Pearson

Mark Scheme (Results)

October 2025

Pearson Edexcel International Advanced Subsidiary Level in Biology
WBI12/01A

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October 2025
Question Paper Log Number P87408A
Publication Code WBI12_01A_2510_MS

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.

Question Number	Answer	Additional guidance	Mark
1(a)(i)	• anaphase (1)	REJECT additional stages REJECT {I / II}	**(1)**

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	A description that includes two of the following points: • {chromosomes / chromatids / chromatin / DNA} {decondense / uncoil} (1) • nuclear {membranes / envelope} reforms around chromosomes (1) • spindle fibres {break down / detach from centromere} (1) • cell {plate / wall} begins to form (1)	IGNORE chromosomes break down / disappear ACCEPT {nuclei / nucleus / nucleolus} form ACCEPT description of cleft / cleavage furrow IGNORE cytokinesis	**(2)**

Question Number	Answer	Additional guidance	Mark
1(b)(i)	An answer that includes the following points: • A / safranin • as the {chromosomes / chromatids} {are visible / can be seen} in mitosis (1)	both points are required for the mark REJECT B / nile red ACCEPT because {chromosomes / DNA} are nucleic acids	**(1)**

Question Number	Answer	Mark
1(b)(ii)	The only correct answer is B 21.9% *A is not correct because that was number of cells in interphase divided by cells in mitosis without conversion into a percentage* *C is not correct because 28 should be divided by the total number of cells and not the number in interphase* *D is not correct because that was number of cells in interphase divided by cells in mitosis*	**(1)**

Question Number	Answer	Mark
2(a)(i)	The only correct answer is B amyloplast and chloroplast only *A is not correct because the chloroplast can also contain starch* *C is not correct because the chloroplast contains starch* *D is not correct because the vacuole does not store starch*	**(1)**

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	A description that includes three of the following points: • polymer of α-glucose monomers (1) • composed of amylose and amylopectin (1) • both 1,4 and 1,6 glycosidic bonds (1) • {starch / amylopectin} is branched (1)	REJECT β / beta IGNORE glucose unqualified	**(3)**

Question Number	Answer	Additional guidance	Mark
2(b)(i)	An answer that includes one of the following points: • contains {digestive enzymes / hydrolytic enzymes / lysozymes} (1) • digest {pathogens / cells / components / organelles / cellular waste / glycogen} (1)	REJECT incorrect answers e.g. protein synthesis / forming enzymes ACCEPT involved in exocytosis of {digestive enzymes / hydrolytic enzymes / lysozymes} IGNORE enzymes unqualified ACCEPT autophagy / glycophagy / apoptosis / fuse with phagosome / other correct functions of lysosomes ACCEPT digest {unwanted substances / zona pellucida} IGNORE phagocytosis	**(1)**

Question Number	Answer	Mark
2(b)(ii)	The only correct answer is B 0.1 : 1 *A is not correct because 20 : 200 is not 0.01 : 1* *C is not correct because 20 : 200 is not 10 : 1* *D is not correct because 20 : 200 is not 100 : 1*	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)	An answer that includes one of the following points: • bacteria take in oxygen {for aerobic respiration / to produce ATP / to release energy} (1) • for asexual reproduction / synthesis of digestive enzymes (1)	IGNORE respiration unqualified ACCEPT obligate aerobe REJECT produce energy ACCEPT increase in bacterial population IGNORE to digest the sewage	**(1)**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	A calculation showing the following steps: • correct calculation of the numerator (1) • correct D value (1)	13806 2.3 IGNORE incorrect units correct answer scores full marks	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	An answer that includes the following points: • decreased {biodiversity / index of diversity} (1) • correct reason (1) **OR** • increased {biodiversity / index of diversity} (1) • correct reason (1)	ACCEPT negative effect e.g. loss of species / lower species {richness / abundance} / as more organisms of {one / fewer} species found / lower species evenness do not credit answers just referring to decrease in population size ACCEPT positive effect e.g. because new species will be present / higher species richness / presence of species {that are tolerant to low oxygen content / due to more organic material}	**(2)**

		do not credit answers just referring to increase in population size	

Question Number	Answer	Additional guidance	Mark
4(a)(i)	• 4143 km (1)	ACCEPT 4000 to 4300 ACCEPT correct standard form	**(1)**

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	An answer that includes two of the following points: • habitat {loss / destruction} (1) • hunting / poaching (1) • reduction in prey / less food available (1) • disease (1) • poor reproductive success / reproductive isolation / unable to find a mate (1)	IGNORE genetic diversity / pollution / adaptations / natural disaster e.g. deforestation / clearing land for {food production / housing} ACCEPT climate change ACCEPT new predator ACCEPT new species competing for food ACCEPT geographical isolation IGNORE inbreeding	**(2)**

