Pearson

Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Level in Biology

WBI14/01

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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	Mark
1(a)	<table><tr><th rowspan="2">Structure</th><th colspan="4">Structure found in</th></tr><tr><th>HIV only</th><th>TMV only</th><th>both HIV and TMV</th><th>neither HIV nor TMV</th></tr><tr><td>RNA</td><td>[x]</td><td>[x]</td><td>[x]</td><td>[x]</td></tr><tr><td>capsid</td><td>[x]</td><td>[x]</td><td>[x]</td><td>[x]</td></tr><tr><td>envelope</td><td>[x]</td><td>[x]</td><td>[x]</td><td>[x]</td></tr></table>	(3)

Question number	Answer	Additional guidance	Mark
1(b)(i)	• correct value read from graph and conversion shown (cm^3 converted to dm^3 / dm^3 converted to cm^3) (1) • 5.5×10^9 (1)	$5000 \times 1\,100 \times 10^3$ 5 500 000 000 Bald answer of 5.5×10^9 = 2 marks Bald answer of 5 500 000 000 = 1 mark Bald answer in wrong standard form but right magnitude = 1 mark	(2)

Question number	Answer	Additional guidance	Mark
1(b)(ii)	An explanation that includes the following points: • because {HIV / the virus} {is a retrovirus / exists as a provirus / is in latency / is in lysogeny} (1) • therefore (during latency) T helper cells not {destroyed / lysed}(1) • and therefore the immune response not weakened (1)	**ACCEPT** exists as DNA copy of viral RNA already inserted into host DNA dormant **ACCEPT** converse for when HIV enters lytic phase after latency **ACCEPT** (person won't be {immunodeficient / immunocompromised}	**(3)**

Question number	Answer	Additional guidance	Mark
1(c)	An answer that includes two of the following points: • not all continents represented (1) • {the countries were selected / only some countries included} (1) • idea of availability is not defined (1) • too much variability between countries in any one continent (1)	**IGNORE** only a small sample size e.g. available but people cannot {afford it / get to the hospital} **IGNORE** not diagnosed **NB** lack of access, do not want to take treatment must be qualified to be awarded	**(2)**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>2(a)(i)</td><td>
<table>
<tr><th>Type of squirrel</th><th>Length of head and body / cm</th><th>Length of tail / cm</th><th>Total length of squirrel / cm</th></tr>
<tr><td>Abert's squirrel</td><td>46 to 58</td><td>19 to 25</td><td>65 to 83</td></tr>
<tr><td>Kaibab squirrel</td><td>45 to 58</td><td>17 / 17.5 / 18 to 25</td><td>62 / 62.5 / 63 to 83</td></tr>
</table>
</td><td></td><td>(1)</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
2(a)(ii)	An answer that includes two of the following points: • both (length of head and body / total length) are similar size (1) **NB** the following can apply to any of the lengths shown in the table • Kaibab has a greater range of sizes (1) • smallest Kaibab is smaller than the smallest Abert's (1) • largest Abert's is same size as the largest Kaibab (1)	**NB** If values are wrong in part (a), then their answer to part (ii) must match the numbers in (i) **ACCEPT** converses where appropriate **ACCEPT** Kaibab are (slightly) smaller **DO NOT ACCEPT** same **ACCEPT** maximum length is the same	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	An explanation that includes four of the following points: • Abert's squirrels got {divided into two / separated from each other} by the {river / canyon} (1) • different {conditions / named condition / selection pressures} on {each / north} side (of the canyon) (1) • resulting in a change in allele frequency of {Kaibab squirrels /squirrels on the North rim / both groups of squirrels} (1) • because there was no gene flow (between the two populations of squirrels) (1) • because the (two groups of) squirrels could not cross the {canyon / river} (1)	**ACCEPT** conditions changed on North rim **ACCEPT** ref to {geographical isolation / allopatric isolation / allopatric speciation / reproductively isolated / egs of reproductive isolation}	**(4)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	An answer that includes the following points: • credit reason for being a subspecies still (1) • credit a reason for becoming different species (1)	e.g. they could still breed together 10 000 years is not very long (for speciation to occur the genomes of the two types of squirrel are still similar e.g. mutations will continue to take place they will become {**too / more**} genetically different (to breed successfully) they will become reproductively isolated / example of how	**(2)**

