Pearson Edexcel

Mark Scheme (Results)

October 2019

Pearson Edexcel International Advanced Level
In Biology (WBI06) Paper 01
Practical Biology and Investigative Skills

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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
1a	1. **dependent variable** identified;	e.g. oxygen consumption / oxygen used **IGNORE** rate of respiration	
	2. method of measuring dependent variable;	e.g. (movement of fluid) using a respirometer **ACCEPT** diagram or description of respirometer	
	3. use of {soda lime / potassium hydroxide} to absorb carbon dioxide;		
	4. description of how to measure rate with reference to distance and time;	**ACCEPT** volume and time	
	5. at least two suitable temperatures stated (within the range 5-50°C);	**IGNORE** other temperatures outside the range suggested	
	6. suitable method for control of temperature;	e.g. thermostatic water bath **ACCEPT** use of an incubator or air conditioned room	
	7. repeats (at each temperature) **and** calculate a mean;		**(5)**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	Abiotic 1. pH; 2. water; 3. carbon dioxide; Biotic 4. {variety / age / eq} of seed; 5. stage of germination / eq; 6. mass of seeds; 7. presence of {micro-organisms / fungi / bacteria};	4. **ACCEPT** source of seed, e.g. seeds from the same plant 7. **IGNORE** disease	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	1. variable with suitable control method described; 2. results are not valid / description of expected effect on the dependent variable;	**ACCEPT** description of how to control a variable not allowed in (b)(i) **IGNORE** not reliable	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)	1. oxygen required for aerobic respiration; 2. availability of oxygen affects the rate of (aerobic) respiration / eq; 3. correct detail of the role of oxygen {in oxidative phosphorylation / as final electron acceptor / eq}; 4. anaerobic respiration occurs at low oxygen concentrations;	2. ACCEPT description of how a change in oxygen can affect rate of respiration	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)	1. there will be no significant difference; *2.* between the **shell length** (of snails) fed on **diet A** and **diet B** / eq;	1. **DO NOT ACCEPT** correlation/relationship 2. **ACCEPT** reference to diets with or without added calcium, or mean shell length of snails in groups A and B	**(2)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(b)</td><td>1. suitable table format with data correctly ranked from lowest to highest;

2. correct column headings with units in heading only;

3. medians correctly identified;</td><td>Example table:

<table><tr><td colspan="2">Shell length /cm</td></tr><tr><td>Diet A</td><td>Diet B</td></tr><tr><td>13.4</td><td>14.9</td></tr><tr><td>13.9</td><td>15.2</td></tr><tr><td>15.3</td><td>18.3</td></tr><tr><td>15.6</td><td>18.4</td></tr><tr><td>15.7</td><td>19.0</td></tr><tr><td>15.8</td><td>19.6</td></tr><tr><td>16.0</td><td>20.9</td></tr><tr><td>16.2</td><td>21.2</td></tr><tr><td>16.6</td><td>21.5</td></tr><tr><td>17.3</td><td>21.7</td></tr><tr><td>17.4</td><td>22.1</td></tr></table></td><td>(3)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2c	1. axes correct orientation and linear scale; 2. medians plotted correctly (15.8 and 19.6) ; 3. range bars plotted correctly (13.4 – 17.4 and 14.9 -22.1);	**ACCEPT** ECF from 2b 1. {diet/ A and B / with or without calcium/eq} on x axis and **median** shell length in **cm** on y axis, scale starting at 0 on y axis 2. e.g. means (15.7 and 19.3) plotted instead of median values 3. No mark can be awarded if linear scale stops at 22	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(d)	1. critical value is 30; 2. calculated value (18.0) is less than the critical value; 3. therefore, reject the null hypothesis; 4. there is a significant difference between the (median) shell **length** of snails fed on diet A or diet B / eq; 5. reference to overlapping range bars on the graph;	4. **IGNORE** reference to growth	**(4)**

