(b)(ii)	82 (μm) ;	**1**	
8(b)(iii)	(covered in) spikes / sticky ; (pollen) sticks to, insect / animal (bodies / legs / AW) ; large(r) size (in comparison with wind) ; AVP ;	**2**	
8(c)(i)	ovule ;	**1**	
8(c)(ii)	(nucleus) containing one set of (unpaired) chromosomes ;	**1**	
8(c)(iii)	so that chromosome number does not double (at fertilisation) ; so that chromosome number remains constant from generation to generation ;	**1**	

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Question 9 [13]

9 (a) (i)		**A –** pollen tube ; **B –** ovule ; **C –** egg cell / female gamete / female nucleus ;	[3]	**R** egg / ovum
(ii)	**1**	(stigma) place where pollen grain, germinates / develops (to form a tube) ;		**I** lands
	2	growth of pollen <u>tube</u> (down the style) ;		MP2 **A** male gamete travels down **R** pollen grain moves
	3	pollen tube / **A**, enters, ovule / **B** ;		
	4	ref to micropyle ;		
	5	tip of, pollen tube / **A**, opens ;		linked to pollen tube
	6	(male) nucleus / gamete fuses with, female gamete / nucleus / egg cell (nucleus) / **C** ;		
	7	forms zygote ;		**A** ovum as an *ecf*
	8	diploid ;	[max 3]	
(iii)		**max 3 for advantages OR disadvantages**		
		advantages		
	1	*idea that* self-pollination perpetuates variety that is well adapted to habitat ;		
	2	greater chance of pollination / ensures pollination occurs ; **A** reproduction / fertilisation		**I** faster
	3	less wastage of pollen / gametes / energy (in pollen production) ;		
	4	*idea that* useful if no other plants (of same species) nearby ;		
	5	no need for pollinating agent ;		
		disadvantages		
	6	less, variation ;		**R** ref. to clones / genetically identical
	7	ref. to genotype becoming homozygous ;		
	8	ref. to harmful alleles (**A** genes) ;		
	9	less chance of adapting to changing conditions / AW ;		
	10	more susceptible to diseases ;		
	11	may become extinct ;	[max 4]	

(b) (i)	*Glycine* ;	[1]	**R** *Glycine max*
(ii)	network / AW, of veins / one (large) central vein ; broad leaves ; two, cotyledons / seed leaves ; flower parts in multiples of, 4 / 5 ; central / main, root ; vascular bundles regularly arranged ; has (true) secondary growth ;	[max 2]	**A** reverse arguments **I** large leaves **R** parts **A** 'not in 3s' **A** vascular bundles **not** irregularly arranged
		[Total: 13]	

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Question 10 [13]

10 (a)	*method of pollination*: wind ; *explanation to max 2:* Feathery / AW, stigma ; long, filament ; large, anthers / stamens ; anthers / stamens, hang outside flower ; anthers loosely attached (to filament) ; light pollen ; no petals ;	[1] + [2] max [3]	**A** 'only bracts'
(b)	cross (pollination) ;	[1]	
(c)	pollen tube ; delivers male gamete / pollen nucleus / male nucleus to ovule ; AW	[2]	**A** female gamete / egg / female nucleus / ovum**.**
(d)	*idea that* tip of pollen tube opens / AW ; gametes / sex cells / ova and pollen nuclei, fuse / join / combine ; formation of zygote ; diploid ;	max [2]	**A** male nucleus for pollen nucleus **ignore** pollen unqualified **ignore** meet / mix
(e) (i)	ovule ;	[1]	
(ii)	ovary (wall) ;	[1]	
(iii)	colonise new areas ; reduce (intraspecific) competition ; reduce inbreeding ; **ora**	max [1]	
(f)	stored food / food reserves (in seed) broken down ; named enzyme plus substrate ; product plus use ; enzymes required in process of respiration ;	max [2]	
		[Total:13]	

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