

# GCSE Science – Investigative Skills Assignment – Marking Guidelines

## Biology 2.2 – Photosynthesis

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	Dependent variable must be identified	1 mark
	eg to see if photosynthesis / the number of bubbles changes	Just 'the number of bubbles' is <b>not</b> sufficient	
	Independent variable correctly identified and correctly linked to dependent		1 mark
	eg ...when I change the light intensity / distance between lamp and plant variable		
2(a)	Mark dependent upon particular investigation performed		1 mark
	eg light intensity / distance between lamp and plant		
(b)(i)	By inspection of the candidate's results table / graph		1 mark

	<b>Answer</b>	<b>Additional Guidance</b>	
(ii)	Sensible value chosen Suitable reason given eg because the pattern is not clear at this value / to check the shape of the curve at this value	Note <b>1</b> mark for <b>both</b> value and reason  Accept an extension of range if no clear reason for one within range	1 mark
<b>3</b>	One factor stated eg time / distance / number of bubbles / temperature	Answers should relate to variables in candidate's own investigation	1 mark
<b>4</b>	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>to allow stabilisation</li> <li>rate to become constant</li> <li>so rate of bubbling at new value of variable is not affected by previous one</li> </ul>	Accept alternative ideas based on particular investigation carried out	1 mark
<b>5</b>	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>carry out (more) repeats</li> <li>collect bubbles and measure volume of gas</li> <li>control temperature more carefully</li> </ul>	Accept alternative ideas based on particular investigation carried out	1 mark
<b>6(a)</b>	Check candidate's results table and/or graph to establish whether answer is reasonable	Look for at least a 10% variation from any trend / pattern	1 mark
<b>(b)</b>	Answer should relate to divergence from the pattern established by the results.	If the candidate identifies that no repeats are necessary this should be borne out by the results, if so, then the response should indicate that all the results fall on / near a smooth curve / line or expected values	1 mark
<b>7</b>	Amplified statement for <b>2</b> marks eg light intensity / distance between lamp and plant affects the rate of bubbling / photosynthesis for <b>1</b> mark <b>plus</b> the rate of photosynthesis / bubbling increases as the light intensity increases / distance decreases for <b>2</b> marks <b>or</b> eg there is no relationship between light intensity and the rate of the bubbling / photosynthesis for <b>1</b> mark <b>plus</b> 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

	<b>Answer</b>	<b>Additional Guidance</b>	
<b>8</b>	<p><b>Table:</b> Correct headings AND units all correct for all measured variables</p> <p><b>Graph/chart:</b> X axis: suitable scales chosen and labelled with quantity and units Y axis: suitable scales chosen and labelled with quantity and units Points or bars plotted correctly to within <math>\pm 1\text{mm}</math> Suitable line drawn on graph or bars correctly labelled on bar chart 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)</p>	<p>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</p> <p>Accept axes reversed</p> <p>Allow <b>one</b> plotting error out of every 5 points plotted. Allow error carried forward from incorrect plots</p>	<p>2 marks</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p>

**Max 18 marks**

## SECTION 2

	<b>Answer</b>	<b>Additional Guidance</b>	
<b>9</b>	Lettuces grow faster / ready to sell sooner at higher temperatures		1 mark
	As temperature rises effect decreases		1 mark
<b>10</b>	The time for the lettuces to be ready to sell		1 mark
<b>11</b>	Any <b>one</b> from: eg <ul style="list-style-type: none"> <li>random errors / variations more easily spotted</li> <li>some (lettuces) may die</li> </ul>		1 mark
<b>12(a)</b>	Lettuces grow faster / ready to sell sooner		1 mark
(b)	Greater cost at 26°C (not compensated for by improved growth)		1 mark
<b>13</b>	It is a control variable / to ensure different water availability does not affect growth or results	Do <b>not</b> accept vague statements such as to make it a fair test unless explained	1 mark

