

# 16. Reproduction

## 16.3 Sexual reproduction in plants

### Paper 3 and 4

#### Marking Scheme

## Q1.

(a)(i)	<b>A</b> ; <b>B</b> ;	<b>2</b>	either order
(a)(ii)	<b>D</b> ;	<b>1</b>	
(a)(iii)	(bright) colours / large / landing platform / guidelines / scented ; to attract (named) pollinators / AW ;	<b>2</b>	
(b)(i)	anther ; stigma ;	<b>2</b>	
(b)(ii)	<i>any three from:</i> (insect-pollinated pollen is) larger ; heavier ; sticky / hooked / AW ; produced in smaller quantities ; AVP ;	<b>3</b>	

## Q2.

(a)(i)	<b>C</b> ; <b>D/E</b> ;	<b>2</b>	either order
(a)(ii)	cold ticked ; dry ticked ;	<b>2</b>	<b>R</b> each additional tick

## Q3.

	<b>A</b> attracts, insects / (named) pollinator ; <b>B</b> produces / contains, female sex cells, female gametes / ovules ; <b>C</b> produces / contains / releases, male sex cells, male gametes / pollen ; <b>D</b> receives pollen (grains) / site of pollination or description ;	<b>4</b>	<b>A</b> site of fertilisation / where seeds develop
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## Q4.

(a)	<i>any two from:</i> smooth(er) / AW ; small(er) ; light(er) ; more pollen ;	<b>2</b>	
(b)	<b>X</b> drawn on the ovary ; stigma circled ; label line to anther ; correct labelling as anther ;	<b>4</b>	
(c)	<i>any two from:</i> suitable temperature ; water / moisture ; oxygen ;	<b>2</b>	

**Q5.**

(a)(i)	<b>A</b> – filament ; <b>C</b> – petal ; <b>E</b> – ovary ;	<b>3</b>	
(a)(ii)	produce / release, pollen / male gamete ;	<b>1</b>	
(a)(iii)	<b>D</b> ;	<b>1</b>	
(b)	<i>any one from:</i> large petals ; (named) sexual organ(s) are, inside (the flower) / are internal ;	<b>1</b>	
(c)	<i>total of three from:</i>  <i>flower structure - max two from:</i> petals / flower, small / none / dull / not (brightly) coloured ; anthers / stigma, hang outside (of flower) / are external / AW ; feathery stigma ; pendulous / versatile, anther AW ;  <i>pollen - max two from:</i> large amounts of pollen, produced / released ; light / small, pollen ; smooth pollen ;	<b>3</b>	
(d)	Animal ;	<b>1</b>	

**Q6.**

(b)	suitable temperature ; oxygen ; water ;	<b>3</b>	<b>R</b> each additional circle
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**Q7.**

(d)	<i>any four from:</i> large petals ; colourful / bright, petals ; scented ; nectar / nectaries ; anthers / stigmas, inside the flower ; sticky / spiky, pollen grains ; less pollen made (than wind pollinated) ; AVPs ;; e.g. larger / heavy, pollen grain	<b>4</b>	
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**Q8.**

(a)(i)	water ;	<b>1</b>	
(a)(ii)	light ;	<b>1</b>	
(a)(iii)	no seeds, germinate / grow ; seeds are, killed or damaged / enzymes destroyed ;	<b>2</b>	

## Q9.

(a)(i)	<b>B</b> ; <b>C</b> ; <b>A</b> ;	3	
(a)(ii)	<b>X</b> drawn on an ovule ;	1	
(a)(iii)	sepal ;	1	
(b)	<i>any two from:</i> larger ; heavier ; stickier ; spiky ; AVP ;	2	

## Q10.

(a)(i)	anther labelled ; petal labelled ; stigma labelled ;	3
(a)(ii)	<i>any two from:</i> (large) petals ; stigma inside petals ; anther inside petals ; large stigma ;	2

## Q11.

(a)(i)	<b>B</b> and <b>C</b> ; <b>(B)</b> is too cold / not optimum temperature / needs warmth ; <b>(C)</b> is dry / lacks water / needs to be damp ;	3	
(b)	1 : 2 ;	1	

## Q12.

(a)	<pre> graph LR     anther[anther] --- attracts_insects[attracts insects]     ovary[ovary] --- place[place where pollen has to land]     petal[petal] --- produces_ovules[produces ovules]     sepal[sepal] --- produces_pollen[produces pollen]     stigma[stigma] --- protects[protects the flower bud]     water[transports water] --- transports[transports water]     ....[:::]   </pre>	5	one mark for each correct line
(b)	small(er) ; light(er) / less mass ; smooth(er) / not rough / not spiky / AW ; not sticky ; have, wings / extensions / air bladders or sacs ;	2	
(c)	sexual ; oxygen ; water ; gravity / light ; water / oxygen / mineral ions ;	6	mp2 and mp3 in either order