Question number	Answer	Additional guidance	Mark
3(a)	An explanation that includes three of the following points: • the fungus will block the xylem (1) • so that {water / mineral ions} cannot travel (up) in the plant (1) • credit a consequence of no water (that could lead to wilting) (1) • credit a consequence of a lack of a named mineral ion (1)	**IGNORE** fungus uses {water / mineral ions} **ACCEPT** less water enters xylem / reduces transpiration e.g. no support, no photolysis, no light-dependent reaction, no translocation, no hydrolytic reactions **IGNORE** dehydrated, photosynthesis, metabolic reactions **DO NOT ACCEPT** respiration e.g. no magnesium ions no chlorophyll, no calcium ions no (calcium) pectate, no nitrates no enzymes	**(3)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	An explanation that includes the following points: • the appropriate rate given (1) • appropriate units given, that matches explanation (1) • some explanation that includes taking a mean of {more than two / several} measurements (1)	e.g. mm or cm per hour or day if {hyphal length / diameter} measured, mm^2/cm^2 per hour or day if surface area calculated **ACCEPT** h^{-1}, hr^{-1}, d^{-1}	**(3)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An answer that includes two of the following points: • germination (of spore) (1) • synthesis of enzymes (to digest {spore coat / nutrients}) (1) • fungus has to {warm up to temperature / acclimatise} (to new conditions) (1) • synthesis of cell {components / named component} (1)	**NB** spore and hyphae for fungus **ACCEPT** replicate cells	**(2)**

Question number	Answer	Additional guidance	Mark
3(b)(iii)	A description that includes the following points: • idea of removing the fungus from the agar and weighing it (1) • indication that two values for mass have been obtained and change is divided by time (1)	**NB** if they start with the spore, only one mass can be used	**(2)**

Question number	Answer	Additional guidance	Mark
4(a)	A description that includes three of the following points: • compare the Rf values to known values for the same solvent (1) And any **two** of the following: • grind up the leaves in a solvent (1) • load the {pigment / chlorophyll} (solution) onto {filter paper / chromatography paper} (1) • dip into a solvent and let the solvent soak up the paper (but not to the top) (1)	**IGNORE** names of solvent, unless water **ACCEPT** place in solvent and remove from solvent before it reaches the top	**(3)**

Question number	Answer	Additional guidance	Mark
4(b)(i)	• wavelength and nm (1)	**ACCEPT** wavelength and m × 10^{-9} wavelength and μm × 10^{-3} wavelength and mm × 10^{-6} wavelength and cm × 10^{-7} **DO NOT ACCEPT** frequency / amplitude / speed	**(1)**

Question number	Answer	Mark
4(b)(ii)	The only correct answer is **A** ***B** is incorrect because per hour is hour^{-1}* ***C** is incorrect because µm are a unit of length, not mass* ***D** is incorrect because µm are a unit of length, not mass and per hour is hour^{-1}*	**(1)**

Question number	Answer	Additional guidance	Mark
4(b)(iii)	An explanation that includes four of the following points: • lower leaves would have <u>more</u> light available to them (1) • the {green / 490 to 580} light can be absorbed by {some of the pigments / the chlorophylls / the carotenoids } (in their leaves) (1) • therefore more light-dependent reactions occur (1) • producing more {ATP / NADPH} for the {light-independent reactions / Calvin cycle} (1) • producing more {organic molecules / biomass} (to produce tomatoes) (1)	**NB** only need a comparative statement once to access all marks **ACCEPT** photolysis / (non-cyclic) photophosphorylation **DO NOT ACCEPT** for carbon fixation	**(4)**

