

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

**GCSE Science – Controlled Assessment ISA – Marking Guidelines**

**Science ISA – BU1.x Microorganisms (Specimen)**

**For moderation in May 20yy or January 20zz**

Please mark in red ink. Each part of each question must show some red ink to indicate that it has been seen. Subtotals for each part of each question should be written in the right-hand margin.

Enter the marks for **Section 1** and **Section 2** and the **total mark** on the front cover of the answer booklet for Section 1. Fasten both sections together with the results table(s) and the graphical work and the Candidate's Research Notes.

The teacher must sign and date the front covers of Section 1 and Section 2 of the ISA.

The papers must be kept in a secure place and must **not** be returned to the candidates.

These Marking Guidelines are necessarily generic. Additional guidance on how to relate these generic Marking Guidelines to particular investigations is given below the generic section.

Read through the whole of the candidate's answer and use the Marking Guidelines below to arrive at a 'best fit' mark.

**SECTION 1**

|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>1 mark</b>                                                                                                                        | <b>2 marks</b>                                                                                           | <b>3 marks</b>                                                                                                        |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Q. No.<br/>1</b>        | No creditworthy response.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Two relevant sources are identified<br><b>or</b><br>one relevant source is identified and the usefulness of the source commented on. | Two relevant sources are identified.<br><br>The usefulness of <b>one</b> of the sources is commented on. | Two relevant sources are identified.<br><br>The usefulness of <b>both</b> sources is explained and a comparison made. |
| <b>Additional Guidance</b> | <p><i>An identified source is referred to by title and author or for websites at least the name of the website should be quoted.</i></p> <p><i>Any identified source should be capable of being accessed by the moderator.</i></p> <p><i>A clear comment on only one of the sources may be sufficient to gain 3 marks if the answer implies a comment on the other source.</i></p> <p><i>If candidates have taken part in peer discussion as part of their research, simply stating this is not sufficient to qualify for quoting a source. Similarly, reference to their own notes or exercise book alone is insufficient.</i></p> |                                                                                                                                      |                                                                                                          |                                                                                                                       |

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

| <b>SECTION 1</b>           |                                                                                                                                                                                                                                                                                                                                                                     |                                        |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                          |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                      | <b>1 mark</b>                          | <b>2 marks</b>                                                                                                                                                                                                                   | <b>3 marks</b>                                                                                                                                                                                                                                                                                           |
| <b>Q. No.<br/>2</b>        | No creditworthy response                                                                                                                                                                                                                                                                                                                                            | A suitable control variable is stated. | <p>A suitable control variable is stated.</p> <p>Only one value to be investigated in the preliminary experiment is suggested</p> <p>The dependent variable is stated, but details concerning its measurement are incomplete</p> | <p>A suitable control variable is stated.</p> <p>The limits of the range to be investigated in the preliminary experiment are appropriate.</p> <p>A statement concerning how the dependent variable values obtained could be used to determine the best value for the control variable has been made</p> |
| <b>Additional Guidance</b> | <p><i>A suitable method may involve measuring the extent of growth of colonies of bacteria after different time intervals, and then comparing the results.</i></p> <p><i>The way in which the results could be used may refer to deciding whether there is sufficient growth of colonies to allow clear identification of each colony as a separate entity.</i></p> |                                        |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                          |

