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Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Subsidiary
In Biology (WBI16)
Paper 1: 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.

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Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer. ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication
Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear · select and use a form and style of writing appropriate to purpose and to complex subject matter · organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

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Question Number	Answer	Additional Guidance	Mark
1(a)	An explanation that includes two of the following points: • polymer containing lots of glucose molecules (1) • a large molecule so that it {is insoluble / does not have an osmotic effect} (1) • branched molecule so that it can be hydrolysed quickly (1)	**ALLOW** polysaccharide **ALLOW** made of amylose and amylopectin as meaning large **ALLOW** broken down **IGNORE** easily	**(2)** **exp**

Question Number	Answer	Additional Guidance	Mark
1(b)	A description that includes five of the following points: • method to produce (same) initial {mass/volume/length} of cells (1) • Five different concentrations used/stated (1) • suitable control of temperature or a stated temperature (1) • measure change in mass /volume/length after the {same/stated} time interval (1) • repeats (at each concentration) and calculate mean (1) • plot change in mass/volume/length against concentration of solution/find point at which the (two)lines cross the x axis (1)	**IGNORE** size **ALLOW** air-conditioned room **ALLOW** time period in the range 30 mins to 3 days **ALLOW** calculation of mean size ALLOW size	**(5)** **exp**

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Question Number	Answer	Additional Guidance	Mark
1(c)(i)	An answer that includes the following points: • (abiotic variable) pH / temperature / mass/volume at time zero (1) • (biotic variable) same age / same part of tuber (1)		**(2)** **exp**

Question Number	Answer	Additional Guidance	Mark
1(c)(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)	**IGNORE** accuracy/precision / reliability / repeatability **ALLOW** Description of how membranes affected	**(2)** **exp**

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Question Number	Answer	Additional Guidance	Mark
1(d)	An answer that includes three of the following points: • some {molecules / solutes/ions} may be different (in each species) (1) • different concentrations of each {molecule / solutes/ions} (in each species) (1) • potato cells with different concentration of solution/cytoplasm affects water potential (1) • cell walls may have different structures (1)	**ALLOW** mineral ions / minerals **ALLOW** mineral ions / minerals **ALLOW** higher solute concentration will have lower water potential **ALLOW** wall pressure / turgor pressure / pressure potential	**(3)** **exp**

(Total for question 1 = 14 marks)

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Question Number	Answer	Additional Guidance	Mark
2(a)	• there will be no difference between the length of leaves treated with insecticide or water (after 56 days) (1)		**(1) exp**

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	26 / 26.1 / 26.13 (%)	Allow 21 / 20.7 / 20.71	**(1) grad**

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

suitable table format with data (1)
correct column headings with units (1)
means correctly calculated (1)

</td>
<td>
Length of leaf /cm
<table>
<tr><th></th><th>Insecticide treated</th><th>Water treated</th></tr>
<tr><td></td><td>12.6</td><td>9.1</td></tr>
<tr><td></td><td>13.1</td><td>9.4</td></tr>
<tr><td></td><td>13.9</td><td>10.3</td></tr>
<tr><td></td><td>14.0</td><td>10.1</td></tr>
<tr><td></td><td>11.1</td><td>10.4</td></tr>
<tr><td></td><td>11.6</td><td>10.9</td></tr>
<tr><td></td><td>12.4</td><td>9.0</td></tr>
<tr><td></td><td>12.9</td><td>9.7</td></tr>
<tr><td></td><td>12.5</td><td>9.9</td></tr>
<tr><td></td><td>13.4</td><td>10.8</td></tr>
<tr><td></td><td>13.7</td><td>9.3</td></tr>
<tr><td></td><td>12.0</td><td>9.8</td></tr>
<tr><td></td><td>11.9</td><td>9.2</td></tr>
<tr><td></td><td>12.6</td><td>9.7</td></tr>
<tr><td></td><td>11.8</td><td>9.4</td></tr>
<tr><td>mean</td><td>12.6</td><td>9.8</td></tr>
</table>
</td>
<td>(3)
exp</td>
</tr>
</table>

