



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced Level in Biology

WBI16/01

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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)	<ul style="list-style-type: none"> measured length of head to abdomen from photograph divided by 15 and correct answer (1) 	<p>55mm ÷ 15</p> <p>3.67 /3.7 (mm)</p> <p>DO NOT ACCEPT 3.66</p> <p>ACCEPT 3.66 recurring</p> <p>ACCEPT a stated range of</p> <p>54mm = 3.6</p> <p>56 mm = 3.73 recurring..</p>	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)	<p>A description that includes six of the following points:</p> <ul style="list-style-type: none"> • description of dependent variable as number adults produced (1) • use of at least three different temperatures in the range 5-60 °C (1) • method of control of temperature (1) • use of {same/stated} number of eggs at the start (1) • identify one named variable (1) • identify second named variable (1) • repeats to calculate {mean and SD/perform statistical test} (1) 	<p>IGNORE refs to time</p> <p>ACCEPT record the number of {adults / hatched beetles / hatched eggs} (for each temp)</p> <p>IGNORE germination</p> <p>ACCEPT thermostatic water bath /TC waterbath /AC /incubator / incubate</p> <p>ACCEPT count the eggs at start</p> <p>variables e.g. type of {flour/grain/food}/ mass of {grain/food} humidity / light intensity / oxygen / species / age of eggs / volume of water</p> <p>IGNORE pH / salt / age of beetle</p>	(6)

Question Number	Answer	Additional Guidance	Mark
1(c)	<p>An explanation that includes three of the following points:</p> <ul style="list-style-type: none"> • insecticides kill most beetles / insecticide is a selection pressure (1) • some beetles have {resistant / advantageous} allele(s) (1) • due to (random) mutation (1) • (these survive and reproduce so) the proportion of offspring with alleles for resistance increase (1) 	<p>DO NOT ACCEPT gene(s) for 1,2,4</p> <p>ACCEPT adults without the resistant allele die</p> <p>DO NOT ACCEPT if there is a selection pressure SO the flour beetle randomly mutates</p> <p>DO NOT ACCEPT mutation caused by insecticide or selection pressure</p> <p>IGNORE so they mutate</p> <p>ACCEPT {survive and) pass on allele to offspring</p> <p>ACCEPT allele frequency increases</p> <p>IGNORE change in allele frequency</p> <p>note passing on advantageous allele = MP2 +4 together</p>	(3)

(Total for question 1 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	<p>An answer that refers to the following points:</p> <ul style="list-style-type: none"> suitable fieldwork risk identified (1) description of how risk can be reduced (1) 	<p>mark as a whole</p> <p>DO NOT ACCEPT allergy unqualified e. g. allergy to plants/risk of infection/sunburn/attacked by wild animals / falling trees or branches/sharp thorns/toxic plants/dehydration / insect bite</p> <p>IGNORE uneven ground</p> <p>note MP2 must relate to MP1 suitable described reduction of stated risk e.g. insect repellent / hat / gloves / wildlife warden / ranger</p> <p>IGNORE wear protective clothing unqualified</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	<p>A description that refers to the following points:</p> <ul style="list-style-type: none"> • Create a grid/use a gridded map (1) • select points (on grid) using a random number generator (1) 	<p>IGNORE use an app/GPS/map unqualified</p> <p>ACCEPT two measuring tapes at right angle =grid</p> <p>ACCEPT random co-ordinates</p> <p>ACCEPT other valid methods of how to e.g. random number tables / numbers out of a bag / dice</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	<p>A calculation that shows the following points:</p> <ul style="list-style-type: none"> • correct calculation of numerator and denominator (1) • correct answer to two decimal places (1) 	<p>1640 and 480</p> <p>3.42</p> <p>Correct answer gains two marks</p> <p>Incorrect answer to 2dp = 1 mark e.g. 0.04 (using 5 for N)</p> <p>2.73×10^{-3} = 0 marks as standard form technically doesn't have it as 2 dp as it is 0.00273</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	<p>A description that includes any two of the following:</p> <ul style="list-style-type: none"> • the {diversity / index} has {increased / gone higher} (with time) (1) • 20 year index suggests complete recovery (of biodiversity) (1) 	<p>MP 1 needs to be a clear statement</p> <p>IGNORE biodiversity/reverse argument</p> <p>ACCEPT reached same index as before it was cleared for farming</p> <p>ACCEPT both = 5.15</p> <p>ACCEPT the diversity index (D) between the 20 years and mature forest are the same (5.15)</p> <p>the forest must recover for {20 years/more than 10 years} (1)</p>	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	<p>Any two of the following:</p> <ul style="list-style-type: none"> pH (of water/soil) light intensity water soil minerals temperature 	<p>mark first answer on each line</p> <p>IGNORE amount</p> <p>DO NOT ACCEPT light</p> <p>ACCEPT rainfall/ humidity</p> <p>ACCEPT soil type/salinity</p>	(1)

