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# **Mark Scheme (Results)**

Summer 2017

Pearson Edexcel International Advanced  
Level

in Biology (WBI06) Paper 01

Practical Biology and Investigative Skills

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Publications Code WBI06\_01\_1706\_MS

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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
Q1(a)	<ol style="list-style-type: none"> <li>1. method of standardising length of fibres ;</li> <li>2. measure {diameter / area} of fibres ;</li> <li>3. method of suspending fibres ;</li> <li>4. add weights progressively until fibres break ;</li> <li>5. tensile strength calculated ;</li> <li>6. suitable safety precaution with a reason ;</li> <li>7. repeat and calculate the mean ;</li> </ol>	<p><b>3. ACCEPT</b> attach to a clamp vertically or horizontally</p> <p><b>4. ACCEPT</b> use a force meter on the fibre until it breaks</p> <p><b>5. ACCEPT</b> e.g. force <math>\div</math> (cross-sectional) area or force <math>\div</math> diameter</p> <p><b>6. ACCEPT</b> e.g. {wash hands / wear gloves} to reduce risk of infection or allergy  e.g. wear goggles to protect eyes  e.g. wear safety shoes or use a cushion to prevent foot injury</p>	<b>5</b>

Question Number	Answer	Additional Guidance	Mark
Q1(b)(i)	Any two from: 1. {age / variety / eq } of plant or fibre ; 2. pre-treatment (of fibres) ; 3. {length / diameter / cross sectional area} of fibre ; 4. humidity (of room) ; 5. temperature (of room) ;	<b>2. ACCEPT</b> e.g. time / soaked / retting / same pH	<b>2</b>

Question Number	Answer	Additional Guidance	Mark
Q1(b)(ii)	1. variable with suitable control method described ; 2. results are not valid / effect on tensile strength of fibres described ;	<b>2. ACCEPT</b> 'the variable will {affect / increase / decrease} the strength of fibres'	<b>2</b>

<b>Question Number</b>	<b>Answer</b>	<b>Additional Guidance</b>	<b>Mark</b>
<b>Q1(c)</b>	<ol style="list-style-type: none"><li>1. (fibres made of) cellulose ;</li><li>2. (with) lignin ;</li><li>3. { cellulose / lignin } is difficult to { hydrolyse / digest / breakdown } ;</li><li>4. idea that only some { bacteria / fungi / microorganisms / decomposers } produce { enzyme / cellulase } ;</li></ol>		<b>3</b>

Question Number	Answer	Additional Guidance	Mark
Q2(a)	<ol style="list-style-type: none"> <li>1. there will be no significant difference ;</li> <li>2. between the { size / eq } of the fish in the pools / eq ;</li> </ol>	<b>ACCEPT</b> equivalent statement e.g. 'the length of fish in the pools is not significantly different' gains MP1 and 2	<b>2</b>

Question Number	Answer	Additional Guidance	Mark
Q2(b)(i)	<ol style="list-style-type: none"> <li>1. table format with complete row and column headings including units ;</li> <li>2. raw data correctly entered ;</li> <li>3. both means correctly calculated 41.1 and 45.5 ;</li> </ol>	DO NOT AWARD mp 1 if units repeated in body of table  <b>3. ACCEPT</b> 41 and 45/46 Or 41.13 and 45.47	<b>3</b>

Question Number	Answer	Additional Guidance	Mark
Q2(b)(ii)	<ol style="list-style-type: none"> <li>1. axes with appropriate linear scale and labelled ;</li> <li>2. mean data correctly plotted as bars ;</li> <li>3. correct range bars ;</li> </ol>	y: mean length of fish / mm x: (pool) A and (pool) B  <b>2. ACCEPT</b> ecf from table in 2bi  A 51-31, B 54-37	<b>3</b>

