GradeMax

Pearson

Mark Scheme (Results)

January 2026

Pearson Edexcel International Advanced Subsidiary level In Biology
WBI12/01

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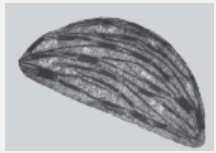
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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th rowspan="2">Statement</th><th colspan="3">Organelle</th></tr>
<tr><th></th><th></th><th></th></tr>
<tr><td>absorbs light energy</td><td></td><td></td><td>✓</td></tr>
<tr><td>contains a double membrane</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>contains ribosomes</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>forms spindle fibres</td><td>✓</td><td></td><td></td></tr>
</table>
</td><td>one mark per correct row</td><td>(4)</td></tr>
</table>

Question Number	Answer	Mark
1(b)	The only correct answer is C Eukarya *A is not correct because Archaea do not contain these organelles* *B is not correct because Bacteria do not contain these organelles* *D is not correct because prokaryotes do not contain these organelles*	**(1)**

Question Number	Answer	Additional guidance	Mark
2(a)	An answer that includes the following points: • phloem is B • sclerenchyma is A • xylem is C	all three correct = 2 marks 1 or 2 correct = 1 mark REJECT if more than one answer in a box	**(2)**

Question Number	Answer	Additional guidance	Mark
2(b)	A description that includes the following points: • function of phloem is {translocation / transport} of organic solutes (1) • function of sclerenchyma is to provide support for plant (1) • function of xylem is transport of water and {mineral ions / inorganic solutes} (1)	ACCEPT correct named organic solute IGNORE water REJECT **in**organic solutes IGNORE glucose / sugar IGNORE strength / rigidity ACCEPT support for plant	**(3)**

Question Number	Answer	Mark
3(a)(i)	The only correct answer is D *A is not correct because R is a pollen grain* *B is not correct because R is a pollen grain* *C is not correct because S is a polar nucleus*	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	A description that makes reference to the following points: • {male nucleus / U} fuses with egg cell nucleus to form the embryo (1) • {male nucleus / U} fuse with the two polar nuclei to form the endosperm (1)	 REJECT generative nucleus REJECT generative nucleus	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	An answer that makes reference to the following: • correct line measurement and conversion (1) • correct answer (1)	<u>Example of calculation:</u> 42 × 1000 = 42 000 μm allow tolerance of ±0.5 mm (42 000 ÷ 5) =× 8 400 ACCEPT correct answer in correct standard form Correct answer with no working shown scores full marks	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	An answer that makes reference to the following: • electron microscope (1) • due to higher {magnification / level of detail} than a light microscope (1)	ECF for magnification from (i) ACCEPT scanning electron microscope REJECT transmission / TEM IGNORE electronic / electric ACCEPT higher resolution than a light microscope / descriptions of higher resolution IGNORE 3D image	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(iii)	An explanation that makes reference to two of the following: • by {meiosis / mutation} (1) • {crossing over / exchange of alleles} in prophase I (1) • resulting in different combinations of alleles / recombinant {chromosomes / chromatids} (1) • {independent / random} assortment of maternal and paternal chromosomes in metaphase I (1)	REJECT incorrect stage ACCEPT sister chromatids becoming genetically different from each other REJECT incorrect stage	**(2)**

Question Number	Answer	Additional guidance	Mark
4(a)(i)	• polysaccharide / carbohydrate (1)	ACCEPT polymer	**(1)**

Question Number	Answer	Mark
4(a)(ii)	The only correct answer is C cell wall *A is not correct because cellulose is not stored in an amyloplast* *B is not correct because the cell membrane does not contain cellulose* *D is not correct because the tonoplast does not contain cellulose*	**(1)**

Question Number	Answer	Mark
4(a)(iii)	The only correct answer is B 1,4-glycosidic bond and hydrogen bond *A is not correct because cellulose microfibrils do not contain 1,6 glycosidic bonds* *C is not correct because cellulose microfibrils contain 1,4 glycosidic bonds* *D is not correct because cellulose microfibrils contain 1,4 glycosidic bonds*	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)(i)	An answer that makes reference to one of the following points: • renewable / plants can be regrown / carbon neutral (1) • biodegradable / can be broken down by decomposers (1)	ACCEPT available for future generations ACCEPT reduces use of oil-based packaging IGNORE recyclable / re-usable / sustainable	**(1)**

