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Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Subsidiary Lev
in Biology

WBI12/01

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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.

Question Number	Answer	Additional guidance	Mark
1(a)(i)	• chloroplast		**(1)**

Question Number	Answer	Additional guidance	Mark
1(a)(ii)	An answer that makes reference to one of the following points: • absorb light energy (1) • conversion of light energy to chemical energy (1) • formation of glucose in photosynthesis (1)	**REJECT** incorrect answer **IGNORE** traps light **ACCEPT** production of chlorophyll **IGNORE** storage of chlorophyll	**(1)**

Question Number	Answer	Mark
1(a)(iii)	**The only correct answer is A amyloplast** ***B*** *is not correct because the cell membrane does not contain starch* ***C*** *is not correct because the cell wall does not contain starch* ***D*** *is not correct because the tonoplast does not contain starch*	**(1)**

Question Number	Answer	Mark
1(a)(iv)	**The only correct answer is C** ***A*** *is not correct because starch contains two types of glycosidic bonds* ***B*** *is not correct because starch contains two types of glycosidic bonds* ***D*** *is not correct because starch contains α-glucose molecules*	**(1)**

Question Number	Answer	Mark
1(b)	**The only correct answer is D** ***A*** *is not correct because cellulose does not contain glycosidic bonds between cellulose molecules* ***B*** *is not correct because cellulose contains hydrogen bonds between cellulose molecules* ***C*** *is not correct because cellulose does not contain glycosidic bonds between cellulose molecules*	**(1)**

Question Number	Answer	Additional guidance	Mark
2(a)(i)	An explanation that makes reference to the following points: • access to {lipid / amino acids / proteins / vitamins / water} (1) • needed for production of new {named cell components / structural proteins / enzymes} / aerobic respiration / mitosis / cell division / hydrolysis (1)	**ACCEPT** {closer to shell / shorter distance} for oxygen diffusion **IGNORE** nutrients / development of chick / minerals	**(2)**

Question Number	Answer	Additional guidance	Mark
2(a)(ii)	An answer that makes reference to the following points: • correct total egg mass given (1) • correct total mass of egg white (1)	<u>Example of calculation:</u> 60 g = 36.6 g OR 61% 36.6 g correct answers score two marks	**(2)**

Question Number	Answer	Additional guidance	Mark
2(a)(iii)	• correlation coefficient tests {strength / significance} of {relationship / correlation} between the {two variables / mass of chickens and time since fertilisation} (1)		**(1)**

Question Number	Answer	Additional guidance	Mark
2(b)	An answer that makes reference to two of the following points: • feathers are {more sustainable / renewable / available for future generations / biodegradable} (1) • feathers are {cheaper / don't have to be made} (1) • using feathers for insulation results in {fewer feathers being burned / less carbon dioxide emissions} (1)	**ACCEPT** converse for oil-based plastics **ACCEPT** converse for oil-based plastics **IGNORE** don't require any factory process **IGNORE** references to less pollution / global warming **IGNORE** greenhouse gases unqualified	**(2)**

Question Number	Answer	Additional guidance	Mark
3(a)(i)	• smell of {mushrooms / fungi / female insects} (1)	**IGNORE** nectar **IGNORE** sweet	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	An answer that makes reference to one of the following points: • fertilisation will occur (1) • pollination will occur / pollen will be transferred to {stigma / carpel / pistil} (1) • suitable use of named digested molecule in plant (1)	 **ACCEPT** {zygote / fertilised egg cell} produced **ACCEPT** fusion of male and female nuclei **IGNORE** pollen transferred to {female flower unqualified / structure containing female gamete / female gamete} e.g. use amino acids to {produce new proteins / growth} e.g. glucose for respiration **IGNORE** nutrients / food source	**(1)**

Question Number	Answer	Additional guidance	Mark
3(a)(iii)	A description that makes reference to the following points: • secretes {digestive / hydrolytic} enzymes to digest pathway (1) • which allows the male nuclei to {fuse with / fertilise} egg cell nucleus and polar nuclei (1)	**ACCEPT** contains the tube nucleus which controls the production of {digestive / hydrolytic} enzymes **IGNORE** generative nucleus **IGNORE** pollen entering ovary	**(2)**

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

Question Number	Answer	Mark
3(b)(ii)	**The only correct answer is B endemism** ***A*** *is not correct because endemic means it is only found there* ***C*** *is not correct because endemic means it is only found there* ***D*** *is not correct because endemic means it is only found there*	**(1)**

