

# GCSE Science – Investigative Skills Assignment – Marking Guidelines

## Biology 1.3 – Microorganisms

For use until May 2009

**Last date for submission for moderation May 2010**

Please mark in red ink, and use one tick for one mark. 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.

**Please add annotations where necessary to explain why marks have or have not been awarded.**

Enter the marks for **Section 1** and **Section 2** and the **total mark** on the front cover of the answer booklet.

The teacher must sign and date the front cover of the ISA.

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

The marking guidelines show examples of typical responses that candidates may make. However, teachers should use their professional judgement in deciding whether or not to award marks. If, in the judgement of the teacher, the candidate has provided a response which correctly answers the question, then a mark should be awarded even if this response is not shown in the mark guidance. If necessary, the teacher should annotate the script and/or mark guidance to justify the decision.

In the mark guidance:

- the use of a solidus (/) indicates an alternative answer
- the use of brackets ( ) indicates wording that is not essential in the candidate's answer, but makes the guidance more clear.

### SECTION 1

	Answer	Additional Guidance	
1	Statement referring to <b>change</b> in the dependent variable eg to see if number of bacteria / colonies changes	Dependent variable must be identified  Just number of bacteria / colonies is <b>not</b> sufficient.	1 mark
	Independent variable correctly identified and linked to dependent variable eg ...when I changed the origin of the water		1 mark
2(a)	Response depends on the particular investigation carried out eg the origin of the water / time of exposure (if left exposed for different times)		1 mark
(b)	Categoric	Unless the investigation carried out involved a different type of variable	1 mark

	Answer	Additional Guidance	
3(a)	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>• volume of water</li> <li>• temperature of incubator</li> <li>• time of incubation</li> <li>• make up of the agar</li> </ul>	Do <b>not</b> accept single word answer eg just volume or water or temperature or time or agar  Allow other examples where the experiment carried out is different to the one suggested, eg length of time exposed	1 mark
(b)	Idea that variation could affect the dependent variable	Fair test should <b>not</b> be awarded a mark as it is in the question	1 mark
4	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>• repeat and calculate a new mean</li> <li>• check with someone else</li> <li>• use a different method</li> </ul>		1 mark
5	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>• chance</li> <li>• different spreading / fewer overlapping colonies</li> <li>• different extent of contamination</li> <li>• difficulty counting when there are many</li> </ul>		1 mark
6(a)	Check / look for changes		1 mark
(b)	Thermometer / thermostat	Accept data logger if linked to a temperature probe	1 mark
7	Amplified statement for <b>2</b> marks eg where the water comes from affects the number of bacteria / colonies for <b>1</b> mark <b>plus</b> the more exposed the place the water comes from the more bacteria / colonies for <b>2</b> marks <b>or</b> eg there is no relationship between where the water comes from and the number of colonies / bacteria for <b>1</b> mark <b>plus</b> as the results do not show a trend / are random for <b>2</b> marks	<b>NB</b> statement <b>must</b> relate to candidate's own results  Simple correct statement, stating whether or not there is a relationship between the two variables, for <b>1</b> mark only	2 marks

	Answer	Additional Guidance	
<b>8</b>	<b>Table:</b> Correct headings AND units all correct for all measured variables	Table with incomplete headings or units for the measured variables gains <b>1</b> mark eg all headings present = 1 eg all units present = 1	2 marks
	<b>Graph/chart:</b> X axis: suitable scales chosen and labelled with quantity and units	Accept axes reversed	1 mark
	Y axis: suitable scales chosen and labelled with quantity and units		1 mark
	Points or bars plotted correctly to within $\pm 1$ mm	Allow <b>one</b> plotting error out of every 5 points plotted.  Allow error carried forward from incorrect plots	1 mark
	Suitable line drawn on graph or bars correctly labelled on bar chart		1 mark
	If wrong type of graph / chart, maximum <b>3</b> marks  If the independent variable is: <i>continuous</i> should draw a <i>best fit line graph</i> <i>categoric</i> should draw a <i>bar chart</i> <i>discrete</i> may draw either a <i>best fit line graph</i> or a <i>bar chart</i> (but allow dot-to-dot joining of points in this case)		
<b>Max 18 marks</b>			

## SECTION 2

	Answer	Additional Guidance	
<b>9(a)</b>	37	Award <b>1</b> mark for 36/36.6/36.7/etc. (as a result of failure to round correctly)  Accept an answer in the space by the question, if one is not given in the table	2 marks
<b>(b)</b>	0 / zero / the test with no 'Ger-off'		1 mark
<b>(c)</b>	As a baseline / to allow comparison / to see if low concentrations of 'Ger-off' have any effect		1 mark
<b>(d)</b>	The company scientists making thumbprints on agar jelly		1 mark
<b>10</b>	Values close to the mean (at each concentration)		1 mark

	Answer	Additional Guidance	
11(a)	80% – 100%		1 mark
(b)	(Some) bacteria / colonies grew at 80% none did at 100%, (so the lowest concentration that kills all the bacteria must be between 80% and 100%)	Accept alternative expression of this principal	1 mark
12(a)(i)	<i>E. coli</i>	Accept non-standard format	1 mark
(ii)	All bacteria killed / no bacteria or colonies grew at 100% (concentration)		1 mark
	Some bacteria / colonies grew at 80%	Accept any value between 65% and 89%	1 mark
(b)	Any <b>one</b> from: <ul style="list-style-type: none"> <li>• (may have) more experience</li> <li>• check results</li> <li>• test more types of bacteria</li> </ul>		1 mark
13	Any <b>three</b> from: eg <ul style="list-style-type: none"> <li>• Advantages of 100% <ul style="list-style-type: none"> <li>– kills all <i>E. coli</i></li> <li>– kills all <i>Listeria</i></li> </ul> </li> <li>• Advantages of 80% <ul style="list-style-type: none"> <li>– kills all <i>Listeria</i></li> <li>– cheaper</li> </ul> </li> <li>• Disadvantages of 100% <ul style="list-style-type: none"> <li>– does not kill all <i>Staphylococcus</i></li> <li>– more expensive</li> </ul> </li> <li>• Disadvantages of 80% <ul style="list-style-type: none"> <li>– does not kill all <i>Staphylococcus</i></li> <li>– does not kill all <i>E. coli</i></li> </ul> </li> </ul> <p><b>Quality of written communication</b></p> <p>The mark is to be awarded for the response being set out in a logical order, comparing 80% with 100%, not just quoting information drawn from the graph, making clear which are advantage(s) and which are disadvantage(s) of 80% / 100%</p>	<p>It is not necessary for the candidate to arrive at a decision as to which concentration of ‘Ger-off’ should be used</p> <p>Accept answers derived from candidate’s knowledge about bacteria eg bacteria are likely to become resistant due to overuse</p> <p>Do <b>not</b> allow two answers which are the converse of each other for two marks eg 80% does not kill all <i>E. Coli</i> and 100% kills all <i>E. Coli</i> is only worth <b>1</b> mark</p> <p>Annotate below candidate’s answer with <i>Q✓</i> for mark given or <i>Q✗</i> for mark not given</p>	3 marks
			1 mark
			<b>Max 16 marks</b>
			<b>ISA Total 34 Marks</b>