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	<ul style="list-style-type: none"> similar measurements mean the variables have little influence on the results / ORA (1) 	<p>candidates will express this in different ways</p> <p>ACCEPT so results can be compared / investigation worth doing / to be a valid test</p> <p>ACCEPT {results are / investigation is} valid</p> <p>ACCEPT assess validity</p> <p>ACCEPT taken into account so don't affect validity (of results)</p> <p>ACCEPT to determine how valid the investigation</p> <p>IGNORE accurate/reliable/precise</p>	(1)

(Total for question 2 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)	<ul style="list-style-type: none"> there is no (significant) difference between the oxygen consumption of {group A / trained} and {group B / untrained} (volunteers) (1) 	<p>Candidates will express this in different ways</p> <p>DO NOT ACCEPT no correlation</p>	(1)

Question Number	Answer	Additional Guidance	Mark																
3(b)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none">• suitable table drawn with headings and units (1)• all data entered correctly to two decimal places (1)• correct both means calculated to two or three decimal places (1)	<p>IGNORE extra columns</p> <table><tr><th colspan="2">Oxygen consumption/dm³ min⁻¹</th></tr><tr><th>Group A</th><th>Group B</th></tr><tr><td>0.24</td><td>0.22</td></tr><tr><td>0.25</td><td>0.20</td></tr><tr><td>0.21</td><td>0.19</td></tr><tr><td>0.18</td><td>0.22</td></tr><tr><td>0.18</td><td>0.18</td></tr><tr><td>M=0.21(2)</td><td>M=0.20(2)</td></tr></table>	Oxygen consumption/ dm³ min⁻¹		Group A	Group B	0.24	0.22	0.25	0.20	0.21	0.19	0.18	0.22	0.18	0.18	M=0.21(2)	M=0.20(2)	(3)
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M=0.21(2)	M=0.20(2)																		

Question Number	Answer	Additional Guidance	Mark
3(c)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> • bar graph with linear scale starting at zero and axes labelled, with units (1) • data plotted correctly (1) • correct range bars plotted (1) 	<p>A 0.25 to 0.18 B 0.22 to 0.18</p> <p>Y axis mean oxygen consumption dm³ min⁻¹ X axis {A and B / trained and untrained} IGNORE bars touching</p> <p>ACCEPT an ECF for plotting incorrect means from 3b</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(d)(i)	<p>A calculation that includes the following points:</p> <ul style="list-style-type: none"> • correct substitution into formula (1) • correct answer (1) 	<p>0.6(0)</p> <p>0.59976014</p> <p>correct denominator is 0.016673</p> <p>If they square Sa and Sb the square root of the denominator is 0.0004898</p> <p>If they divide this into 0.01 they get 20.4164 Or 20.02164 For 1 mark</p>	(2)

Question Number	Answer	Additional Guidance	Mark
3(d)(ii)	<p>A description that includes three of the following points:</p> <ul style="list-style-type: none"> • mean values are similar (1) • the calculated value of t (0.6108) is less than the critical value 2.31 therefore accept the null hypothesis (1) • there is no significant difference between the resting oxygen consumption of {A and B / trained and untrained volunteers} (1) • (14 days of) training has no effect on resting oxygen consumption (1) 	<p>IGNORE repeat the experiment</p> <p>ACCEPT reverse statement if calc t value larger than 2.31</p> <p>ACCEPT reverse statement if calc t value larger than 2.31 do not accept no correlation</p> <p>ACCEPT reverse statement if calc t value larger than 2.31</p>	(3)

Question Number	Answer	Additional Guidance	Mark
3(e)	<p>A description that includes two of the following points:</p> <ul style="list-style-type: none"> • ({lactate / lactic acid} transported) to the liver (in blood) (1) • {lactate / lactic acid} is {oxidised / converted / changed / broken down} to pyruvate (1) • pyruvate to link reaction (1) 	<p>IGNORE stored in liver</p> <p>DO NOT ACCEPT reduced</p> <p>ACCEPT converted to glucose / Acetyl-CoA / ACCEPT enters aerobic respiration DO NOT ACCEPT pyruvate to Krebs cycle</p>	(2)