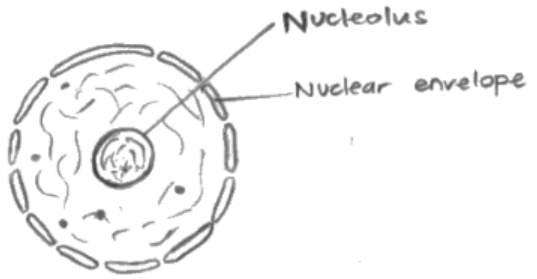
Question Number	Answer	Additional guidance	Mark
3(c)	An answer that makes reference to two of the following points: • satin and spotted bowerbirds are different species (1) • the female spotted bower bird is attracted by a different {dance / behavioural adaptation / courtship ritual / behaviour} (1) • therefore, the two bird species are reproductively isolated (1)	**ACCEPT** different sub-species **ACCEPT** the dance only attracts satin bower bird females) **ACCEPT** they have different courtship dances **ACCEPT** behavioural isolation	**(2)**

Question Number	Answer	Additional guidance	Mark
4(a)	An explanation that makes reference to the following points: • less likely to have disease / more energy available for other processes (1) • predators would {die / avoid eating them} due to being poisoned / learning that the millipedes are poisonous (1) • {prevent / reduce} competition from other organisms / outcompete other organisms (1)	**ACCEPT** prevents {infection / growth of microbes} / kills microbes **IGNORE** immune **IGNORE** healing **ACCEPT** prevents predation	**(3)**

Question Number	Answer
***4(b)**	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. <u>Graph</u> • correct description of the data given in the graph e.g. the number of times a bitten millipede is rubbed on fur increases in {June / July} / there are certain months (Feb to May) where the mosquitos will be breeding when the capuchin is not rubbing on their fur <u>Advantages to Capuchin</u> • rubbing benzoquinones chemicals onto fur results in fewer {nematodes / parasites / botfly eggs /mosquito bites / maggots} • fewer parasites reduces {blood loss / loss of digested molecules} • reduce {infections / disease} • more energy can be used for {growth / survival / finding food / competition} / less energy required by immune system <u>Disadvantages to Capuchin</u> • energy needed to {find the millipedes / apply chemicals} • may be hard to find the millipedes • the benzoquinone chemicals may have a {poisonous / toxic} effect / consideration of long-term effect of exposure • the {mosquito / botfly / nematode / parasite} may become resistant to benzoquinone chemicals <u>Advantage to botfly</u> • {botfly eggs can still be transferred to capuchin / maggots can develop / higher chance of successful botfly reproduction} when capuchin does not rub fur during months Feb to May • no need for the botfly to find a capuchin as the {mosquito / vector} is transferring the eggs <u>Disadvantage to botfly</u> • {rubbing / chemicals} ensures botfly eggs will not hatch resulting in decreased {population of botfly / number of botfly adults / chance of species survival} **(6)**

			Additional guidance
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
5(a)(i)	A calculation in which: • correct unit conversion (1) • correct calculation of magnification (1)	<u>Example of calculation:</u> 21± 1 × 1000 = 21 000 (μm) 21 000 ÷ 5 = ×4200 **ACCEPT** standard form Correct answer scores full marks no ECF	**(2)**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	An answer that makes reference to the following points: • drawing showing double nuclear membrane with nuclear pores (1) • nucleolus shown inside nucleus (1) • two correctly labelled nucleus structures in correct location (1)	 **REJECT** an inner circle line with no pores **REJECT** drawings of cells **REJECT** incorrect label e.g. cell wall / cell membrane / centriole / ribosome inside nucleus	**(3)**

Question Number	Answer	Mark
5(a)(iii)	**The only correct answer is B** ***A*** *is not correct because the domain eukarya does not have pili* ***C*** *is not correct because the domain eukarya has cytoplasm* ***D*** *is not correct because that domain eukarya has cytoplasm*	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	An answer that makes reference to the following points: • cell in metaphase correctly labelled • cell in telophase correctly labelled		**(2)**

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer that makes reference to the following point: • cells stained to make chromosomes visible (1)	**IGNORE** genetic information **IGNORE** organelles / cells	**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	A calculation in which: • calculating total number of cells and number of cells in mitosis (1) • calculation of correct mitotic index to 2 significant figures (1)	<u>Example of calculation:</u> Total =149 Cells in mitosis = 61 41 % or 0.41	**(2)**