## Q13.

(a)(i)	<b>B:</b> no water / AW; <b>C:</b> low temperature / AW ;	2	
(a)(ii)	<i>prediction</i> – all / some / most (seeds), germinate ; <i>explanation</i> – light not necessary for germination / all conditions for germination present / water <b>and</b> suitable temperature present ; <b>OR</b> (for explanation) poor or no growth / die, as no light for photosynthesis / AW ;	2	
(b)(i)	91(%) ;;	2	
(b)(ii)	<i>Idea of:</i> something wrong with seed e.g. infertile / diseased / dead / immature / abnormal ; <b>OR</b> <i>Idea of:</i> lack of resources ; e.g. no oxygen / need more time / not enough water / competition / too close together / insufficient nutrients / AVP ;	1	

**Q14.**

(a)(i)	labelled line to one ovule ; labelled line to petal ;	2	
(a)(ii)	carpel / ovary ; sepal ;	2	
(b)	line from the anther of one flower ; line to stigma of another flower ;	2	
(c)	(large) petals ; stamens / anthers / filaments, inside flower <b>or</b> short, stamens / filaments <b>or</b> small anthers ; stigma inside flower / short style ; stigma, broad / wide / not feathery / AW ;	2	I features that are not visible on Fig. 7.1

**Q15.**

(a)(i)	a group of organisms that can reproduce ; to produce fertile offspring ;	2	
(a)(ii)	self-pollination labelled and arrow drawn from an anther to the stigma on the same flower ; cross-pollination labelled and arrow drawn from anther on one flower to stigma on the other flower ; anther labelled <b>and</b> stigma labelled ;	3	
(a)(iii)	<b>X</b> : contains ovules / female gamete / site of fertilisation / forms the fruit / site of seed, formation <b>or</b> production ; <b>Y</b> : protects (flower when in) bud ;	2	

**Q16.**

(a)(ii)	feathery stigma / stigma with large surface area ; stigma / anthers, hang outside the flower(s) ;	2
(b)(i)	<b>C</b> ovary (wall) ; <b>D</b> ovule ; <b>E</b> style ;	3

## Q17.

(a)(i)	<p><i>any three from:</i>            large / obvious / AW, petals / sepals ;            anthers / stigmas, inside flower ;            filaments are stronger / thicker / AW ;            pollinators must touch anthers, to reach nectar / AW ;            sticky stigma ;            pollen, large ;            pollen, sticky / spiky ;            AVP ; honey guides / landing platforms / mimic insects         </p>	3	
(a)(ii)	anther ;	1	<b>A</b> stamen
(b)(i)	<p><i>any five from:</i>            pollen transferred to stigma ;            ref to (pollen) <u>tube</u> ;            (pollen) tube, growth / germination ;            (pollen tube grows) down style ;            (pollen tube) enters ovule ;            (ovule is) in the ovary / carpel ;            pollen / male, <u>nucleus</u> fuses with ovule / female, <u>nucleus</u> ;            ref. to fertilisation ;            to form zygote ;            (zygote divides by) mitosis to form an embryo ;            AVP ; e.g. (fertilised) ovule becomes the seed         </p>	5	MP4 <b>A</b> pollen nucleus moves down style
(b)(ii)	<p><i>any two from:</i>            allows, variation / genetic diversity ;            plant more likely to survive (named) environmental change ;            resistance to disease ;            (ability to) evolve ;            ref. to fitness ;            AVP ;         </p>	2	

## Q18.

(b)	<p><u>genetically</u> identical ;            quick ;            can reproduce even if variety is sterile ;            described consequence of being genetically identical ;            AVP ; e.g. no pollinators required / reliable / no harmful variation         </p>	3	
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## Q19.

(a)(i)	<p>anthers / stamens / filaments / stigma, hang / AW, outside (the flower) ;  large, anthers / <b>C</b>, produce large quantities of pollen ;  <i>idea that</i> anthers / <b>C</b>, easily release pollen ;  'feathery' / AW, stigma / <b>B</b> ;  stigma has, feathery surface / large surface area, to catch pollen ;  bracts / <b>A</b>, are, small / inconspicuous ;</p>	3	<p><b>A</b> petals</p>
(b)	<p><i>idea that</i> pollination / fertilisation, always going to happen / AW ;  no agent of pollination needed ;  little wastage of pollen ;  reduced / little, variation / diversity ;  increased competition between plants (as have the same adaptation) ;  increase chance of, genetic / inherited, disease ;  all plants adapted to same, conditions / environment ;  little ability to adapt to changing conditions / little ability to evolve ;  an infectious disease can kill all of the population / all plants more susceptible to the same disease ;  risk of <u>extinction</u> ;  AVP ;</p>	4	

## Q20.

(d)(i)	<p><i>ref. to</i> asexual reproduction ;  (plantlets / cells / offspring grow by) <u>mitosis</u> ;  all cells / new plants, are <u>genetically identical</u> ;  AVP ;</p>	3	
(d)(ii)	<p>competition for resources as all individuals are close together ;  increased risk of inheriting harmful, alleles / features / trait ;  no / little, (genetic) variation ;  no new adaptive features ;  no evolution / no (natural) selection / no artificial selection / AW ;  no / little, ability to respond to (named) environmental change ;  all individuals are susceptible to the same, diseases / pests ;  higher risk of <u>extinction</u> ;</p>	3	