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| SECTION 1                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Q. No.<br/>3</b>        | <p>In this question candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.</p> <p>Candidates will be required to use good English, organise information clearly and use specialist terms where appropriate.</p> <p>In order to attain a mark within a certain level, <b>both</b> the science <b>and</b> the QWC must be considered.</p> <p>Read through the whole of the candidate's answer and use the Marking Guidelines below to arrive at a 'best fit' mark, as candidates may meet some criteria but not others in a mark range.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                            | 0 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1, 2 or 3 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4, 5 or 6 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 7, 8 or 9 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                            | <p>No creditworthy response</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>Some of the necessary equipment is stated.</p> <p>The method described is weak but shows some understanding of the sequence of an investigation.</p> <p>The measurements to be made are stated.</p> <p>An appropriate hazard is identified, but the corresponding risk assessment and control measure is weak or absent.</p> <p>The answer is poorly organised, with almost no specialist terms and little or no detail given.</p> <p>The answer shows very weak spelling, punctuation and grammar.</p> | <p>Most of the necessary equipment is stated.</p> <p>The method described will enable valid results to be collected.</p> <p>The measurements to be made are stated and a at least one control variable is given.</p> <p>Any significant hazards are identified, together with a corresponding control measure but the risk assessment is weak or absent.</p> <p>The answer has some structure and organisation, use of specialist terms has been attempted but not always correctly, and some detail is given.</p> <p>The answer shows reasonable spelling, punctuation and grammar although there may still be some errors.</p> | <p>Most of the necessary equipment is stated.</p> <p>The method described will enable valid results to be collected.</p> <p>The measurements to be made are stated and the significant control variables are clearly identified, with details of how they will be monitored or controlled.</p> <p>Any significant hazards are identified, together with an assessment of the associated risks and corresponding control measures.</p> <p>The answer is coherent and written in an organised, logical sequence, containing a range of relevant specialist terms used correctly.</p> <p>The answer shows almost faultless spelling, punctuation and grammar.</p> |
| <b>Additional Guidance</b> | <p><i>Typical hazards with associated risk reduction might include: once incubated the plates should not be opened to prevent possible spread of pathogens that may have grown.</i></p> <p><i>It may be possible to credit a clearly labelled diagram for some of the marks.</i></p>                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## BU1.x Microorganisms (Specimen) ISA - Marking Guidelines

| SECTION 1                  |                                                                                                                                                                                                                                                              |                                                                                                                                        |                                                                                                                                                                 |                                                                                                                                                            |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>0 marks</b>                                                                                                                                                                                                                                               | <b>1 mark</b>                                                                                                                          | <b>2 marks</b>                                                                                                                                                  | <b>3 marks</b>                                                                                                                                             |
| <b>Q. No.<br/>4</b>        | No creditworthy response                                                                                                                                                                                                                                     | An alternative method is outlined briefly although some of the necessary steps may not be clear.                                       | An alternative method is outlined briefly.<br><br>A simple suggestion is given as to why this alternative method would not have been as good as the one chosen. | An alternative method is outlined briefly.<br><br>An explanation is given as to why this alternative method would not have been as good as the one chosen. |
| <b>Additional Guidance</b> | <p><i>Full detailed plans are not required for the alternative method.</i></p> <p><i>Suggestions regarding lack of specific, named equipment are sufficient as a sensible explanation.</i></p>                                                               |                                                                                                                                        |                                                                                                                                                                 |                                                                                                                                                            |
| Table for the results      |                                                                                                                                                                                                                                                              |                                                                                                                                        |                                                                                                                                                                 |                                                                                                                                                            |
|                            | <b>0 marks</b>                                                                                                                                                                                                                                               | <b>1 mark</b>                                                                                                                          | <b>2 marks</b>                                                                                                                                                  |                                                                                                                                                            |
| <b>Q. No.<br/>5</b>        | No table or a table with incomplete headings or units for the measured variables.<br><br>Fewer than half of the required elements are present.                                                                                                               | A table with incomplete headings or units for the measured variables.<br><br>At least half of the required elements should be present. | Correct headings and units present for all measured variables.                                                                                                  |                                                                                                                                                            |
| <b>Additional Guidance</b> | <p><i>The table should be able to accommodate all the variables that the candidate is going to measure or record during the investigation.</i></p> <p><i>There is no need for the candidate to include columns for repeats, means or derived values.</i></p> |                                                                                                                                        |                                                                                                                                                                 |                                                                                                                                                            |