Question number	Answer	Additional guidance	Mark
5(a)	• {no / decrease in} {swelling / size of hand / oedema} **OR** {no/ decrease} in {redness / red / rubor} **OR** {no / less indication of} distress due to less pain / increase in use of hand (1)	**DO NOT ACCEPT** decrease in temperature / cooler **IGNORE** decrease in rash / reduced pain or descriptions of reduced pain / increase in function unqualified **ACCEPT** less licking of hand	**(1)**

Question number	Answer	Additional guidance	Mark
5(b)(i)	A description that includes the following points: • appropriate culture method (1) • appropriate method for adding the extracts to the bacteria (1) • appropriate means of judging the effects (that would work for their method) (1)	e.g. bacteria grown on agar bacteria in broth **DO NOT ACCEPT** grown on plates / streaking e.g. discs soaked with extracts laid on top of bacteria extracts added to broth e.g. (all) zones of inhibition indicate extracts are effective less turbidity indicates effectiveness	**(3)**

Question number	Answer	Additional guidance	Mark
5(b)(ii)	An explanation that includes the following points: • not all {antibiotics / chemicals} will dissolve in the same solvent (1) • credit a reason why (1) **OR** • different {antibiotics / chemicals} will have different solubilities (in different solvents) (1) • credit a reason why (1) **OR** • extracts may react with the solvents (1) • which could change their properties (1)	e.g. because the antibiotics may be hydrophobic and solvent hydrophilic because extracts may be polar or non-polar e.g. need to ensure concentration of {antibiotic / chemical} is high enough because the antibiotics may be hydrophobic and solvent hydrophilic because extracts may be polar or non-polar	**(2)**

Question number	Answer	Additional guidance	Mark
5(c)	An explanation that includes three of the following points: • because bacteria {are / are becoming} resistant to (current) antibiotics (1) • and therefore {people / animals} could die from infection with pathogenic bacteria (1) • some (species of) plants are (currently) a source of {antibiotics / antimicrobials} (1) • some (species of) plants could contain new antibiotics (to which bacteria are not resistant) (1)	**ACCEPT** pathogens **ACCEPT** plants could die (in the same context)	**(3)**

Question number	Answer	Additional guidance	Mark
6(a)(i)	• 70 (1)	**DO NOT ACCEPT** 70.0	**(1)**

Question number	Answer	Additional guidance	Mark
6(a)(ii)	• 1.8 : 1 (1)	**DO NOT ACCEPT** 1.80	**(1)**

Question number	Answer	Additional guidance	Mark
6(b)	An answer that includes three of the following points: • because a (primary) immune response {has not been initiated / has not developed} (1) • because {malaria kills the birds / the birds die} {**first / immediately**} (before immunity develops) (1) • macrophages may have been **unable** to engulf the pathogens (therefore immune response not started) (1) • no {T killer cells to destroy infected cells / antibodies for opsonization / antibodies for agglutination} (1) • the antigens (on the pathogens) may have changed (1)	**ACCEPT** (primary) immune response takes time to develop pathogen may have evaded the immune system **IGNORE** weak immune system **IGNORE** antigen	**(3)**

Question number	Answer	Additional guidance	Mark
6(c)	An explanation that includes four of the following points: • global warming would increase the temperature (of atmosphere / Earth's surface / Hawaii) (1) • credit an effect this could have on the honeycreepers (1) • credit an effect this could have on the mosquitoes (1) • idea that there would be **more** {interaction / overlap} (between honeycreepers and mosquitoes) (1) • so **more** mosquitoes to {transmit malaria to / bite the} honeycreepers (1)	e.g. honeycreepers cannot live above the tree line, trees may die so reduced {food / nesting sites} e.g. so the mosquitoes will be distributed higher up the island, mosquitoes will breed faster **IGNORE** rising sea levels **ACCEPT increase** chance **more** honeycreepers if no ref to more mosquitoes	**(4)**