Question Number	Answer	Additional Guidance	Mark
Q2(c)	<ol style="list-style-type: none"> <li>1. critical value is 2.05 ;</li> <li>2. the calculated value (2.31) is greater than critical value ;</li> <li>3. therefore reject the null hypothesis ;</li> <li>4. there is a { significant / eq } difference between fish in pool <b>A</b> and pool <b>B</b> ;</li> <li>5. comment on variability of data ;</li> </ol>	<p><b>1. ACCEPT</b> 2.05 circled in table</p> <p><b>2. ACCEPT</b> the converse statement</p> <p><b>4. ACCEPT</b> "fish in pool B are significantly bigger than fish in pool A"</p> <p><b>5. ACCEPT</b> { error / range } bars overlap data are very variable</p>	<b>4</b>

Question Number	Answer	Additional Guidance	Mark
Q2(d)	<ol style="list-style-type: none"> <li>1. named {biotic / abiotic} factor ;</li> <li>2. how it will be measured ;</li> <li>3. another named {biotic / abiotic} factor ;</li> <li>4. how it will be measured ;</li> </ol>		<b>4</b>



Question Number	Answer	Additional Guidance	Mark
Q3(a)	1. (they) kill or inhibit {bacteria / fungi / pathogens} ; 2. to protect from {damage / infection / disease / eq} ;	<b>1. ACCEPT</b> virus / harmful microorganisms	<b>2</b>

Question Number	Answer	Additional Guidance	Mark
Q3(b)(i)	1. practise method to see if it works ; 2. find suitable extraction method ; 3. find suitable type of {bacteria / fungus / microorganism} ; 4. find suitable growth medium ; 5. find suitable method of applying plant extract ; 6. find suitable incubation {time / temperature} ; 7. find suitable method to measure bacterial {growth / inhibition} ;	<b>4.</b> e.g. agar, broth culture  <b>6. ACCEPT</b> find a suitable time or temperature for {growth / inhibition} of bacteria	<b>3</b>

Question Number	Answer	Additional Guidance	Mark
Q3(b)(ii)	<p>1. idea of using two (or more) named parts of the plants ;</p> <p>2. description of method for extraction ;</p> <p>3. dependent variable defined as the effect on bacteria ;</p> <p>4. method of applying extract ;</p> <p>5. method of measuring the dependent variable ;</p> <p>6. idea of aseptic technique ;</p> <p>7. identify one named variable ;</p> <p>8. method of control of the named variable ;</p> <p>9. repeat and calculate a mean ;</p> <p><b>Level 0, 1, 2</b> descriptors for QWC (2 marks)</p>	<p><b>2.</b> e.g. grind with pestle and mortar</p> <p><b>3.</b> e.g. reduction, absence of bacteria, zone of inhibition</p> <p><b>4.</b> e.g. agar wells or soaked paper discs or directly into a broth</p> <p><b>5.</b> e.g. measure {area / diameter} of inhibition zone using a ruler or grid</p> <p><b>7.</b> e.g. mass of plant part, age of plant part, { volume / type } of solvent, grinding time, temperature of incubation, size of paper discs / wells, species / strain of bacteria, pH of agar medium / broth, incubation time, concentration of extract</p>	<p><b>10</b></p>

Level	Mark	Descriptor
<b>Level 1</b>	<b>0</b>	The account is very disorganised and is very difficult to follow. Scientific vocabulary is very limited with many spelling and grammatical errors.
<b>Level 2</b>	<b>1</b>	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.
<b>Level 3</b>	<b>2</b>	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
Q3(b)(iii)	1. table with headings and appropriate units ; 2. means indicated from repeats ; 3. bar graph format with labelled axes ; 4. use of a statistical test for differences ;	<b>4. ACCEPT</b> t-test, Mann-Whitney, ANOVA	<b>4</b>

Question Number	Answer	Additional Guidance	Mark
Q3(b)(iv)	1. difficult to control variables which affect { production of inhibitor in leaves / size of clear zone } ; 2. difficult to control concentration of extract ; 3. idea of difficulty of measuring bacterial inhibition ; 4. idea of { one species of this plant genus used / limited sample of oregano } / one bacterial { species / type } used ; 5. idea that different parts of the plant produce different inhibitors ;	<b>3.</b> e.g. zones of inhibition not circular / edges of zone not clear	<b>3</b>

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