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Question Number	Answer	Additional Guidance	Mark
2c	• bar graph with linear scale and axes labelled with unit (1) • means plotted correctly (1) • range bars plotted correctly (1)	**ALLOW** ECF from 2b axes mean length (cm) and insecticide /water 12.6 9.8 14-11.1 and 10.9 -9.0	**(3)** **exp**

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Question Number	Answer	Additional Guidance	Mark
2(d)(i)	• numerator calculation or value shown (1) • denominator calculation or value shown (1) • *t* = 10.3 / 10.31 (1)	= 'insert calc' / 2.8 OR 'insert calc' / 2.83 = 'insert calc' / 0.272 OR 'insert calc' / 0.273 OR 10.4 / 10.37 Correct answer with no working gains full marks	**(3)** **exp**

Question Number	Answer	Additional Guidance	Mark
2(d)(ii)	An answer that includes two of the following points: • critical value is 2.048 and the calculated value (10.31) is more than the critical value (1) • therefore reject the null hypothesis there is a difference between the length of the leaf of insecticide treated and water treated(thistle plants) (1) • comment on variability of data (1)	**IGNORE** other calculated values as long as they are greater than 2.048 range bars do **not** overlap **IGNORE** reliability / accuracy / reliability / repeatability	**(2)** **exp**

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Question Number	Answer	Additional Guidance	Mark
2(e)	An answer that includes two of the following points: • the leaves should have been measured before the treatment (because the rate of growth may be different) (1) • the environmental conditions need to be controlled/measured (because they will affect the rate of growth) (1) • the leaves should have been measured at different {time interval(s) / growth season} (to compare the rate of growth) (1) • use of different concentrations of insecticides (1)	**IGNORE** different fields **ALLOW** measured from the same part of the plant eg at a specified height or 5th leaf down **ALLOW** a named condition controlled/measured **ALLOW** in a greenhouse/eq Allow a longer period of time	**(2)** **exp**

(Total for question 2 = 15 marks)

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Question Number	Answer	Additional Guidance	Mark
3(a)	• one sensible risk identified	eg cuts/burns/allergies/infections/electrocution	**(1) exp**

Question Number	Answer	Additional Guidance	Mark
3(b)	A description that includes the following points: • find a suitable method for measuring the production of oxygen (1) • over a suitable time period (1) • find a suitable method for varying the light intensity (1)	**IGNORE** practise the method **IGNORE** rate of photosynthesis / counting oxygen bubbles **ALLOW** stated number of minutes / hours e.g. 10 minutes to 8 hours	**(3) Exp**

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Question Number	Answer	Additional Guidance	Mark
3(c)	An answer that includes ten of the following points: • clear statement of the dependent variable (1) • description of method to provide 5 different intensities of light (1) • plant given time to acclimatise (1) • description of method for measuring gas volume (1) • method of calculating rate of gas released (1) • the carbon dioxide must be in excess (1) • variables that need to be taken into account (2) • description of how these variables are {controlled/measured} (2) • repeats for each light intensity (1)	**ALLOW** {volume / concentration} of oxygen **IGNORE** counting oxygen bubbles **ALLOW** equilibrate **IGNORE** counting bubbles **ALLOW** number of bubbles per unit time **ALLOW** use of sodium hydrogen carbonate e.g. temperature, pH, background light e.g. controlled room temperature or waterbath. buffer or pH meter, blackout other light sources	**(10) exp**

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Question Number	Answer	Additional Guidance	Mark
3(d)	An answer that includes the following points: • table with headings (1) • means calculated from repeats (1) • line graph format with labelled axes (1) • use of an appropriate correlation statistical test (1)	**ALLOW** concentration of oxygen Units only needed once from table or graph **ALLOW** sketch graph either rising or falling depending on axis labels e.g. Pearsons, Spearman's Rank	**(4)** **exp**

Question Number	Answer	Additional Guidance	Mark
3(e)	An answer that includes three of the following points: • difficult to control all variables affecting {growth / photosynthesis} of plants (1) • idea of difficulty of controlling a named variable (1) • idea that surface area cannot be controlled/measured (1) • possible errors in measuring volume of gas released (1)	**ALLOW** biotic/ abiotic variables e.g. temperature or pH **ALLOW** size of leaves **ALLOW** size of bubble may vary Not counting bubbles unqualified	**(3)**

(Total for question 3 = 21 marks)

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