Pearson Edexcel

Mark Scheme (Results)

January 2025

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

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)	e.g 196 / $\frac{(79 - 65)^2}{65} + \frac{(51 - 65)^2}{65}$	
	• Correct answer (1)	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)	*Only mark the first response on each line* *If no response on a line mark first two answers on other line* 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 x 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