Question Number	Answer	Additional guidance	Mark
4(a)(iii)	An answer that includes the following points: • same species because they can breed together to form fertile offspring (1) • different subspecies due to {differences / variation} in {phenotype / characteristics / behaviour / adaptations / molecules / alleles / genome / diet} (1)	IGNORE variation unqualified IGNORE similarities	**(2)**

Question Number	Answer	Additional guidance	Mark
4(b)	An explanation that includes the following points: • links would allow individuals to move to other areas / prevent {geographically isolated / reproductively isolated / fragmented} populations (1) • links between fragmented habitats would enable {outbreeding / individuals from different populations to breed together} (1) • {increasing / allowing} gene flow between populations (1)	ACCEPT prevent inbreeding IGNORE mating of different sub-species ACCEPT examples / descriptions e.g. introduce different alleles from other populations / prevent loss of alleles / prevent reduction of gene pool / prevents genetic drift IGNORE increase genetic diversity	**(3)**

Question Number	Answer	Additional guidance	Mark
4(c)	A description that includes three of the following points: • raise awareness of importance of {tigers / biodiversity} / raise awareness {of risk of extinction / that tigers are endangered} (1) • raise awareness of {protection / conservation / expansion / preventing destruction} of current {range / habitat} (1) • raise awareness of {develop / increase} breeding programmes / reintroduction of captive bred tigers (1) • raise awareness of need to decrease poaching / make {hunting / selling tiger parts / buying tiger parts} illegal (1) • encourage donations for conservation projects (1)	IGNORE increases chance of survival ACCEPT raise awareness of role of tiger in {food chain / ecosystem} ACCEPT raise awareness of {preventing deforestation / preventing reduction in food sources} IGNORE reducing pollution ACCEPT raise awareness of need for {conservation areas / protected areas / sanctuaries / zoos} ACCEPT raise awareness of maintaining genetic diversity / freezing gametes IGNORE breeding unqualified ACCEPT influence government policy ACCEPT volunteering in conservation work	**(3)**

Question Number	Answer	Additional guidance	Mark
5(a)(i)	An answer that includes one of the following points: • xylem (1) • sclerenchyma (1) • phloem / sieve tube element (1)	mark first answer if listed more than one tissue REJECT molecules REJECT organs	**(1)**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	An answer that includes one of the following points: • due to high {cellulose / lignin} content (1) • the fibres are {woven into a mesh / twisted with others into a helix} to give a high tensile strength (1)	IGNORE references to elasticity ACCEPT secondary thickening of cell walls / hemicellulose ACCEPT {microfibrils / fibres} arranged in {mesh / different angles} ACCEPT hydrogen bonding between {cellulose molecules / microfibrils}	**(1)**

Question Number	Answer	Additional guidance	Mark
5(a)(iii)	An answer that includes one of the following points: • jute is {biodegradable / broken down by decomposers} whereas oil-based plastics are not (1) • jute is carbon neutral whereas oil-based plastics are not (1)	ACCEPT converse for oil-based plastics IGNORE do not use fossil fuels / will not run out / renewable / re-usable / easier to grow IGNORE less carbon dioxide released during production / less pollution	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)	An answer that includes three of the following points: • the extract made from jute leaves is more effective against *L. monocytogenes* (1) • the extract made from jute seeds is more effective against E. *faecalis* (1) • no significant difference in effectiveness of leaf compared to seed extracts against *L. monocytogenes* as SD's overlap (1) • credit comment on effectiveness related to methodology (1)	IGNORE antimicrobial properties IGNORE diameter references ACCEPT seed extract is more effective than leaf extract {overall / for all bacteria except *L. monocytogenes}* IGNORE diameter references ACCEPT correct conclusion of significant difference or no significant difference for stated {bacteria / extracts} REJECT incorrect statements e.g. was {volume / concentration} of extract controlled e.g. same {agar / disc material / method of	**(3)**

		seeding plate / aerobic conditions} e.g. no control disc	

Question Number	Answer	Additional guidance	Mark
5(c)(i)	• digitalis	ACCEPT digoxin / digitalin	**(1)**

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	A description that includes the following points: • modern drugs trials use known active ingredients (1) • extract would first be tested {on a small number of healthy people / in phase I} (1) • modern drug trials start with {lowest / smallest} dosage first (1)	 ACCEPT scientists {are sure it contains active ingredients / do pre-clinical phase / research} ACCEPT ingredients {chemically analysed / extracted / tested on animals / tested on cells} ACCEPT tested on {human cells / animals} ACCEPT tested to check it is safe for human trials ACCEPT modify after animal trials / it is	**(4)**

	• modern trials {have three-phased testing / test on larger number of patients / have phase III test} (1)	amended before being given to people IGNORE give lowest effective dose unqualified IGNORE tested on healthy people first	