Question Number	Answer	Additional Guidance	Mark
2(e)	1. the sample size is small / eq; 2. samples may not be representative / eq; 3. named abiotic variable not **controlled**; 4. another named variable to do with the snails used; 5. overlapping range bars;	1**. ACCEPT** the investigation was not repeated; 3. e.g. temperature, water availability, humidity, mass or type of food 4**.** e.g. source of snails / genetic variability. **IGNORE** age / initial length / gender	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(a)	1. risk of infection from { bacteria / fungi / pathogens} / eq; 2. risk from handling plants; 3. risk from animals; 4. risk from environmental factors;	**ACCEPT** harmful e.g. allergic reactions to plants, thorns/eq e.g. insect bites, snakes, grazing animals e.g. exposure to {sun/cold/rain}, slips and trips	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)	1. practise the method to see if it works; 2. find a suitable method to sample plants; 3. find time of year when clover plants are flowering; 4. method to count flowers per plant; 5. find a method of measuring water content of soil / eq;	e.g. size of quadrat / transect	**(3)**

Question Number	Answer	Additional Guidance	Mark
***3c**	QWC -Spelling of technical terms must be correct and answer must be organised in a logical sequence	QWC- emphasis is clarity of expression	
	1. clear statement of the **dependent variable**;	1. number of flowers per plant	
	2. description of sampling method;	2.e.g. transect or sampling from ridges and furrows or random sampling within the field or appropriate use of quadrat	
	3. description of method of determining (mean) number of flowers per plant;		
	4. description of (standardising) soil sampling;	4.e.g. soil from a certain location or position (in quadrat)	
	5. description of method of measuring water content;	5.e.g. use a moisture meter to the same depth / determine by drying soil and measuring mass before and after	
	6. and 7. two relevant variables identified;	6. and 7. e.g. light intensity, temperature, humidity, soil pH, mineral ions, wind speed, competition from other plants, grazing, disease, age of plants, clover species	
	8. and 9. description of how these variables are {measured / monitored} ;		
	10. sampling within short time period;	10. e.g. within the same day	**(10)**

	11. repeats in other {**areas/fields}** ;	11. I**GNORE** repeats of lab experiments	

Level	Mark	Descriptor
1	0	The account is very disorganised and is very difficult to follow. Scientific vocabulary is very limited with many spelling and grammatical errors.

2	1	There is some disorganisation in the account which is not always in the correct sequence. Some relevant scientific vocabulary is used. The account is not always in continuous prose and there are grammatical errors and some important spelling mistakes.
3	2	The account is well organised with no undue repetition and a correct sequence. There is good use of scientific vocabulary in the context of the investigation described. The account is written in continuous prose which is grammatically sound with no major spelling errors.

Question Number	Answer	Additional Guidance	Mark
3(d)	1. table for recording raw data with headings; 2. means calculated from repeats; 3. relevant graph format sketched with labelled axes (for flower number against soil water content); 4. use of an appropriate statistical test;	1. e.g. soil moisture content and number of flowers per plant **DO NOT ACCEPT** added water or regular values shown in the table **IGNORE** ridges and furrows if no reference to soil moisture 2. **ACCEPT** description of a scatter graph to show correlation **OR** bar chart for differences 3. e.g. (Spearman's rank) test for correlation between soil moisture and number of flowers per plant **OR** T-test for number of flowers per plant on ridges and furrows	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(e)	1. other variables (apart from soil water) affecting flowering of plants (cannot be controlled) ; 2. only one {field / furrow / eq} has been investigated; 3. difficulty in determining number of flowers per plant; 4. possible errors in measuring soil moisture / eq; 5. soil water content can change quickly / eq;	1. **ACCEPT** a relevant named variable that is difficult to monitor e.g. genetic variability 2. **ACCEPT** only sampled on one occasion e.g. one season / year/day 3. e.g. difficulty in determining what is a single plant 4. **ACCEPT** difficult to measure	**(3)**

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