Question Number	Answer	Additional guidance	Mark
6(a)	A description that makes reference to three of the following points: • {transport of / solvent for} named {molecules / substances} (1) • for {hydrolysis reactions / photosynthesis} (1) • maintain turgidity of {vacuole / cells} (1)	E.g. {inorganic / mineral} ions / sucrose / assimilates / (in)organic solutes / plant hormones **IGNORE** ions unqualified / minerals / nutrients **IGNORE** transport medium unqualified **ACCEPT** temperature control / cooling effect (for plants) **ACCEPT** used for {metabolic / catabolic} reactions **ACCEPT** activation of enzymes **IGNORE** production of oxygen **ACCEPT** provides support to plant **ACCEPT** prevents wilting **IGNORE** osmotic pressure	**(3)**

Question Number	Answer	Mark
6(b)(i)	**The only correct answer is C 1.4 : 1.8 : 1.0** ***A*** *is not correct because the correct ratio is 1.4 : 1.8 : 1.0* ***B*** *is not correct because the correct ratio is 1.4 : 1.8 : 1.0* ***D*** *is not correct because the correct ratio is 1.4 : 1.8 : 1.0*	**(1)**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An answer that makes reference to the following points: • correct comment for method of inorganic ion loss (1) • correct comment for loss of specific inorganic ion (1) • correct comment for loss of another specific inorganic ion (1) • relevant comment on methodology (1)	e.g. plant uptake causes greatest loss in inorganic ions e.g. more potassium ions dissolve in rainwater than {nitrate / phosphate} e.g. {only one field/ small sample size}, no repeats, time of year, timescale, weather / some areas of field may be {closer to trees / more exposed to wind / rain / have soil with different pH / different plants} **IGNORE** no SD/ error bars / significance	**(4)**

Question Number	Answer
***6(b)(iii)**	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. • farmer would make more money because group A fields would have had more {plant growth / yield / more fruit / more seeds / plants to sell} • animal waste is cheap / plentiful resource / no need to buy fertilisers • water from pit 1 will add {nitrates / phosphates / calcium ions / magnesium ions / potassium ions} to the {soil/plants} of group A fields / converse • due to the dissolving of inorganic ions from the {animal waste / plants parts} • microbes in the water could break down the {animal waste / plant parts} and release the inorganic ions • soil lost ions due to {soil erosion / plant uptake / dissolved in rainwater} • more nitrates will result in more {amino acid / (structural) protein / enzyme / nucleotides / chlorophyll} production • magnesium ions needed for {chlorophyll / chloroplasts / photosynthesis} • calcium ions needed for calcium pectate to hold cells together • detail of how {nitrates / magnesium ions / calcium ions} would improve plant {growth / yield} e.g. more respiration enzymes, protein channels / more cells / cell membranes / more glucose for {respiration / formation of other molecules} increase support to plants which will allow them to grow taller • more potassium ions will result in more translocation of named organic solutes • correct reference to where the solutes are translocated {to / from} • (more) phosphates results in more ATP for cell processes e.g. protein synthesis / mitosis / active transport / metabolic reactions • more DNA molecules will result in more {DNA replication / mitosis} **(6)**

			Additional guidance
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	Additional guidance	Mark
7(a)(i)	An answer that makes reference to the following points: • allele is an alternative version of a gene at a specific locus (1) • allele frequency the {proportion / percentage / fraction} of a specific allele in a {population / species / gene pool} (1)	**IGNORE** frequency / amount / number **IGNORE** number of different alleles	**(2)**

Question Number	Answer	Additional guidance	Mark
7(a)(ii)	An answer that makes reference to the following point: • mutation (1)	e.g. non-random mating / gene flow (i.e. migration in or out) / changing population size / {reproductive/ geographical} isolation / genetic drift / mutagen / disease / inbreeding / crossbreeding / founder effect / bottle neck event / allopatric speciation / sympatric speciation **IGNORE** survival of fittest / selection pressure / evolution / environmental factors unqualified / genetic variation / crossing over / random assortment / epigenetic modification	**(1)**

Question Number	Answer	Additional guidance	Mark
7(a)(iii)	An explanation that makes reference to three of the following points: • mutation results in {new / different} alleles / genetic variation in population (1) • correct reference to selection pressure affecting organisms (1) • individuals with an advantageous allele survive to reproduce and pass on allele to offspring / converse (1) • frequency of advantageous allele would increase in population / converse for other alleles (1)	**IGNORE** genes **ACCEPT** described selection pressure examples **IGNORE** change in frequency	**(3)**

Question Number	Answer	Additional guidance	Mark
7(b)(i)	• 0.09 0.7	Both required for the mark	**(1)**

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	• 9000 / 9100	**REJECT** 5000	**(1)**

