



Mark Scheme (Results)

January 2025

Pearson Edexcel International Advanced
Level In Biology (WBI16)
Paper 01 Practical Skills in Biology II

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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)	A description that includes six of the following points: • description of dependent variable as number of eggs hatched {per unit time/stated time} (1) • use (5) {different/stated} concentrations of copper ions (1) • {count brine shrimps hatched/swimming} at {same/stated interval(s)/record time for first hatching} (1) • identify one variable (1) • Identify a second variable (1) • repeats to calculate {mean / SDs} (1) • further method detail (1)	Accept time taken to hatch / time for a fixed/stated number of eggs to hatch Accept a concentration without copper as 0% Accept time for 100% hatching Temperature/salt concentration/pH/species of shrimp/age of eggs/number of eggs/light intensity Accept average e.g. delivery of eggs/making concentrations of copper ions/shining light for counting	6

Question Number	Answer	Additional Guidance	Mark
1(b)	No ethical concern because: shrimps {are not vertebrates / cannot feel pain / are not harmed (in this experiment) / are plentiful so no risk of extinction}	Candidates will express this in several different ways Accept little pain Ignore simple nervous system/feelings/stress/return to habitat	1

Question Number	Answer	Additional Guidance	Mark
1(c)	A description that includes the following points: - copper ions interfere with {secondary structure / ionic bonding / R groups} (1) - alters {tertiary / 3D} structure of enzyme (1) - active site shape changed (1) {reduces / stops} substrate {fitting/binding} (1)	Ignore refs to pH Accept enzyme denatures Accept copper ions bind to the active site Accept fewer / less or no E-S complexes formed	3

(Total for question 1 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	A description that includes four of the following: • random sampling to select trees (1) • measure distances between tree and termite mounds (1) • (compare) trees that are close to mounds and not close to mounds (1) • decide if a tree is fruiting (1)	Accept count fruit	4

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	• correct values in table (1)	65, 65	1

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	• Correct use of formula (1) • Correct answer (1)	e.g $196 / \frac{(79 - 65)^2}{65} + \frac{(51 - 65)^2}{65}$ 6 / 6.0 / 6.03 / 6.031 Correct answer with no working gains 2 marks	2

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	the data are {categorical / nominal}	Accept {not a normal distribution / not continuous data / (raw) counts / frequency data}	1

Question Number	Answer	Additional Guidance	Mark
2(b)(iv)	An answer that includes two of the following points: - pH of soil (1) - water content (1) - temperature (1) - organic matter (1)	<i>Only mark the first response on each line</i> <i>If no response on a line mark first two answers on other line</i> Reject light/ humidity Accept soil moisture Accept soil structure / compaction / depth / oxygen content / carbon dioxide content	2

Question Number	Answer	Additional Guidance	Mark
2(c)	An answer that includes two from one pair of following points: • nitrate needed to produce {amino acids / proteins} (1) • for production of enzymes (1) OR • nitrate needed to make {DNA/nucleic acids} (1) • for cell division (1) OR • nitrate needed to make chlorophyll (for photosynthesis) (1) • for {GALP / sugar} (for fruits) (1)	Accept named enzyme eg RUBISCO Accept RNA	2

(Total for question 2 = 12 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)	There is no correlation between the percentage of visible gill remaining and the number of touches (1)	Candidates express this in several different ways Accept frequency (for number)	1

Question Number	Answer	Additional Guidance	Mark
3(b)	{bar / scatter} graph with linear scale (1) - complete axis labels (1) - all data plotted correctly (1)	MP1 Bar graph: y axis starts at zero, separate bars of same width Ignore lines in scatter graph Accept mean % gills visible and stimulus / (number of) touches 10 52 47 49 45 MP3 Do not accept if line extrapolated to origin	3

Question Number	Answer	Additional Guidance	Mark
3(c)(i)	correct completion of table (1)	0, 9, 0, 0, 9 Do not allow -9	1

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	- correct denominator used (1) - correct answer (1)	$120 / 5 \times 24 / 5(5^2-1)$ 0.1 Correct answer with no working gains two marks	2

Question Number	Answer	Additional Guidance	Mark
3(c)(iii)	- the calculated value of $r_s(0.100)$ is less than the critical value 1.000 (1) - therefore, accept the null hypothesis, so there is no correlation between the percentage response and the number of touches (1)	Allow ECF from 3cii if calculated value is more than stated critical value Accept critical value of 1 / 1.0 / 1.00 or marked in table at 5% significance	2

Question Number	Answer	Additional Guidance	Mark
3(d)	An answer that includes two of the following points: • use more than 5 touches (1) • change time intervals (between touches) (1) • use {more sea slugs / different ages / different species of sea slug} (1) • change a variable (related to sea water) (1)	Ignore increase sample size / repeat the experiment Accept temperature / pH / salinity / oxygen concentration / carbon dioxide concentration	2

Question Number	Answer	Additional Guidance	Mark
3(e)	An answer that includes one of the following points: • allows more oxygen uptake (1) • allows more feeding time (1) • (reduced response) conserves energy (1)		1

(Total for question 3 = 12 marks)

Question Number	Answer	Additional Guidance	Mark
4(a)	A description that includes two of the following points: • find a suitable {mass / age/species} of larvae (1) • find a suitable temperature for respiration (1) • find suitable method to measure the oxygen consumption (1) • suitable timescale to collect data (1)	A method to provide quantitative results Ignore amount/number of larvae Ignore comments about meat or liver Ignore respiration unqualified	2

Question Number	Answer	Additional Guidance	Mark
4(b)	An answer that includes nine of the following points: • clear statement of the dependent variable e.g. oxygen consumption per unit time (1) • use of a respirometer (1) • use of {same / stated} mass of larvae (1) • use of soda lime to absorb carbon dioxide (1) • detail of measuring dependent variable (1) • description of calculation of rate of gas consumption or production per unit mass (1) • Repeat with the other tissue (1) • two variables that need to be controlled (1) • method of control of one named variable (1) • repeat the whole experiment to calculate mean and {SD / error bars} (1)	Ignore amount/RQ Accept measure the distance (travelled) per unit time Accept respirometer described accept labelled diagram Ignore number of larvae/weight Accept sodium or potassium hydroxide but reject sodium hydrogen carbonate eg use of capillary tube or gas syringe Accept temperature / age / species of larvae / mass of meat /size of cube / species of meat Ignore light intensity/pH / volume of soda lime/weight Accept range bars	9

Question Number	Answer	Additional Guidance	Mark
4(c)	An answer that includes the following points: - table for collecting raw data (about liver and muscle) with headings and units with means calculated from repeats (1) - bar graph format with labelled axes (1) - use of a named statistical test for difference (1)	Not rate of... accept description of mean calculated in text or mean on one graph label if not in a table column eg t test U test Z test	3

Question Number	Answer	Additional Guidance	Mark
4(d)	An answer that includes two of the following points: - difficult to measure (small) distances along capillary tube with precision (1) {difficult to control age of larvae / respiration rate may change with changes in development of larvae} (1) - a stated difficulty with the apparatus (1)	Ignore refs to anaerobic/aerobic respiration MP1 accept (small) volumes of {gas/oxygen/carbon dioxide} MP1 ignore gas consumed or released Accept gas leakage/spent soda lime/death of some larvae/ temperature change due to respiration generating heat in the apparatus	2

Total for question 4 = 16