(Total for question 3 = 14 marks)

Question Number	Answer	Additional Guidance	Mark
4(a)	<ul style="list-style-type: none"> • bacteriocidal antibiotics kill bacteria whereas bacteriostatic antibiotics prevent bacteria increasing in numbers (1) 	ACCEPT inhibits growth/reproduction/stops cell division/binary fission	(1)

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> • clear statement of the dependent variable (1) • use of aseptic technique (1) • create {a lawn / (even) spread} of bacteria on agar plates (1) • (incubate) stated temperature and time (after adding antibiotic) (1) • method of applying antibiotic (1) • same size of disc / same volume of antibiotic in well (1) • same concentration of antibiotic (1) • use same {type / strain / species} of {<i>E. coli</i> / bacteria} (1) • appropriate method of measuring zone of inhibition (1) • repeats to give mean values and SD (1) 	<p>IGNORE amount</p> <p>e.g. dependent variable is the {diameter / area} of the zone of inhibition</p> <p>ACCEPT a description of one technique / use of sterile equipment</p> <p>IGNORE taping plate</p> <p>e.g. spread over / spread / pour plate</p> <p>IGNORE streak</p> <p>temp range 20 - 35 °C and time 24hr to 96hrs</p> <p>dip disc into antibiotic / add antibiotic to well / add antibiotic disc</p> <p>IGNORE known concentrations</p> <p>e.g. ruler, graph paper, more than 1 orientation</p>	(9)

	<p>OR a liquid culture method</p> <ul style="list-style-type: none"> • clear statement of the dependent variable e.g. measure turbidity /count colonies at the same (incubation) time (1) • use of aseptic technique (1) • create a liquid culture (1) • incubate at same/stated temperature to allow growth of bacteria (1) • method of shaking the culture (1) • Same volume of antibiotic (1) • same concentration of antibiotic (1) • use same type/strain of <i>E. coli</i> (1) • method of measuring turbidity /dilution plating (1) • repeats to give mean values and SD (1) 		
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Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	<p>An answer that includes the following points:</p> <ul style="list-style-type: none"> table for raw data with headings and units with means calculated from repeats (1) <p>AND</p> <ul style="list-style-type: none"> bar graph format with labelled axes (1) use of a t test (for difference) (with a bar graph showing only two different treatments (1) <p>OR</p> <ul style="list-style-type: none"> {line / scatter} graph format with labelled axes (1) use of a correlation test (difference with a line graph showing more than two different treatments (1) 	<p>Depends on table shown if several concentrations of antibiotic used</p> <p>DO NOT ACCEPT rate units</p> <p>ACCEPT description of mean calculated in text or mean on one graph label</p> <p>DO NOT ACCEPT bar graph with third bar for control</p>	(3)

Question Number	Answer	Additional Guidance	Mark
4(b)(iii)	<p>An explanation that includes three of the following points:</p> <ul style="list-style-type: none"> • (L) difficult to prevent contamination • (E) reason poor aseptic technique (1) • (L) difficult to measure the zone of inhibition • (E) reason irregular shape (1) • (L) cannot investigate at human body temperature (37°C) • (E) reason because of the increased risk of infection to the student (1) • (L) results don't apply to other bacteria • (E) reason only one {strain / type / species} of <i>E. coli</i> tested (1) 	<p>just two limitations described = 1 mark MAX</p> <p>but one limitation and two supporting reasons = two marks for the reasons</p> <p>(L) difficult count bacteria/colonies (E) Reason large numbers (1) or (L) difficult to measure mass (E) as really small change (1)</p> <p>ACCEPT valid limitation and reason for a turbidity method e.g. (L) difficult to {record change in light / measure turbidity} (E) because not shaken enough</p>	(3)

		<p>Guidance</p> <p>1 limitation = 0 mks</p> <p>2 limitations = 1mks</p> <p>1 limitation + 1 explanation =1mk</p> <p>1 limitation + 2 explanations = 2mks</p> <p>2 limitations + 1 explanation = 2mks</p> <p>2 limitations + 2 explanations = 3 mks</p>	
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(Total for question 4 = 16)