### BU1.x Microorganisms (Specimen) ISA - Marking Guidelines

| SECTION 2                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                           |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                  |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q. No.<br>1 (a)            | 0 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 mark                                                                                                                                                                                    | 2 marks                                                                                                                                                                                                                   | 3 marks                                                                                                                                                                                                                                                          |
|                            | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Any <b>one</b> variable correctly identified.                                                                                                                                             | Any <b>two</b> variables correctly identified.                                                                                                                                                                            | All <b>three</b> variables correctly identified.                                                                                                                                                                                                                 |
| <b>Additional Guidance</b> | <p><i>The independent variable is the concentration of disinfectant used.</i></p> <p><i>Examples of dependent variables are: the number of colonies of bacteria that grow, or the cloudiness of nutrient broth.</i></p> <p><i>Examples of control variables are: the volume of disinfectant used, the temperature of incubation, or the time of incubation.</i></p>                                                                                                                                                                          |                                                                                                                                                                                           |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                  |
| SECTION 2                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                           |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                  |
| Q. No.<br>1 (b)            | 0 marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 mark                                                                                                                                                                                    | 2 marks                                                                                                                                                                                                                   | 3 marks                                                                                                                                                                                                                                                          |
|                            | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>There is a correct statement regarding whether or not any measurements were repeated.</p> <p>There is mention of the presence or absence of anomalous results or minor variations.</p> | <p>There is a correct statement regarding whether or not any measurements were repeated.</p> <p>There is reference to either anomalous results or to systematic or random errors with reference to their own results.</p> | <p>There is a correct statement regarding whether or not any measurements were repeated.</p> <p>There is reference to either anomalous results or to systematic or random errors with reference to their own results, and the effects that these would cause</p> |
| <b>Additional Guidance</b> | <p><i>If the candidate answers “Yes”, they may refer to clearly anomalous results that need repeating, or to the fact that not all the points lie comfortably on a line of best fit (random errors) or to a systematic error, therefore needing more result to calculate a mean.</i></p> <p><i>If the candidate answers “No”, they may refer to eg all points on the graph lying close to the best fit line.</i></p> <p><i>Reference to lack of time may be allowed for 1 mark at the teacher’s discretion, but should be annotated.</i></p> |                                                                                                                                                                                           |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                  |

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

| <b>SECTION 2</b>           |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                       |                                                                                                                                                                                                                             |                                                                                                                                                                                                                          |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                                          | <b>1 mark</b>                                                                                                                                         | <b>2 marks</b>                                                                                                                                                                                                              | <b>3 marks</b>                                                                                                                                                                                                           |
| <b>Q. No.<br/>1 (c)</b>    | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                | At least one end of the range is correctly stated.<br><br>Another value of the independent variable is suggested, although it may not be appropriate. | The range is correctly stated, according to the candidate's own results.<br><br>Another appropriate value of the independent variable is suggested.<br><br>The reason for the additional value is unclear or inappropriate. | The range is correctly stated, according to the candidate's own results.<br><br>Another appropriate value of the independent variable is suggested.<br><br>The reason for the additional value is clear and appropriate. |
| <b>Additional Guidance</b> | <p><i>An appropriate extra reading will usually be one of the following:</i></p> <ul style="list-style-type: none"> <li>• <i>an intermediate reading to fill in a gap, perhaps where the trend line becomes unclear</i></li> <li>• <i>a reading outside the range already investigated, perhaps to see if the trend continues.</i></li> </ul>                                           |                                                                                                                                                       |                                                                                                                                                                                                                             |                                                                                                                                                                                                                          |
| <b>SECTION 2</b>           |                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                       |                                                                                                                                                                                                                             |                                                                                                                                                                                                                          |
|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                                          | <b>1 mark</b>                                                                                                                                         | <b>2 marks</b>                                                                                                                                                                                                              | <b>3 marks</b>                                                                                                                                                                                                           |
| <b>Q. No.<br/>1 (d)</b>    | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                | A valid statement is made about whether or not the results support the hypothesis.                                                                    | A valid statement is made about whether or not the results support the hypothesis.<br><br>The answer includes <b>either</b> a reference to a pattern <b>or</b> some examples from the results.                              | A valid statement is made about whether or not the results support the hypothesis.<br><br>The answer includes a reference to a pattern <b>and</b> some examples from the results.                                        |
| <b>Additional Guidance</b> | <p><i>The candidate's statement(s) must match the candidate's own results.</i></p> <p><i>An example of a pattern might be "The stronger the concentration of disinfectant, the more bacteria were killed".</i></p> <p><i>An example of results quoted in support might be "At 20% concentration the bacteria count was 50, but at 100% concentration all bacteria were killed".</i></p> |                                                                                                                                                       |                                                                                                                                                                                                                             |                                                                                                                                                                                                                          |

