GCSE Science – Investigative Skills Assignment – Marking Guidelines

Physics 1.2 – Wind Turbines

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 number of blades / size of blades / pitch of blades / wind speed Second (dependent) variable correctly identified eg output voltage / reading on voltmeter NB The link between the two must be evident to be awarded both marks	1 mark 1 mark
2	Correct independent variable identified eg number of blades / pitch of blades / size of blades / wind speed	1 mark
3(a)	Correct range of independent variable stated, from smallest value to largest value	1 mark
(b)	No mark for YES or NO Mark is for an appropriate explanation eg YES – because it gave a large difference between the two extremes **or** NO – because there was very little difference in the output between any of the values	1 mark
4	No mark for YES or NO Mark is for an appropriate explanation eg YES – because that gave a more reliable result **or** because there was a wide variation in some of the readings **or** NO – because all the readings were very close together	1 mark
5	Any control variable named This is likely to be one of the other possible independent variables listed in part 1 of Q1 mark guidance	1 mark
6	Error correctly identified eg difficult to read the meter as it was fluctuating / difficult to maintain constant wind speed / interference from draughts and other experiments in the room (Do **not** allow human error)	1 mark

7	Amplified correct statement Simple correct statement for **1** mark only eg the wind speed affects the output for **1** mark **plus** the greater the wind speed the greater the output **or** **plus** the output rose quickly to start with, but then more slowly for **2** marks **or** the number of blades affects the output for **1** mark **plus** the more blades I used, the bigger the output **or** **plus** but after 5 blades it didn't seem to make any difference for **2** marks	2 marks
8(a)	Any **one** suitable change stated from: • carrying out more repeats **and** calculating a new mean • checking own results with others • using a different technique or equipment	1 mark
(b)	Any **one** reason given (correctly related to part (a)) from: • could identify anomalous results • reduce the effect of random errors • easier to identify systematic errors	1 mark
9	**Table:** Suitable table of results with all relevant data included Columns and rows correctly labelled with quantities and units **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 1 mark 1 mark
		Max 18 marks

SECTION 2

10(a)	36%	1 mark
(b)(i)	Because there is an anomalous result	1 mark
(ii)	Discard the anomalous result and averaged the other two, or repeated	1 mark

(c)(i)	4 blades	1 mark
	Because it has a very wide variation in results	1 mark
(ii)	Any **three** from: • variation in wind speed • difficulty in reading meter • blades tend to alter pitch • friction at motor/generator	3 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: • reliability • variation • uncertainty • validity • accuracy • precision The marker should circle these terms. Annotate below candidate's answer with *Q✓ for mark given or QX for mark not given*.	1 mark
(iii)	Repeated them	1 mark
11(a)	Because the data is not a continuous variable **or** number of blades is a categoric variable	1 mark
(b)	A bar chart	1 mark
(c)	Efficiency rises to start with as number of blades increases and then falls Any numerical value quoted eg peak is at 4 blades	1 mark 1 mark
(d)	No – because the data it is based on is not valid	1 mark
12	No – because it involves value judgements eg there are political, economic or environmental factors to consider	1 mark
		Max 16 marks

ISA Total 34 Marks