GCSE Science – Investigative Skills Assignment – Marking Guidelines
Physics 3.2 – Transformers
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 ratio of turns / number of turns on primary	Dependent variable must be identified	1 mark
	Independent variable correctly identified and linked to dependent variable eg voltage at output	**NB** The link between the two must be identified to be awarded **both** marks	1 mark
2(a)	Dependent variable correctly identified	eg voltage at output	1 mark
(b)	Suitable instrument stated	This will depend upon the answer to part (a), but may be eg (a.c) voltmeter / oscilloscope / data logger	1 mark
3	Correct reason given eg **Yes** – because eg it gave enough results to see a pattern **or** **No** – because eg I don't know what happened at the start /end	No mark for stating the number of turns No mark for **Yes** or **No.** **M**ark is for the reason Allow 'because the range was too small'	1 mark

		Answer	Additional Guidance	
4		Correct reason given eg **Yes** – because eg I got some anomalous results **or** **No** – because eg all results fitted into a pattern	No mark for **Yes** or **No.** **M**ark is for the reason	1 mark
5(a)		Check / watch for changes in		1 mark
(b)		Touch / thermometer / thermocouple		1 mark
(c)		Correct variable stated eg input p.d. / input current		1 mark
(d)		May have an effect on the dependent variable		1 mark
6		Amplified statement for **2** marks eg the turns ratio affects the output voltage for **1** mark **plus** the greater the turns ratio the greater the voltage for **2** marks **or** eg there is no effect on the output voltage for 1 mark **plus** eg because there is no pattern/ the results are random for 2 marks.	Simple correct statement for **1** mark only **NB** statement **must** relate to the candidate's own results	2 marks

7	**Table:**		
	Correct headings AND units all correct for all measured variables	eg all headings present = 1	2 marks
	Table with incomplete headings or units for the measured variables = **1** mark	eg all units present = 1	
	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		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**	
8(a)(i)	Any suitable control variable eg power input / temperature of coils / turns ratio		1 mark
(ii)	Idea of conservation of energy eg some energy always transformed into thermal energy	Allow would have given a greater power output than the power input	1 mark
(b)	No units (for frequency)		1mark
	Results not in order		1 mark
(c)	Could then spot any random errors in the results	Allow enables other people to check calculations	1 mark
(d)	Because they have (calculated) a mean		1 mark
(e)	Continuous		1 mark

8f)(i)	Suitable best-fit line drawn Candidates should avoid the anomalous point at 1250 Hz	Do **not** allow dot-to-dot Do **not** allow multiple lines Do **not** allow very thick times	1 mark
(ii)	Efficiency rises and then falls Peak at 600 Hz	Allow efficiency peaks at 600 Hz for **2** marks Allow 600 ± 50 Hz	1 mark 1 mark
(g)(i)	Scale on *x*-axis is non-linear		1 mark
(ii)	Because frequency is a continuous variable		1 mark
9	Any **three**: eg • repeat the experiment more times • use a different technique • get someone else to repeat the experiment • use different equipment • check results with those of others • check calibration of instruments **Quality of written communication** Candidates should use at least **two** technical terms: eg • accuracy • precision • calibration • error • sensitivity • validity	 The actual technique need not be specified The actual equipment need not be specified Allow idea of making a comparison The mark is to be awarded for the **correct** use of technical terms **NB** Ensure that candidates are not just copying part of the question	3 marks 1 mark
		Max 16 marks	

ISA Total 34 Marks