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

| SECTION 2                  |                                                                                                                    |                                                                                       |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |
|----------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | 0 marks                                                                                                            | 1 mark                                                                                | 2 marks                                                                                                                                                                                                                                         | 3 marks                                                                                                                                                                                   |
| <b>Q. No.<br/>1 (e)</b>    | No creditworthy response                                                                                           | A simple correct statement is made as to whether or not the results are reproducible. | A simple correct statement is made as to whether or not the results are reproducible.<br><br>A simple explanation is given, supported by an example from the results (this may be a qualitative example referring to a pattern on the results). | A simple correct statement is made as to whether or not the results are reproducible.<br><br>A detailed explanation is given, supported by at least <b>two</b> examples from the results. |
| <b>Additional Guidance</b> | <i>Note that the answer should refer to the class or teacher's results, and not simply to the expected result.</i> |                                                                                       |                                                                                                                                                                                                                                                 |                                                                                                                                                                                           |

| SECTION 2                  |                                                                                                                                                                                                                                                                                                  |                                                                 |                                                                                                               |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|                            | 0 marks                                                                                                                                                                                                                                                                                          | 1 mark                                                          | 2 marks                                                                                                       |
| <b>Q. No.<br/>2 (a)</b>    | No creditworthy response                                                                                                                                                                                                                                                                         | Both axes labelled with the variables (ignore any units given). | Both axes labelled with the variables (ignore any units given)<br><br>and an appropriate line has been drawn. |
| <b>Additional Guidance</b> | <i>Accept axes drawn either way round, ie it does not matter which axis the concentration is on.<br/>The line should be a curve approximately matching the pattern shown by the data in Case Study 1.<br/>No values need to be shown on either axis, and the line may intercept either axis.</i> |                                                                 |                                                                                                               |

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

| <b>SECTION 2</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                        |                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                           |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>1 mark</b>                                                                                                                                                          | <b>2 marks</b>                                                                                                                                                                                                                                                           | <b>3 marks</b>                                                                                                                                                                                                                                                            |
| <b>Q. No.<br/>2 (b)</b>    | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                                                                             | A simple correct statement is made about <b>at least two</b> of the Case Studies <b>1, 2 and 3</b> , as to whether or not they support the hypothesis.                 | Correct statements are made about Case Studies <b>1, 2 and 3</b> , supported by a more detailed explanation of <b>one</b> of them.                                                                                                                                       | Correct statements are made about Case Studies <b>1, 2 and 3</b> , supported by a more detailed explanation of <b>both</b> Case Studies <b>2 and 3</b> .                                                                                                                  |
| <b>Additional Guidance</b> | <p><i>An example of a clear statement for Case Study 1 is “The greater the concentration, the fewer colonies/bacteria grow”.</i></p> <p><i>Further explanation for Case Study 2 could include reference to the variation in results between the two tests.</i></p> <p><i>Further explanation for Case Study 3 will be that that results are based on type of disinfectant rather than concentration.</i></p>                                         |                                                                                                                                                                        |                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                           |
| <b>SECTION 2</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                        |                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                           |
|                            | <b>0 marks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>1 mark</b>                                                                                                                                                          | <b>2 marks</b>                                                                                                                                                                                                                                                           | <b>3 marks</b>                                                                                                                                                                                                                                                            |
| <b>Q. No.<br/>2 (c)</b>    | No creditworthy response                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>A comment is made as to whether the advice is supported or not.</p> <p>There is a simple statement that uses information from the graph to support the comment.</p> | <p>A comment is made as to whether the advice is supported or not.</p> <p>There is a statement that uses information from the graph to support the comment.</p> <p>A clear advantage of using “Ger-off” <b>or</b> a clear disadvantage of using “Ger-off” is stated.</p> | <p>A comment is made as to whether the advice is supported or not.</p> <p>There is a statement that uses information from the graph to support the comment.</p> <p>A clear advantage of using “Ger-off” <b>and</b> a clear disadvantage of using “Ger-off” is stated.</p> |
| <b>Additional Guidance</b> | <p><i>Examples of advantages include: “All Listeria will be killed (at 90% concentration)” or “All E. coli (probably) killed (at 90%)”</i></p> <p><i>Examples of disadvantages include: “Staphylococcus will not all be killed” or “Has not been tested on other bacteria” “Need to consider cost (effectiveness)”, “Need to compare effectiveness with currently used disinfectants” or “Use depends on nature of infection being treated”.</i></p> |                                                                                                                                                                        |                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                           |

