GCSE Science – Investigative Skills Assignment – Marking Guidelines
Chemistry 3.1 – Substances Dissolved in Water
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	Dependent variable must be identified,	1 mark
		eg to see if hardness of water changes	Just hardness of water alone is **not** sufficient	
		Independent variable correctly identified and linked to dependent variable		1 mark
		eg when the location of the water source is changed		
2 (a)		Control ringed		1 mark
	(b)	Any **one** from: eg • volume of water tested • amount of shaking • concentration of soap solution • type of soap used • temperature		1 mark

	Answer	Additional Guidance	
2(c)	Explanation of how the variable was kept constant	Answer must be from candidate's own investigation	1 mark
(d)	Explanation of how it affects the volume of soap solution needed	eg the greater the volume of test water the more soap solution it will need	1 mark
3(a)	Error correctly identified	**Not** just human error eg volume of water / permanent lather	1 mark
(b)	Error correctly explained	eg difficult to measure volume of test water exactly / hard to judge exactly when there is a permanent lather	1 mark
4	Recognition of spread / scatter / random errors eg anomalies / random errors are more obvious / can be recognised	Accept wide spread suggests a lack of reliability	1 mark
	Further explanation of spread / scatter / random errors and its affect on reliability eg calculating the mean when there are many repeats reduces the affect of random errors	Accept anomalous results can be left out when calculating the mean	1 mark
5	Amplified statement relating the dependent and independent variables for **2** marks eg the hardness of water varies / depends on the locality of the sample for **1** mark **plus** sample X gave the highest or lowest value / trend stated for **2** marks **or** eg the hardness of water does not vary / depend on the locality of the sample for 1st mark **plus** the results do not show a trend / are random for **2** marks	**NB** the statement **must** relate to the candidate's own results Simple correct statement for **1** mark only eg any **one** of these statements	2 marks

	Answer	**Additional Guidance**	
6	**Table:**		
	Correct headings AND units all correct for all measured variables	Table with incomplete headings or units for the measured variables gains **1** mark eg all headings present = 1 eg all units present = 1	2 marks
	Graph/chart:		
	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 ± 1mm	Allow **one** 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	Allow error carried forward from incorrect plots	1 mark
	If wrong type of graph / chart, maximum **3** marks		
	If the independent variable is: *continuous* *categoric* *discrete*	should draw a *best fit line graph* should draw a *bar chart* may draw either a *best fit line graph* or a *bar chart* (but allow dot-to-dot joining of points in this case)	
			Max 18 marks

SECTION 2

	Answer	**Additional Guidance**	
7	Water sample **E** Test 3		1 mark
	Volume of soap solution needed is much greater than other 2 results		1 mark
8(a)	Location of water sample is a categoric variable		1 mark
	Categoric variables are best displayed using bar charts	Accept no trend between categoric variables	1 mark
(b)	Labelled bar drawn with correct width and height	Accept ± $\frac{1}{2}$ small square	1 mark
9	Samples **D** and **F**	**Both** needed for the mark	1 mark

	Answer	Additional Guidance	
10	Idea of using a measuring instrument with a smaller scale division		1 mark
	Any **one** from:		1 mark
	eg	Accept description of instrument that includes smaller divisions	
	• use a pipette / burette to measure the volume of test water	Accept different methods that would give more precise results	
	• use a burette to measure the volume of soap solution		
	• add the soap solution in smaller increments		
11	Correct reason given	No mark for **Yes** or **No** mark is for the reason	1 mark
	There is not an even spread of samples across the area		
	Further detail		1 mark
	Any **one** from: eg		
	• there are no samples from Southcot		
	• there is only one sample from Westcot		
	• there is only one sample from Eastcot		
12	The water is less hard at Northcot than it is at Westcot / Eastcot	Accept letters instead of names	1 mark
		Accept the water is getting harder the further south the samples are taken	

	Answer	**Additional Guidance**	
13	Any **two** from: • the company should have taken a test sample • the company would be interested in selling its own products • the family should have used an independent company to test their water • the water should be tested / treated for all impurities	No mark for **Yes** or **No** marks are for the reasons Accept valid named impurities eg nitrates / heavy metals / bacteria / hydrocarbons	2 marks
	Quality of written communication Candidates should use at least **two** technical terms from: eg • sample • impurities • contamination • independent • correctly named impurities	The mark is to be awarded for the **correct** use of the terms The marker should circle these terms Annotate below candidate's answer with *Q✓ for mark given or Q× for mark not given*	1 mark
14	Distilled water contains no dissolved substances		1 mark
	Distilled water is a control	Distilled water should give a 1 cm^3 value with the soap solution for 1 mark	1 mark
		Max 16 marks	
		ISA Total 34 Marks	