PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 2: CELLS, VIRUSES AND REPRODUCTION OF LIVING THINGS

SEXUAL REPRODUCTION IN PLANTS

SCORE	PERCENTAGE
/30	%

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(Total for question = 1 mark)

Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
(i)	A: generative nucleus (1) B: (pollen) tube nucleus (1)	If 2 suggestions provided, 0 marks	**Grad (2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation including three of the following • {one male nucleus / one male gamete} fuses with the two polar nuclei • to form a {triploid / 3n} nucleus (1) • {one male nucleus / one male gamete} fuses with the {egg cell / female gamete / ovum} • to form the {diploid / 2n} zygote (1)	Do not allow polar bodies Do not allow fertilises Accept triploid endosperm **nucleus** Accept fertilises Do not accept embryo	**Exp (3)**

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	• reading from graph at $1x10^{-2}$ • reading multiplied by 7.5 and divided by 100	Example of calculation: 76 % 76 ÷100 X 7.5 mm = 5.7 mm **Accept** 5700 μm **TE** for wrong reading from graph A Correct answer gains full marks 5.7 with no units = maximum 1 mark	**(2)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An answer that makes reference to four of the following: • {chemical A / stopping transcription} has {less effect / smaller reduction} on pollen tube growth (1) • growth levels off when chemical A increases and growth {falls steeply / drops to zero} when chemical B increases (1) • mRNA is already present (1) • (pollen tube) growth requires production of new proteins / enzymes (1)	**Accept** converse for chemical B / stopping translation **Accept** correct mathematical comparison e.g. overall chemical A causes a 29% drop and chemical B causes a 100 % drop **Accept** transcription occurred before chemical A added **Accept** pollen tube cannot grow without synthesis of new proteins	**(4)**

Q3.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that includes four of the following: • obtain DNA (from the two types of plants) (1) • {use of restriction enzymes to cut DNA into fragments / use of PCR to amplify DNA} (1) • {DNA / fragments} (loaded) on (agarose) gel with {current passed through / voltage or potential difference applied} (1) • fragments of DNA are separated (1) • {same / similar} (banding) pattern suggests they are the same species (1)	Accept movement of (negatively charged) DNA moves to positive electrode Accept description / diagram of banding pattern Accept shorter fragments travel further Accept converse	**Exp (4)**

Question Number	Answer	Additional Guidance	Mark
(ii)	An answer that includes two of the following: • (if leaf is green it contains) chlorophyll / photosynthetic pigments (1) • so more {light / more wavelengths of light} absorbed for photosynthesis (1) • so more glucose produced for growth (1) OR • (if flower is brightly coloured) it attracts {pollinators / insects} (1) • so (more likely to) reproduce successfully (1) • to produce seeds / pass trait on (1)	Accept more light / wavelengths of light leads to higher rate of photosynthesis Accept more GALP / TP / GP for growth Accept so increased genetic variation (as less self- pollination) Accept asexual reproduction (through bulb) still possible if pollination does not occur	**Exp (2)**

Q4.

Question Number	Answer	Additional Guidance	Mark
(i)	The only correct answer is **B** (diploid , triploid, haploid) **A** is not correct because the endosperm nucleus is not diploid but triploid **C** is not correct because the pollen tube nucleus is not diploid but haploid **D** is not correct because the zygote nucleus is not haploid but diploid and the pollen tube nucleus is not diploid but haploid		**(1)**

Question Number	Answer	Additional Guidance	Mark
(ii)	The only correct answer is **A** (meiosis, mitosis, mitosis) **B** is not correct because the third division is not meiosis but mitosis as the DNA mass remains the same **C** is not correct because the first division is not mitosis as the DNA mass halves and the second and third divisions are both mitosis as the DNA mass remains the same and does not halve **D** is not correct because the first nuclear division halves the DNA mass and the third nuclear division does not halve the DNA mass so is not meiosis		**(1)**

Q5.

Question Number	Indicative content
*	Answers will be credited according to candidates' deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. Indicative content: • male gamete fertilise female gamete to produce embryo • one male gamete fuses with {both polar nuclei / (diploid) endosperm nucleus} to form a triploid endosperm nucleus • endosperm is a store of {starch / protein / oils} • ovules will become the seeds inside the berries • xylem transports the water needed for berry formation shown in graph 1 • xylem transports the water needed for hydrolysis of food stores • xylem transports mineral ions for berry formation • phloem transports the sucrose needed for berry formation and ripening in graph 2 • more sucrose is transported from the leaves when berries are present in graph 2 • ^{14}C incorporated into glucose during photosynthesis • glucose converted into sucrose for transport in the phloem

Level 0	Marks	No awardable content
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context. **2 or 3 comments made which may include description of graphs and / or explanations**
Level 2	**3-4**	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure. **4 of 5 comments that include explanations with reference to at least two components**
Level 3	5-6	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured. **6 or 7 comments that include explanations with reference to all three components**

Q6.

Question Number	Answer				Additional Guidance	Mark
	Structure	**Name of structure**	**Number of sets of chromosomes**		**NB** Any two correct cells = 1 mark	(4)
	J	egg cell / female gamete	one / haploid / n	(1)	**ACCEPT** ovum / ova	
	K	polar nucleus / nucleus that forms the endosperm nucleus	one / haploid / n	(1)	**ACCEPT** pleural	
	L	male gamete	one / haploid / n	(1)	**ACCEPT** male / sperm nucleus pleurals	
	M	(pollen) tube nucleus	one / haploid / n	(1)	**DO NOT ACCEPT** generative nucleus	

Q7.

Question Number	Answer	Additional guidance	Mark
	endosperm		**(1)**