GCSE Science – Investigative Skills Assignment – Marking Guidelines

Physics 1.1 – Thermal Insulation

For submission in May 2007 or May 2008

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

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.

SECTION 1

1	First (independent) variable correctly identified eg type of material used for insulation / thickness of insulation / initial temperature of water / number of layers of insulation / type or size or shape of container Second (dependent) variable correctly identified eg final temperature of water / time taken to reach a certain temperature / rate of cooling NB The link between the two must be evident to be awarded both marks	1 mark 1 mark
2(a)	Independent variable correctly identified (See first list in answers to Q1 for examples)	1 mark
(b)	No mark for writing down the number of values No mark for YES or NO Mark is for a suitable reason correctly linked to response eg Yes – because it enabled me to see a pattern **or** it gave a significant difference between the first and the last values **or** No – because there was very little difference between any of the values	 1 mark
3(a)	Correct instrument stated eg thermometer / ruler	1 mark
(b)	Results would have been more **precise** (Do **not** credit answers referring to accuracy)	1 mark
4(a)	Key control variable correct This will depend upon what independent variable was chosen and is likely to be one of the variables listed in part 1 of Q1	1 mark

(b)	Any idea of making it a fair test **or** sensible reason for control **explained** The answer needs to be an **explanation**, and **not** just a statement that the results would be affected. A bald statement such as 'to make it a fair test' would **not** be enough	1 mark
5	Amplified correct statement Simple correct statement for **1** mark only eg the longer I left the water, the colder it became for **1** mark **plus** the temperature fell quickly to start with but then more slowly for **2** marks **or** the more layers I put on, the hotter it kept the water for **1** mark **plus** but after 5 layers it didn't seem to make any difference for **2** marks	2 marks
6(a)	Suitable change stated eg carrying out more repeats / checking own results with others / using a different technique or equipment	1 mark
(b)	Reason given (correctly related to part (a)) eg could indicate anomalous results / reduce the effect of random errors / easier to identify systematic errors	1 mark
7	**Table:** Suitable table of results with all relevant data included Columns and rows correctly labelled with quantities and units	 1 mark 1 mark
	Graph/chart: X axis: suitable scales chosen and labelled with quantity and units (no mark if bars are not the same width) Y axis: suitable scales chosen and labelled with quantity and units Points or bars plotted correctly to within ± 1mm Allow **one** plotting error Suitable line drawn on graph or bars correctly labelled on bar chart (allow error carried forward from incorrect plots)	 1 mark 1 mark 1 mark 1 mark
		Max 18 marks

SECTION 2		
8	4.7 circled	1 mark
9	Optoglass	1 mark
10	No mark for Type of glass Mark is for a correct reason eg very little difference between figures for different cavity widths	 1 mark
11(a)	Bar chart	1 mark
(b)	Idea that different types of glass mean that it is a categoric variable (**not** a continuous variable)	1 mark
12	Idea that mean outside temperature varies in different parts of the country	1 mark
13	U-value would decrease	1 mark
14(a)	No mark for YES or NO Marks are for explanation Any **four** from: • very little difference in values • increased insulation levels out as width increases • a lot of variation in values • increased cost of installation would not be reflected in savings • two of the windows show an increase	 4 marks
	Quality of written communication The mark is to be awarded for the correct use of technical terms Candidates should use at least **two** of the following in the correct context: • insulation • U-value • conductivity • (rate of) heat loss The marker should circle these terms. Annotate below candidate's answer with *Q✓ for mark given or QX for mark not given*.	1 mark
(b)	Answer implying commercial bias	1 mark
15	Dependent variable = time taken for room to reach end temperature Control variable 2 Control variable 3 Control variables may be thickness of glass / size of room / area of window etc	1 mark 1 mark 1 mark
		Max 16 marks
		ISA Total 34 Marks