**BU1.x Microorganisms (Specimen) ISA - Marking Guidelines**

| <b>SECTION 2</b>           |                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                   |                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <b>0 marks</b>                                                                                                                                                                   | <b>1 mark</b>                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>2 marks</b>                                                                                                                                                                                                    | <b>3 marks</b>                                                                                                                                                                                             |
| <b>Q. No.<br/>3</b>        | No creditworthy response                                                                                                                                                         | Results from the investigation or an idea from the research has been related to the context.                                                                                                                                                                                                                                                                                                                                        | Results from the investigation or an idea from the research has been related to the context.<br><br>There is a <b>simple</b> explanation of how the results or idea can be applied and used in the given context. | Results from the investigation or an idea from the research has been related to the context.<br><br>There is a <b>detailed</b> explanation of how the results or idea can be applied in the given context. |
| <b>Additional Guidance</b> | <i>The candidate should attempt to explain, e.g. how manufacturers of disinfectants (or homeowners) could work out the optimum concentration of disinfectant to use at home.</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                   |                                                                                                                                                                                                            |
| <b>Graph or chart</b>      |                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                   |                                                                                                                                                                                                            |
|                            | <b>Answer</b>                                                                                                                                                                    | <b>Additional Guidance</b>                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                   | <b>Mark</b>                                                                                                                                                                                                |
| <b>Q. No.<br/>4</b>        | X axis: suitable scales chosen and labelled with quantity and units.                                                                                                             | Scale should be such that the plots occupy at least one third of each axis.                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                   | <b>1</b>                                                                                                                                                                                                   |
|                            | Y axis: suitable scales chosen and labelled with quantity and units.                                                                                                             | Accept axes reversed.<br>It may not always be necessary to show the origin.                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                   | <b>1</b>                                                                                                                                                                                                   |
|                            | Points or bars plotted correctly to within $\pm 1$ mm.                                                                                                                           | Allow one plotting error out of each 5 points/bars plotted.                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                   | <b>1</b>                                                                                                                                                                                                   |
|                            | Suitable line drawn on graph or bars correctly labelled on bar chart.                                                                                                            | Allow error carried forward from incorrect points.<br>If wrong type of graph / chart, maximum <b>3</b> marks.<br>If the independent variable is: <ul style="list-style-type: none"> <li>• categoric, a bar chart should be drawn</li> <li>• continuous, a best fit line should be drawn.</li> </ul> <b>N.B.</b> If no line is possible because there is no correlation, candidates should state this on the graph to gain the mark. |                                                                                                                                                                                                                   | <b>1</b>                                                                                                                                                                                                   |