Mark Scheme (Results)

Summer 2021

Pearson Edexcel International Advanced Level In Biology (WBI16) Paper 01

Practical Skills in Biology II

Question Number	Answer	Additional Guidance	Mark
1(a)	A description that includes the following points: • dependent variable is the number (of eggs) hatched per unit time (1) • use of five different concentrations of calcium ions (1) • counting brine shrimps {hatched / swimming} at {same / stated} time intervals (1) • suitable control of one variable (1) • repeats (for each treatment) and calculate a mean (1)	Accept dependent variable is number (of eggs) hatched per stated time Accept use of zero calcium ions as one of the concentrations Ignore units if given If single count: minimum time one hour, maximum time 3 days eg. temperature / stated temp (up to 45°C) - thermostatically controlled waterbath pH - buffer light intensity – distance of bulb / wattage of bulb salinity - % or gml^{-1}	**(5)** **exp**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	An answer that includes two of the following points: • pH (1)		**(2)**

	• temperature (1) • salinity (1) • light intensity (1)		**exp**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that includes the following points: • variable with suitable control method described (1) • results are not valid / description of expected effect on the dependent variable (1)	Description should be directional	**(2)** **exp**

Question Number	Answer	Additional Guidance	Mark
1(c)	An explanation that includes three of the following points: • calcium ions allow substrate to bind to the active site of enzyme (1) • activation energy lowered (at active site) (1) • an increased rate of respiration (1) • faster {anabolic / synthesis} reactions (leading to earlier hatching) (1)	Accept calcium ions increase binding of substrate to active site Accept calcium ions allow formation of enzyme- substrate complex Accept description of anabolic / synthesis reactions	**(3)** **exp**

(Total for question 1 = 12 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	• there will be no difference between the biomass of Almo and Kanlow (switchgrass)	Accept no difference in biomass between the two varieties of switchgrass	**(1) exp**

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	• the organic matter of living organisms in a given area	Accept biological material for organic matter Accept organic matter per area per unit time eg per hectare per year	**(1) exp**

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	• correct calculation of energy content (1) • answer expressed to two significant figures in standard form (1)	162 450 MJ 1.6×10^5 MJ ALLOW consequential error for MP2 Correct answer with no working gets 2 marks	**(2) exp**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(b)(iii)</td><td>

suitable table format, with data, correct column headings and units (1)
medians correctly identified as 14.0 and 15.2 (1)

</td><td>Do not accept units in the body of the table.
eg.

<table>
<tr><th colspan="3">Biomass (of switchgrass) x10^3 kg / hectare</th></tr>
<tr><th>year</th><th>Almo</th><th>Kanlow</th></tr>
<tr><td>1</td><td>20.1</td><td>15.5</td></tr>
<tr><td>2</td><td>19.2</td><td>22.2</td></tr>
<tr><td>3</td><td>14.2</td><td>14.4</td></tr>
<tr><td>4</td><td>11.4</td><td>11.4</td></tr>
<tr><td>5</td><td>11.8</td><td>12.6</td></tr>
<tr><td>6</td><td>13.6</td><td>15.2</td></tr>
<tr><td>7</td><td>14.0</td><td>16.5</td></tr>
</table>
</td><td>(2)
exp</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2(c)	• bar graph with linear scale, correct axis labels with units (1) • medians plotted correctly (1) • range bars plotted correctly (1)	Scale must start at zero Allow ECF from 2biii	**(3) exp**

Question Number	Answer	Additional Guidance	Mark
2(d)(i)	• correct substitution of given R values in the equation (1) • correct value of U_2 (1)	 19.5 Correct answer with no working gets 2 marks	 **(2)** **exp**

Question Number	Answer	Additional Guidance	Mark
2(d)(ii)	An answer that includes three of the following points: • the calculated value of U (19.5) is more than the critical value which is 8 (at p = 0.05) (1) • therefore accept the null hypothesis • there is no difference between the yield of Almo and Kanlow varieties of switchgrass (1) • comment on variability of data (1)	 Allow ECF from (d)(i) Accept critical value circled in table eg range bars overlap	 **(3)** **exp**

Question Number	Answer	Additional Guidance	Mark
2(e)	An answer that includes three of the following points: • only one field was used so it may not be a representative sample (for biomass from these varieties) (1) • the plots for each variety may not have been randomly selected (1) • one named environmental condition may not be the same for each variety (1) • comment on the range of data over the seven-year period (1)	Do not accept small sample size Accept eg. all of the Almo plots may have been on one side of the field and all of the Kanlow plots on the other eg. shading, soil type, soil moisture, mineral content, slope of field eg. number of growing days / weather conditions might not be the same each year	**(3)** **exp**

(Total for question 2 = 17 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)	A description that includes the following points: • find a suitable method for touching the external gills (1) • find suitable conditions that allow the sea slugs to be active (1) • find a suitable method to decide when the gills have re-emerged (1)	Ignore stated methods – credit is for finding out Accept eg. temperature, light intensity	**Exp (3)**

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that includes ten of the following points: • clear statement of the dependent variable e.g. (time for) re-emergence of gills (1) • <u>description of method</u> to provide different number of touches (1) • <u>description of method</u> for ensuring same intensity of each touch stimulation (1) • <u>description of method</u> for determining complete re-emergence of gills (1) • the method of touching the gills must not cause pain / damage (1) • • the animals are given time to acclimatise {before stimulation begins / between touches} (1) • variables that need to be taken into account (2) • description of how these variables are controlled (2) • repeat whole experiment with different animals (1)	Accept description of frequency of touches eg every 5 minutes eg glass rod of same diameter same person using same glass rod to touch with the same force eg measure / sketch gills at start and refer to this clear statement required eg water temperature, pH, salinity, depth of water, light intensity, substrate eg source / age / sex / species of Aplysia Accept repeat with the same animal (after suitable interval)	**(10)** **exp**

Question Number	Answer	Additional Guidance	Mark
3(c)	• table with headings and units (1) • means calculated from repeats (1) • line graph format with labelled axes (1) • use of an appropriate correlation statistical test (1)	Headings: time for re-emergence (accept minutes or seconds) and number of touches Accept description of table Accept statement or column in table Accept medians in place of mean Accept description of graph Accept named test eg Spearman Rank	**(4)** **exp**

Question Number	Answer	Additional Guidance	Mark
3(d)	• difficult to standardise the touch affecting the withdrawal reflex (1) • possible errors in determining full re-emergence (1) • difficult to control {age of animal / surface area of gills} (1) • difficult to control other possible stimuli which may cause reflex (1)	eg. pressure / force accept sex of Aplysia eg. sound, shadows, vibrations, water currents	**(4)** **exp**