Question Number	Answer	Additional guidance	Mark
4(b)(ii)	An answer that makes reference to the following: • correct increase (1) • 140 (%) (1)	no tolerance on reading from graph (26.0 - 11.0) = 15 (15 ÷ 26) ×100 = 140 Correct answer to two significant figures gains full marks no ECF	**(2)**

Question Number	Answer	Additional guidance	Mark
4(c)	An answer that makes reference to four of the following: • increase in starch concentration increases the tensile strength of bioplastic / converse (1) • increase in glycerol concentration decreases the tensile strength of bioplastic / converse (1) • tensile strength increases due to more hydrogen bonds between {starch / amylose / amylopectin / glucose} molecules / converse (1) • no significant difference between stated concentrations due to overlapping {error / SD} bars / converse (1) • the highest tensile strength is found in bioplastic with {the highest / 20%} starch concentration and {lowest / 20%} glycerol concentration (1) • relevant comment on investigation (1)	ACCEPT glycosidic bonds ACCEPT converse for {lowest / 10%} starch concentration and {highest / 40%} glycerol content e.g. lack of information about suitable named controlled variables e.g. temperature / {thickness / type} of bioplastic / methodology how tensile strength determined	**(4)**

Question Number	Answer	Mark
5(a)	The only correct answer is A egg cells only, egg cell and sperm cell *B is not correct because sperm cells contain mitochondria* *C is not correct because the sperm cell does not contain cortical granules* *D is not correct because sperm cells contain mitochondria*	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	A description that makes reference to the following: • fusion with cell membrane releases enzymes {out of the cell / into zona pellucida} (1) • which hardens the zona pellucida / {remove / block / modify} receptors for sperm (1)	ACCEPT exocytosis of enzymes IGNORE cell membrane / fertilisation membrane	**(2)**

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer that makes reference to four of the following: • increase in membrane potential increases the number of egg cells with polyspermy / converse (1) • large increase from -70 to -40 mV / {little change / small increase} above -40 mV (1) • because the {cortical reaction / normal fertilisation process} results in decrease in membrane potential of egg cell (1) • no significant difference between membrane potentials after -40 to +10 mV due to overlapping error bars / converse for -70 to -40 mV (1) • relevant comment about methodology (1)	ACCEPT because zona pellucida does not harden properly at higher membrane potentials / converse e.g. damaged {egg / sperm} cells / relevant comment on sample size / no information regarding suitable named control variable e.g. source of egg cells, volume of sperm cell sample	**(4)**

Question Number	Answer	Additional guidance	Mark
5(c)	A description that makes reference to three of the following: • {morula / blastocyst} cells divide by mitosis (1) • morula cells are totipotent / blastocyst cells are pluripotent (1) • cells differentiate {from totipotent to pluripotent / into different types of embryonic cells} (1) • inner cell mass becomes the embryo (1)	IGNORE cell division unqualified REJECT blastocyst has totipotent cells ACCEPT specialise for differentiate ACCEPT morula cells can differentiate into {placenta / extra embryonic / blastocyst / pluripotent} cells ACCEPT blastocyst cells differentiate into any cells except {placenta / extra embryonic} cells REJECT blastocyst cells differentiate into any cells except embryonic cells ACCEPT correct description of function of trophoblast	**(3)**

Question Number	Answer	Additional guidance	Mark
6(a)(i)	An explanation that makes reference to two of the following points: • x-raying seeds to check for {embryo / viability} (1) • {disinfecting / sterilising} seeds to remove microbes (1) • {freeze / drying} the seeds to prevent {germination / metabolic reactions} (1)	ACCEPT suitable named microbes IGNORE disease IGNORE prevent growth of seeds IGNORE storing in dry place	**(2)**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation that makes reference to two of the following points: • some seeds may not {be viable / contain embryo / germinate} (1) • to ensure seed bank contains greater number of different alleles / increase probability of storing all alleles from species} / increase probability of not losing alleles from gene pool (1) • to ensure alleles that may confer an advantageous trait are stored (1)	ACCEPT some seeds do not survive storage ACCEPT to collect representative sample of alleles present in {population / gene pool}	**(2)**