Question Number	Answer	Additional guidance	Mark
6(a)	An explanation that includes two of the following points: • seeds {viable / stored} for longer (1) • to prevent {germination / hydrolysis reactions / metabolic reactions / enzyme reactions / enzyme activation} (1) • reduce growth of microbes on surface of seed (1)	ACCEPT prevent cell damage {when seeds are frozen / from ice crystals} IGNORE prevent growth of seeds	**(2)**

Question Number	Answer	Mark
6(b)(i)	The only correct answer is C male nucleus fuses with an egg cell nucleus *A is not correct because the generative nucleus does not fuse with an egg cell nucleus* *B is not correct because the generative nucleus does not fuse with polar nuclei* *D is not correct because the male nucleus does not fuse with polar nuclei*	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation that includes two of the following points: • as this may not destroy the embryo / {prevent extinction of / conserve} endangered species that cannot survive seed drying (1) • prevents {germination when stored / cell division / hydrolysis reactions / metabolic reactions / enzyme activation} (1) • to increase the {number of different species / genetic diversity / number of alleles} stored in the seed bank (1) • storing embryos takes up less space than storing seeds (1)	ACCEPT provide future source of stem cells IGNORE seed (unqualified) would not be destroyed ACCEPT reduce growth of microbes ACCEPT seed enzymes are not denatured ACCEPT increase the chance of future germination IGNORE so embryo doesn't grow	**(2)**

Question Number	Answer	Additional guidance	Mark
6(c)	An answer that includes the following points: • the percentage of seeds which germinate decrease with increased storage time (1) • storage in a sealed metal can {is most effective / has highest germination / keeps germination percentage higher for longer / enables higher seed survival} (1) • suitable quantitative evidence from the graph to support statement (1) • no information regarding specific aspects of methodology (1)	ACCEPT storage in a sealed container is more effective / little change in percentage germination for seeds stored in a sealed can ACCEPT sealed containers prevent entry of {air / water / microbes} ACCEPT converse for cloth bag e.g. {89 -90} % reduction in germination in cloth bag in 30 months e.g. sample size / no {SD / error} bars / were all seeds from same species / were all seeds viable before investigation started / all stored at same temperature	**(4)**

Question Number	Answer	Additional guidance	Mark
6(d)	An explanation that includes four of the following points: • tissue sample contains {totipotent / stem / undifferentiated / unspecialised / meristem} cells (1) • genetically identical because they all contain {the DNA from the parent plant / identical DNA sequence} (1) • mitosis occurs (1) • differential gene expression / {epigenetic modification / DNA (de)methylation / histone acetylation / transcription factors} activating genes controlling {root / leaf} cell development (1) • resulting in {differentiation into / growth of} {root / leaf} (1) • description of {role of nutrients / chemicals} in agar (1)	ACCEPT tissue sample cells differentiate ACCEPT they are clones ACCEPT asexual reproduction IGNORE genetically identical / same genes IGNORE cell division unqualified ACCEPT {proteins / enzymes} formed which modify cell ACCEPT other suitable named examples of {tissue / organ} e.g. carbohydrates for respiration / nitrates for proteins / calcium ions for calcium pectate / magnesium ions for chlorophyll / e.g. plant hormones IGNORE nitrogen	**(4)**

Question Number	Answer	Additional guidance	Mark
7(a)	An explanation that makes reference to two of the following points: • contain a haploid nucleus to {ensure a diploid zygote / restore diploid number} (1) • has a streamlined shape for {efficient movement / speed / reduce resistance} (1) • has {an acrosome / acrosin} to {digest / breakdown} the zona pellucida (1) • {antigen / protein} on cell surface membrane to bind to receptors on egg cell surface membrane (1)	IGNORE digest cell membrane	**(2)**

Question Number	Answer	Additional guidance	Mark
7(b)	A calculation showing the following steps: • conversion to μm (1) • correct answer in μm^3 and standard form to suitable number of decimal places (1)	<u>Example of calculation:</u> radius =50 μm / diameter=100 μm $= \frac{4}{3}\pi r^3$ = 5.24 x 10^5 (μm^3) Correct answer with no working shown scores full marks	**(2)**

Question Number	Answer	Additional guidance	Mark
7(c)(i)	An answer that makes reference to the following points: • only one light and one dark single chromosome in each cell (1) • darker chromosome shorter than (two-thirds length) lighter chromosome in both cells (1)	REJECT recombinant {chromatids / chromosomes}	**(2)**

Question Number	Answer	Additional guidance	Mark
7(c)(ii)	An explanation that makes reference to the following points: • {independent / random} assortment of chromosomes has occurred (1) • different alleles on the chromosomes from each parent / {different / new} combinations of alleles (1)	IGNORE crossing over REJECT random fertilisation ACCEPT description of independent assortment {in metaphase / on equator} IGNORE they have different chromosomes	**(2)**

