

GCSE Science – Investigative Skills Assignment – Marking Guidelines

Chemistry 1.3 – Testing Concrete

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 clearer.

SECTION 1

	Answer	Additional Guidance	
1	Statement referring to change in the dependent variable eg to see if strength / breaking mass changes.	Dependent variable must be identified Just strength or breaking mass alone is not sufficient	1 mark
	Independent variable correctly identified and linked to dependent variable eg when I changed the % (by volume) / proportion of cement / sand used		1 mark
2(a)	Any correct controlled variable: eg <ul style="list-style-type: none">• dimensions / shape of beam• test gap / span• position of masses on beam• age of beam• same sand / cement	Accept same % or volume or mass of cement, sand or water Answer must be consistent with the method used by the candidate	1 mark

	Answer	Additional Guidance	
(b)	Affects the breaking force of the beam Explanation of how it affects the breaking mass eg a thicker beam may be harder to break /concrete gets stronger over time	Accept affects the mass needed to break the beam	1 mark 1 mark
3	Continuous ringed (or answer appropriate to the investigation carried out)		1 mark
4(a)	A random error is a (small) variation in repeated measurements	Accept readings different to true value Do not accept 'human error' Do not accept 'it is an anomalous error'	1 mark
(b)	Explanation of how a random error may arise: eg <ul style="list-style-type: none"> • blocks may not be completely identical • test gap may vary • position of masses on the block may vary • human error • faulty technique • faulty equipment 		1 mark
(c)	Different or improved technique or equipment (1 mark) justification (1 mark) or repeat measurements (1 mark) then calculate new mean (1 mark)	eg better mixing of cement or concrete mixture eg no areas of extra strength or weakness in block	2 marks

	Answer	Additional Guidance	
5	<p>Amplified statement for 2 marks</p> <p>eg the strength of the block increases for 1 mark</p> <p>plus</p> <p>as the % cement increases for 2 marks</p> <p>or</p> <p>eg the strength of the block does not depend on the % cement used for 1 mark</p> <p>plus</p> <p>as the results do not show a trend / are random for 2 marks</p>	<p>Simple correct statement for 1 mark only</p> <p>eg the strength of the block depends on the % cement used</p> <p>or</p> <p>eg the strength of the block does not depend on the % cement used / does not show a trend / is random</p> <p>NB the statement MUST relate to the candidate's own results</p>	2 marks
6	<p>Table:</p> <p>Correct headings AND units all correct for all measured variables</p> <p>Graph/chart:</p> <p>X axis: suitable scales chosen and labelled with quantity and units</p> <p>Y axis: suitable scales chosen and labelled with quantity and units</p> <p>Points or bars plotted correctly to within $\pm 1\text{mm}$</p> <p>Suitable line drawn on graph or bars correctly labelled on bar chart</p> <p>If wrong type of graph / chart, maximum 3 marks</p> <p>If the independent variable is: <i>continuous</i> <i>categoric</i> <i>discrete</i></p>	<p>Table with incomplete headings or units for the measured variables gains 1 mark</p> <p>eg all headings present = 1</p> <p>eg all units present = 1</p> <p>Accept axes reversed</p> <p>Allow one plotting error out of every 5 points plotted.</p> <p>Allow error carried forward from incorrect plots</p> <p>should draw a <i>best fit line graph</i></p> <p>should draw a <i>bar chart</i></p> <p>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>2 marks</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p>
			Max 18 marks

SECTION 2

	Answer	Additional Guidance	
7(a)	20 to 70	Accept: 70 to 20	1 mark
(b)	10		1 mark
8	2.7	1 mark for correct working Accept answer written in the table or elsewhere.	2 marks
9	50% cement Test 4 or 60% cement Test 1 Explanation eg mass added is bigger / smaller than the other 3 results		1 mark 1 mark
10	The higher the % of cement then the greater the breaking mass / mass added		1 mark
11	The (%) water	Accept method of mixing Accept temperature of water	1 mark
12	The measurement would have been less precise		1 mark
13	He could have used a data book or Internet search to find out the how the strength of concrete varied with the proportion of cement used.	Accept ask someone else to repeat the test	1 mark
14	Correct reason given eg No – an awareness that that the new sand may have different properties Yes – an awareness that the new sand should have the same properties	No mark for Yes or No . Mark is for the reason eg the sand may be from a different batch / location / the sand will have a variable composition eg the sand is from the same source / supplier / is the same type / specification	1 mark
15	The test beams need (about) double the mass to break them	Accept the test beams are twice as strong Accept the test beams need more mass to break them / are stronger for 1 mark	2 marks

	Answer	Additional Guidance	
16	<p>Any two from: eg</p> <ul style="list-style-type: none"> • wood is a renewable resource • cement is made from limestone that needs to be quarried • extracting limestone destroys the landscape • extracting limestone causes pollution • limestone is a non-renewable resource • making cement leads to the emission of polluting gases (carbon dioxide) • making cement needs a lot of energy <p>Quality of written communication</p> <p>Candidates should use at least two technical terms from:</p> <p>eg</p> <ul style="list-style-type: none"> • (non)renewable • sustainable • pollution • carbon dioxide • greenhouse gas • energy / heat • limestone • quarried • emission 	<p>Accept new trees can be planted to replace those cut down</p> <p>Accept wood is used for shuttering / moulds for the concrete</p> <p>Accept cutting down trees reduces CO₂ uptake from the atmosphere</p> <p>The mark is to be awarded for the correct use of the terms</p> <p>The marker should circle these terms</p> <p>Annotate below candidate's answer with <i>Q✓</i> for mark given or <i>Q×</i> for mark not given</p>	<p>2 marks</p> <p>1 mark</p>
			Max 16 marks

ISA Total 34 Marks