Question number	Answer	Additional guidance	Mark
6(d)(i)	• 1×10^7		**(1)**

Question number	Answer	Additional guidance	Mark
6(d)(ii)	An answer that includes the following points: • credit a reason for using large numbers (1) • credit a reason for releasing over a long period of time (1)	e.g. outcompete non-infected males there are a lot of females to ensure that male mosquitoes are {distributed over the island / likely to encounter females} increase chance of breeding ensure plenty survive e.g. new females are (continuously) {developing / hatching} insects have a short lifespan	**(2)**

Question number	Answer	Mark
7(a)	The only correct answer is **B** ***A** is incorrect because colonisation means organisms living in a place they didn't before* ***C** is incorrect because entomology is the study of insects* ***D** is incorrect because extrapolation means using trends*	**(1)**

Question number	Answer	Mark
7(b)(i)	The only correct answer is **B** ***A** is incorrect because J points to bark* ***C** is incorrect because L points to phloem* ***D** is incorrect because M points to the pith*	**(1)**

Question number	Answer	Mark
7(b)(ii)	The only correct answer is **A** ***B*** *is incorrect because you do not count the bark* ***C*** *is incorrect because you count each ring once only* ***D*** *is incorrect because you do not count the bark nor each ring twice*	**(1)**

Question number	Answer	Mark
7(b)(iii)	The only correct answer is **B** ***A*** *is incorrect because measurements are made from the bottom of the trunk* ***C*** *is incorrect because measurements are made from the bottom of the trunk* ***D*** *is incorrect because measurements are made from the bottom of the trunk*	**(1)**

Question number	Answer	Additional guidance	Mark
7(c)	An answer that includes five of the following points: Supports because: • {increases / decreases} in rainfall and tree width (in similar time period) (1) • e.g. trough in rainfall in 1979 and trough in width in 1979 (1) • highest peak in rainfall and in width {roughly coincide / coincide} (1) • in 1989 to 1990 (1) • (in the 20-year period there is) {an overall decrease in rainfall and width /both negatively correlated with time} (1) • e.g. 500 to 400 for rainfall and 1.1 to 0.5 for width (1) Doesn't support because: • some increases in width when rainfall decreases (1) • e.g. width increases between 1985 and 1987 but rainfall decreasing (1) • same rainfall can have different widths (1) • e.g. same rainfall in 1976 and 1994 but different widths (1) • no error bars shown <u>for width</u> so do not know if these differences are significant (1)	**NB Must be at least one illustration using data and one for and against for full marks to be awarded** **ACCEPT** there is similar {pattern / trend / shape graph} / **weak** correlation **DO NOT ACCEPT** for rainfall	**(5)**

Question number	Answer	Additional guidance	Mark
7(d)	An explanation that includes three of the following points: • an increase in temperature increases the {activity / kinetic energy} of RUBISCO (1) • increase in temperature increases rate of diffusion of carbon dioxide into the leaf (1) • therefore {carbon fixation / Calvin cycle / light-independent reactions} will {go faster / produce more glucose / produce more GALP} (1) • more {xylem / biomass} produced (1)	**ACCEPT** ATPase / ATP synthase **IGNORE** named molecules	**(3)**

Question number	Answer	Additional guidance	Mark
7(e)(i)	• 4.75 / 4.8 / 5		**(1)**

Question number	Answer	Additional guidance	Mark
7(e)(ii)	An answer that includes the following points: • number of studies remain the same (not zero) and then increase (2011 / 2012) (1) • (increase in number of studies) as people became more {concerned / interested / aware} (of climate change) (1)	**ACCEPT** climate change becoming an issue more government funding / more research groups	**(2)**

Question number	Answer	Mark
8(a)	The only correct answer is **D** ***A** is incorrect because interferon release follows infection* ***B** is incorrect because inflammation is a response to infection* ***C** is incorrect because inflammation is a response to infection*	**(1)**