Question Number	Answer	Additional guidance	Mark
7(d)(i)	A description that makes reference to two of the following points: • epigenetic modification has occurred (1) • {methyl group / CH_3} {added to / removed from} {cytosine / CpG site / histones / lysine / arginine} (1) • formation of {heterochromatin / euchromatin} (1) • {allowing / preventing} binding of transcription factors (1)	e.g. DNA methylation / histone acetylation / histone modification / demethylation of DNA REJECT cysteine ACCEPT {acetyl group / -$COCH_3$} {added to / removed} from {cytosine / lysine / arginine} ACCEPT DNA {wraps tightly / loosens} around histones / supercoiling ACCEPT {allowing / preventing} {binding / action} of RNA polymerase	**(2)**

Question Number	Answer	Additional guidance	Mark
7(d)(ii)	An explanation that makes reference to five of the following points: • the Rab27a gene is active in group A (1) • transcription and translation of the active Rab27a gene occurred in group A (1) • protein fibres transport cortical granules to egg cell surface membrane (1) • resulting in {exocytosis of cortical enzymes / cortical reaction occurs} (1) • causing the zona pellucida to harden (1) • hardened zona pellucida will prevent {polyspermy / additional sperm entering egg cell} (1)	ACCEPT converse for B IGNORE A is active ACCEPT protein fibres produced in A IGNORE gene involved in production of cortical granules IGNORE hardening of {egg cell / fertilisation} membrane	**(5)**

Question Number	Answer	Mark
8(a)(i)	The only correct answer is C organelle R *A is not correct because the RER doesn't form secretory vesicles containing the enzyme* *B is not correct because the SER is involved in lipid synthesis* *D is not correct because the nucleus is not involved in exocytosis of maltase*	**(1)**

Question Number	Answer	Mark
8(a)(ii)	The only correct answer is B – P and S *A is not correct because the Golgi apparatus does not have ribosomes* *C is not correct because the smooth endoplasmic reticulum and Golgi apparatus does not have ribosomes* *D is not correct because the smooth endoplasmic reticulum does not have ribosomes*	**(1)**

Question Number	Answer	Mark
8(a)(iii)	The only correct answer is D mitochondria *A is not correct because the centriole is not involved in respiration* *B is not correct because the chloroplast is not involved in respiration* *C is not correct because the endoplasmic reticulum is not involved in respiration*	**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)(i)	• prophase {I / 1 / one}	IGNORE prophase unqualified IGNORE meiosis I REJECT additional answers	**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	A description that makes reference to the following points: • {sections of chromosomes / sections of chromatids} exchanged at chiasmata (1) • between {non-sister / maternal and paternal} chromatids (1)	REJECT sister chromatids ACCEPT between {bivalent / homologous chromosomes}	**(2)**

Question Number	Answer	Mark
8(c)	The only correct answer is B strong positive correlation *A is not correct because it is a positive correlation* *C is not correct because it is not a weak correlation* *D is not correct because it is not a weak correlation*	**(1)**

Question Number	Answer	Additional guidance	Mark
8(d)(i)	• 6 / six (copies of AMY1)	REJECT other numbers on answer line	**(1)**

Question Number	Answer	
***8(d)(ii)**	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. • People with high starch diet have more copies of AMY1 / people with low starch diet have fewer copies of AMY1 • the more copies of AMY1 the more {amylase / enzyme} produced / positive correlation • mutation occurred during {DNA replication / crossing over} • natural selection aspects e.g. beneficial mutation more likely to be passed onto offspring / increase in allele frequency • transcription / mRNA production • post-transcriptional modification • mRNA molecules would be translated • polypeptides would be modified into amylase by Golgi apparatus and packaged into secretory vesicles for exocytosis • increased concentration of amylase would result in an {increased rate of / more} {starch / amylose} hydrolysis / increased concentration of amylase would result in more amylase – starch enzyme-substrate complexes formed per unit time • more maltose is hydrolysed by maltase into glucose • maltase concentration is a limiting factor • glucose needed for respiration to produce ATP / can be converted to {amino acids / fatty acids} • ATP needed for {mitosis / some metabolic reactions / muscle contraction / protein synthesis / organelle production} • more mitosis results in more growth of the individual • more protein synthesis would result in more {enzymes / structural proteins / growth} • may not be adaptation as {might be neutral mutation / might not be linked to diet / might be due to mutagen} / diet can change • relevant comments linked to confidence in the validity of the results or conclusion e.g. {no sample size given / small sample size} / high correlation coefficient / no SD / no information about controlled variables **(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.