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Mark Scheme (Results)

October 2020

Pearson Edexcel International Advanced Subsidiary
In Biology (WBI06/01)
Paper 1: 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.

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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)	1. dependent variable identified as the number of cells ; 2. cells from same {source/birds} ; 3. use of detergent and a control ; 4. description of how to observe cells under the microscope ; 5. standardised method of counting cells ; 6. repeats and calculate means (to compare) ;	eg use of low then high power lens / use x600 eg. count the cells in a field of view	**(5)**

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Question Number	Answer	Additional Guidance	Mark
1(b)(i)	*abiotic* pH; oxygen concentration; temperature ; concentration of detergent ; chemical formula of detergent ; *biotic* species of bird ; age of bird ; sex of bird ;	**ALLOW** carbon dioxide concentration **ALLOW** volume of detergent	**(2)**

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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 ;	ECF from b(i)	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(c)	1. membrane structure includes phospholipids ; 2. detergent molecules combine with lipid/eq ; 3. increase in permeability of the membrane/eq ; 4. Haemoglobin leaks out ; 5. membrane ruptures ;	**IGNORE** proteins **ALLOW** pigment **ALLOW** cell bursts	**(3)**

(Total for question 1 = 12 marks)

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Question Number	Answer	Additional Guidance	Mark
2(a)	1. there will be no (significant) difference ; 2. between the nucleus to cytoplasm ratio of healthy and infected chilli plants ;	**IGNORE** volume	**(2)**

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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)</td>
<td>1. suitable table format ;

2. correct column headings ;

3. all raw data and means correct ;</td>
<td>
<table>
<tr><th>Chilli plant</th><th>Nucleus to cytoplasm ratio</th><th>Mean (nucleus to cytoplasm ratio)</th></tr>
<tr><td>Healthy</td><td>0.124 0.056 0.098
0.064
0.068
0.119
0.100
0.102
0.068
0.073
0.099
0.094
0.103
0.155
0.144</td><td>0.098
Must be to 3sf</td></tr>
<tr><td>Infected with virus</td><td>0.153 0.099
0.145
0.192
0.164
0.163
0.213
0.169
0.132
0.249
0.205
0.255
0.224
0.207
0.193</td><td>0.184</td></tr>
</table>
</td>
<td>(3)</td>
</tr>
</table>

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Question Number	Answer	Additional Guidance	Mark
2(c)	1. axes labelled and linear scale ; 2. data plotted correctly as a bar graph ; 3. range bars plotted correctly ;	**ALLOW** ECF from 2b Mean ratio; infected and uninfected 0.099 to 0.255 0.056 to 0.155	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(d)	1. critical value is 2.05 ; 2. calculated value (6.41) is more than the critical value ; 3. therefore reject the null hypothesis ; 4. there is a (significant) difference between the nucleus to cytoplasm ratio of healthy and infected chilli plants ;	**IGNORE** range bars overlap	**(4)**

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Question Number	Answer	Additional Guidance	Mark
2(e)	1. the plants may have been different ages/eq ; 2. the samples (of plants) were only taken from one location ; 3. difficult to measure {cytoplasm/ nucleus} accurately /eq; 4. wide variability of results / comment on {large / overlapping} range bars ; 5. a named variable is not controlled ;	**ALLOW** source as plant or place **ALLOW** calculating ratio accurately eg. soil pH, temperature, light intensity **IGNORE** genetics	**(4)**

(Total for question 2 = 16 marks)

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Question Number	Answer	Additional Guidance	Mark
3(a)	1. risk of growing {bacteria/fungi} / risk of infection ; 2. plant (extract) may cause allergic reaction /eq ; 3. other sensible risk ;	 **ALLOW** irritant e.g. glassware safety, heating precaution, risks in the field	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)	1. practise the method to see if it works ; 2. find a suitable method for making the plant extracts /eq ; 3. find suitable method to provide a bacterial lawn/eq ; 4. find a suitable method for measuring bacterial inhibition/eq ;	 **ALLOW** find suitable {concentration/volume} **ALLOW** find suitable {species/growth conditions/ time to grow}	**Exp (3)**

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Question Number	Answer	Additional Guidance	Mark
***3(c)**	**QWC -Spelling of technical terms must be correct and answer must be organised in a logical sequence** 1. clear statement of the dependent variable ; 2. method of producing plant extracts /eq ; 3. use of aseptic technique 4. method of making a bacterial lawn /eq ; 5. method of applying plant extract ; 6. measuring zone of inhibition {area/diameter} ; 7 & 8. variables that should be controlled ; 9 & 10. description of how these variables are controlled ; 11. repeats for flower and leaf extracts ;	QWC-emphasis is for clarity of expression **ALLOW** eg's flaming, Bunsen burner to prevent contamination **ALLOW** growth of known concentration of bacteria in broth **ALLOW** radius **ALLOW** other methods of measuring bacterial growth eg turbidity / absorbance, if grown in broth eg time before ZOI measured / volume of extract /concentration of extract /samples from same plant eg same packet of seeds Max 8 +2QWC QWC descriptors to be inserted	**(10)**

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Question Number	Answer	Additional Guidance	Mark
3(d)	1. table with headings ; 2. means calculated from repeats ; 3. bar graph with labelled axes ; 4. use of an appropriate statistical test for difference ;	eg flowers and leaves; diameter/area with units	**(4)**

Question Number	Answer	Additional Guidance	Mark
3(e)	1. difficult to control {all variables/or a named variable} that affect production of the plant extracts ; 2. idea that only one source of plant extract has been used /eq ; 3. idea of difficulty of culturing bacteria / eq ; 4. idea of difficulty of measuring zone of inhibition accurately	eg contamination / uneven spread of bacteria / difficulty of applying consistent volume or concentration of extract to discs	**(3)**

(Total for question 3 = 22 marks)

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