Question Number	Answer	Mark
6(b)(i)	The only correct answer is D 1.16 : 1 *A is not correct because that is not the correct ratio format* *B is not correct because that is not the correct ratio format* *C is not correct because that is the fibre content ratio*	**(1)**

Question Number	Answer	Mark
6(b)(ii)	The only correct answer is C 33.9 *A is not correct because that is the mass of fat in soybean* *B is not correct because that the mass of fibre in alfalfa* *D is not correct because that is the mass of protein in alfalfa*	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)(iii)	suitable nitrogen containing molecule	e.g. DNA / RNA / nucleotides / nitrogenous base / ATP / chlorophyll / nucleic acids	**(1)**

Question Number	Answer
***6(c)**	Answers will be credited according to candidate's 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 indicated as relevant. Additional content included in the response must be scientific and relevant. Breeding programme • selection of wild relative plants with selected phenotypes e.g. higher yield, grow bigger, grow in colder temperature, grown in drier conditions, high nutritional content and selection of alfalfa plants with highest {nutritional content / yield} • {selective breeding / cross pollination} of alfalfa with wild relative plants • methods of pollination • planting seeds and identifying specific characteristics of offspring • breeding of selected offspring which can grow in the coldest temperatures and lowest rainfall and also has highest nutritional content • breeding of selected offspring repeated {over many generations / until new strain developed with all of the required characteristics} • {cloning / asexual reproduction} of selected plants • consideration of maintaining genetic diversity in case of new selection pressure • consideration of DNA analysis / meiosis role / crossing over role Why farmers would grow new varieties • farmers in {areas with low temperature / areas with low rainfall / named areas from map / most areas} can now grow alfalfa • farmers can now grow alfalfa all year round • {increased nitrate content of soil / alfalfa natural fertiliser} due to root nodules containing bacteria • farmers will have more food to feed their animals / less land needed to produce same quantity of animal feed • animal feed will have higher {nutritional / fat / protein / fibre} content (than other plants which were used for food) • benefits to animals of high {fat / protein / fibre} content / more food e.g. faster growth / more {meat / muscle} / more milk / • farmer will raise {more / healthier} animals • increases {the money that the farmer will earn / food to feed family} due to increased yield • farmers do not need to spend as much money on {water / irrigation / fertilisers} **(6)**

Level 0	0	No awardable content
Level 1	1-2	Demonstrates isolated elements of biological knowledge and understanding to the given context with generalised comments made. Vague statements related to consequences are made with limited linkage to a range of scientific ideas, processes, techniques and procedures. The discussion will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3-4	Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts / concepts. Consequences are discussed which are occasionally supported through linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows some linkages and lines of scientific reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant biological facts / concepts. Consequences are discussed which supported throughout by sustained linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

Question Number	Answer	Additional guidance	Mark
7(a)(i)	An answer that makes reference to the following point: • transcription / formation of mRNA (1)	ACCEPT histone modification / post-transcriptional modification	**(1)**

Question Number	Answer	Additional guidance	Mark
7(a)(ii)	An answer that makes reference to three of the following: Similarities: (max 2) • both have condensed chromosomes (1) • both have {no nucleus / no nuclear envelope} (1) • both have spindle fibres (1) Differences: (max 2) • {spindle fibres / spindle fibres attached to centromere} in metaphase whereas they are beginning to be broken down at beginning of telophase (1) • chromosomes are at the {centre / equator} of cell in metaphase whereas they are at poles of cell at beginning of telophase (1) • condensed chromosomes in metaphase whereas chromosomes beginning to uncondense at beginning of telophase (1) • no nuclear envelope in metaphase whereas nuclear envelope starting to reform at beginning of telophase (1) • the cytoplasm starts to divide at beginning of telophase whereas it doesn't in metaphase (1)	answer must contain both similarities and differences to access full marks ACCEPT {chromatin / chromatids} for chromosomes ACCEPT chromosomes held together by centromere in metaphase but not in telophase ACCEPT cleavage furrow formation at beginning of telophase whereas it doesn't in metaphase	**(3)**

