

GCSE Science – Investigative Skills Assignment – Marking Guidelines

Chemistry 3.2 – Burning Fuels

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 heat / energy changes Independent variable correctly identified and linked to dependent variable eg when I changed the alcohol used	Just heat or energy alone is not sufficient	1 mark
2(a)	Correct control variable identified eg <ul style="list-style-type: none">• volume of water used in calorimeter• distance of flame from calorimeter• time of alcohol burning• mass of alcohol	Accept same type of protection from draughts	1 mark

	Answer	Additional Guidance	
(b)	Affects the temperature measurement		1 mark
	Explanation of how it affects the temperature measurement	eg any variation in the volume of water will affect the temperature change	1 mark
3	Any one from the following: eg <ul style="list-style-type: none"> use pipette / burette / syringe (to measure volume) Details of a more precise temperature / mass measurement method	Any description of a measuring instrument that has smaller scale divisions than those used	1 mark
4	Categoric ringed		1 mark
5	Any one from: eg <ul style="list-style-type: none"> variable height of flame effect of draughts heat loss from calorimeter distance of flame from calorimeter (bottom) 	Do not accept just human error	1 mark
6	Recognition of spread / scatter / random errors	Accept wide spread suggests a lack of reliability	1 mark
	eg anomalies / random errors are more obvious / can be recognised Further explanation of the spread / scatter / random errors and its effects on reliability eg calculating the mean when there are many repeats reduces the effect of random errors	Accept anomalous results can be left out when calculating the mean	1 mark
7	Amplified statement relating the dependant and independent variables eg the heat / energy given out (on burning) increases for 1 mark plus as number of carbon atoms / M_r of the alcohol used increases for 2 marks or eg the heat given out does not depend on the alcohol used for 1 mark plus as the results do not show a trend / are random for 2 marks	Simple correct statement for 1 mark only eg the heat given out depends on the alcohol used for 1 mark only or the heat / energy given out does not depend on the alcohol used / does not show a trend / is random for 1 mark only NB the statement must relate to the candidate's own results	2 marks

	Answer	Additional Guidance	
8	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 ± 1 mm	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		1 mark
	If wrong type of graph / chart, maximum 3 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)		
Max 18 marks			

SECTION 2

	Answer	Additional Guidance	
9	33.5 to 38.5	accept: 38.5 to 33.5	
10	22.7	1 mark for correct working Accept answer written in the table or elsewhere	2 marks
11	Bar chart		1 mark
12	Ethanol, Test 2 or pentanol, Test 3	Accept ethanol 25.7, pentanol 33.5	1 mark
	Energy change much less than other 2 results		1 mark
13	Any one from: eg <ul style="list-style-type: none"> • the thermometer is more sensitive • responds more to a temperature change • the mercury moves more for the same change in temperature 	Accept the thermometer is more precise	1 mark

	Answer	Additional Guidance	
14	The energy produced on burning increases as the number of carbon atoms increase		1 mark
15	Compare the results with values in a data book / Internet	Accept other information sources Accept use another company (to repeat tests)	1 mark
16	Car owners can compare the new fuel with petrol	eg by comparing cost, distance travelled per 10 litres, energy given out	1 mark
17	<p>Correct reasons given</p> <p>Any two from: eg</p> <p>Yes –</p> <ul style="list-style-type: none"> • car owners unlikely to understand kJ/g or kJ/l • car owners buy their fuel in litres • car owners are used to measuring their use of fuel in terms of distance travelled (rather than energy output) <p>No –</p> <ul style="list-style-type: none"> • people are used to kJ/g on food tables 	<p>No mark for Yes or No.</p> <p>Mark is for the reason</p>	2 marks