Question number	Answer	Additional guidance	Mark
8(b)	An explanation that includes the following points: • because they {kill / reduce the growth of} {pathogens / bacteria / microorganisms} (1) • by competing for {nutrients / space} / producing toxins (1)	**IGNORE** food / resources / chemicals / lactic acid	**(2)**

Question number	Answer
*8(c)	**Indicative content:** • only bacteria G were left after 7days (D) • because the antibiotics killed all other types of bacteria / G were resistant to the antibiotics (E) • antibiotics were broad spectrum / antibiotics target non-pathogenic bacteria (E) • G not affected because {possessed resistance gene / did not have the target site of the antibiotic} (E) • antibiotic could be bacteriostatic so G outcompeted the other bacteria (E) • only G present for following 9 months (D) • because it outcompeted other types of bacteria for nutrients / space (E) • other types of bacteria had not been consumed yet (E) • effects of antibiotics were long-lasting / antibiotics still present in the body (E) • after 12 months bacteria H, I and J were present (D) • because they were consumed in food / drink / probiotics (E) • and were able to compete with G for nutrients / space (E) • antibiotic no longer present (E) • because antibiotic has been broken down / passed out of the body (E) • more H than I or J (D) • because consumed first / grew faster / outcompeted I and J (E) • after 18 months G increased and so did I but J and H decreased (D) • still no appearance of A, B, C, D, E nor F (D) • because they had not been consumed yet (E) • the new community of bacteria inhibited their growth (E) • person was taking some other types of antibiotics that affected these bacteria (E) • decrease but not disappearance of H / I / J showed that they were not outcompeted (E)

			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.	Simple description / explanation of some data: 1 mark = a description of one change 2 marks = one simple explanation
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.	Simple explanation of some data: 3 marks = two simple explanations 4 marks = three simple explanations
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.	More detailed explanation of the data: 5 marks = four explanations that includes a detailed explanation **OR** three time points explained that includes one detailed explanation 6 marks = three time points explained that includes two detailed explanations

Question number	Answer	Additional guidance	Mark
8(d)(i)	A description that includes three of the following points: • {isolate / extract / collect} the DNA (from the bacteria in the faeces) (1) • credit a method for analysing the DNA (1) • credit how the number of different types of bacteria could be determined from the analysis (1) • credit an indication of how the numbers of each type of bacteria could be determined (1)	**DO NOT ACCEPT** {mitochondrial / mt} DNA e.g. (gel) electrophoresis / description DNA profiling DNA sequencing e.g. determine the **number** of different {fingerprints / banding patterns} count the **number** of peaks on the profile count the **number** of different sequences / bar codes e.g. {thickness / intensity} of the bands height of the peaks look at the quantity of DNA with the same sequence	**(3)**

Question number	Answer	Additional guidance	Mark
8(d)(ii)	A description that includes two of the following points: • {over time / with age} the proportion of foals without respiratory problems decreases (1) • the foals with high diversity of bacteria developed fewer respiratory problems / foals with low diversity of bacteria developed more respiratory problems (1) • as the foals get older there is a greater **difference** between those foals who develop problems and those that do not (1)	**ACCEPT** proportion of foals with respiratory diseases increases negative correlation with {time / age} / inversely proportional **ACCEPT** converse for with respiratory diseases **IGNORE** steeper **IGNORE** steeper	**(2)**

Question number	Answer	Additional guidance	Mark
8(d)(iii)	An explanation that includes two of the following points: • because (respiratory problems will) decrease the levels of oxygen {entering blood stream / supplied to cells} (1) • therefore less <u>aerobic</u> respiration by muscle (cells) (1) • so cannot release {energy / ATP} for {galloping / running / muscle contractions} (1)	**NB need a ref to muscle once to gain 2 marks** **ACCEPT** oxidative phosphorylation so muscle cells respire <u>anaerobically</u> **ACCEPT** converse idea that if there is less energy then the {horse would have to slow down / muscle contractions would be less frequent} lactic acid produced causing muscle fatigue faster	**(2)**