Question Number	Answer	Additional guidance	Mark
7(b)	An explanation that makes reference to the following: • {methyl / -CH_3} groups are added to {cytosine / CpG} by methyltransferase (1) • heterochromatin is formed / DNA coiled more tightly around histones (1) • preventing {RNA polymerase / transcription factors} binding to promoter region (1)	REJECT histone / lysine / cysteine IGNORE DNA unqualified IGNORE transcription	**(3)**

Question Number	Answer
***7(c)**	Answers will be credited according to candidate's 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 indicated as relevant. Additional content included in the response must be scientific and relevant. • as concentration of drug A increases the activity of methyltransferase decreases / drug A reduces activity of enzyme • relevant comment regarding significant difference in activity of methyltransferase at different concentrations of drug A due to non-overlapping error bars • relevant comment regarding methodology / validity of data • reduced numbers of methyl groups being added to cytosine of tumour suppressor gene • DNA in euchromatin form • tumour suppressor genes {are activated / remain active / expressed / not switched off} • DNA methylation can be passed on during cell division of the cancer cells • {RNA polymerase / transcription factors} can bind to promoter region • transcription can occur and mRNA of the tumour suppressor gene is produced • tumour suppressor proteins formed in translation (one protein or more than one protein from one gene) • role of rER and Golgi apparatus in protein synthesis • suggestion as to how the tumour suppressor proteins {inhibit DNA replication / prevent formation of spindle fibres} • {mitosis does not occur / cell cannot divide / cell remains in interphase} if {DNA replication inhibited / spindle fibres do not form} • consideration of reduction in mitotic index • reduction in {mitotic index / rate of cell division} linked to preventing growth of tumours **(6)**

Level 0	0	No awardable content
Level 1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information and 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.
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.
Level 3	5-6	An explanation is made that 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.

Question Number	Answer	Mark
8(a)(I)	The only correct answer is A anatomical *B is not correct because it is not a behavioural adaptation* *C is not correct because it is not a physiological adaptation* *D is not correct because seasonal is not an adaptation*	**(1)**

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	An answer that makes reference to one of the following: • an extra thumb would help the panda to {climb / grip} trees / branches (1) • an extra thumb would help the pandas to {hold / gather / break} {bamboo / fruit / insects / eggs / food / objects} (1)		**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)	An explanation that makes reference to the following: • giant panda and brown bears {DNA sequences were the most similar / had lowest stability unit value} (1) • red panda regrouped due to {most differences between the DNA sequences / least similarities between the DNA sequences} with all three species (1)	IGNORE stability units were the same	**(2)**

Question Number	Answer	Additional guidance	Mark
8(c)(i)	• 150 to 225 km		**(1)**

Question Number	Answer	Additional guidance	Mark
8(c)(ii)	An answer that makes reference to two of the following: • {deforestation / loss of habitat} lower down the mountain therefore {food sources / bamboo / eggs / insects} are found higher up mountain (1) • red panda prefers cooler temperatures higher up mountain (1) • avoiding {predators / hunters / humans / noise pollution} (1)	ACCEPT converse	**(2)**

Question Number	Answer	Additional guidance	Mark
8(d)(i)	30 / thirty (individuals)	ACCEPT 30.0 REJECT 30.012 / 30.01	**(1)**

Question Number	Answer	Additional guidance	Mark
8(d)(ii)	An answer that makes reference to the following: • identify individuals with low frequency alleles (1) • use selected individuals in a captive breeding programme (1)	REJECT breeding with other species ACCEPT relocate them to different locations to mate with pandas with different alleles	**(2)**

Question Number	Answer	Additional guidance	Mark
8(e)(i)	An answer that makes reference to the following: • calculation of number of red pandas with genotype GG (1) • calculation of {q / frequency of g allele} (1) • calculation of number of red pandas with genotype Gg and gg (1)	$(0.5476^2) \times 30 = 9$ 1 - 0.5476 = 0.4524 $(2 \times 0.5476 \times 0.4524) \times 30 = 15$ $(0.4524^2) \times 30 = 6$ all correct red panda numbers scores full marks	**(3)**

Question Number	Answer	Additional guidance	Mark
8(e)(ii)	An explanation that makes reference to the following: • calculate {p / q} allele frequency for this locus (1) • compare this with the previous allele frequency to see if there has been a change (1)	ACCEPT identify {similarity / difference} between the allele frequencies at two different time points IGNORE {see if there is a / observe} change in allele frequencies overtime	**(2)**