Question Number	Answer	Additional guidance	Mark
7(c)	An explanation that makes reference to the following points: • x-raying seeds determines if they have sufficient {endosperm / starch / protein / glucose / amino acids} / converse (1) • in order to select seeds that {are viable / will germinate} (1) • assessing genetic material identifies seeds that are {heterozygous / have multiple alleles / have different alleles / have rare alleles} for the same gene (1) • assessing genetic material allows more seeds to be collected to obtain {more of the / the rare} alleles in the wild population (1)	**IGNORE** x-raying seeds determines presence of embryo **ACCEPT** seed {chosen / stored} had more endosperm / converse **ACCEPT** in context of either embryo or endosperm **ACCEPT** non-viable seeds {discarded / replaced / not stored} **ACCEPT** more space for viable seeds **IGNORE** analysis of gene pool **ACCEPT** see what alleles the seed possesses **ACCEPT** maximise stored gene pool / maintain genetic {diversity / variation} of species **IGNORE** increase species gene pool **ACCEPT** preventing loss of rare alleles from gene pool if something happened to wild population	**(4)**

Question Number	Answer	Additional guidance	Mark
8(a)(i)	An explanation that makes reference to three of the following points: • {sperm cells / secondary spermatocytes / spermatids} are haploid (1) • the numbers of copies of chromosomes have halved {between primary and secondary spermatocyte / during meiosis I} (1) • because homologous chromosomes are separated during anaphase I (1) • fertilisation allows the formation of a {diploid / 2n} {fertilised egg cell / zygote / embryo} (1)	**ACCEPT** meiosis produces haploid {cells / gametes} **ACCEPT** one copy of each chromosome enters secondary spermatocytes **ACCEPT** homologous chromosomes are separated during meiosis I **IGNORE** chromatids separated in anaphase **ACCEPT** allows formation of {fertilised egg cell / zygote / embryo} with {23 pairs / 46} chromosomes	**(3)**

Question Number	Answer	Additional guidance	Mark
8(a)(ii)	A description that makes reference to the following points: • differential gene expression occurred / only genes needed for sperm cell formation are {active / switched on / transcribed} (1) • due to {epigenetic modification / histone modification / DNA methylation} (1) • translation to form a polypeptide (1) • resulting in formation of named {structures / molecules} of sperm not found in spermatid on diagram (1)	**ACCEPT** genes not required in sperm cell formation are switched off **ACCEPT** production of active mRNA from sperm gene **ACCEPT** transcription factors accept description e.g. acetyl group added to histone **ACCEPT** correct references to splicing of pre-mRNA / post transcriptional modification **ACCEPT** correct {named / described} {structural / functional} change e.g. {acrosin / acrosome / acrosome enzymes / flagellum} **IGNORE** mitochondria	**(4)**

Question Number	Answer	Mark
8(b)(i)	**The only correct answer is D locus** ***A*** *is not correct because the position of a gene on a chromosome is the locus* ***B*** *is not correct because the position of a gene on a chromosome is the locus* ***C*** *is not correct because linkage is when genes that are close together on a chromosome are likely to be inherited together*	**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)(ii)	An answer that makes reference to one of the following points: • as the age of males increases, the percentage methylation increases (1) • there is a positive correlation between male age and the percentage methylation (1)	 **IGNORE** correlation unqualified **IGNORE** positive correlation unqualified by named variables	**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)(iii)	A description that makes reference to the following points: • addition of {methyl / CH_3} group to cytosine (1) • by (DNA)methyltransferase (1)	**REJECT** addition of methyl group to {histones / cysteine} **ACCEPT** CpG site **ACCEPT** by an enzyme	**(2)**

Question Number	Answer	Additional guidance	Mark
8(b)(iv)	An explanation that makes reference to the following points: • DNA methylation results in the gene being silenced (1) • because {RNA polymerase / transcription factors} can't bind {if gene is switched off / DNA wound tightly around histones} (1)	**ACCEPT** RNA polymerase can't transcribe the gene {if gene is switched off / DNA wound tightly around histones}	**(2)**

Question Number	Answer	Additional guidance	Mark
8(b)(v)	An answer that makes reference to one of the following points: • the DNA methylation is copied when the DNA is replicated (1) • daughter cells will contain the same DNA methylation after cell division / methylated DNA copies are separated in {anaphase / mitosis} (1)	 **REJECT** mRNA is copied **IGNORE** independent assortment / crossing over **IGNORE** DNA replication occurs in {G_1 / G_2} **ACCEPT** mitosis produces genetically identical cells	**(1)**

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