

# GCSE Science – Investigative Skills Assignment – Marking Guidelines

## Physics 3.1 – Generators

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 speed of rotation / number of magnets / number of turns on coil	Dependent variable must be identified,	1 mark
	Independent variable correctly identified and linked to dependent variable eg voltage at output	<b>NB</b> The link between the two must be identified to be awarded <b>both</b> marks	1 mark
2(a)	Independent variable correctly identified eg speed of rotation / number of magnets / number of turns on coil		1 mark
(b)	Correct number of different values stated Correct reason given eg <b>Yes</b> – because eg it gave enough results to see a pattern	No mark for <b>Yes</b> or <b>No</b> Mark is for the reason	1 mark
	<b>or</b> <b>No</b> – because eg I don't know what happened at the start / end		1 mark

	<b>Answer</b>	<b>Additional Guidance</b>	
3(a)	A variable that must be kept at the same value / not altered		1 mark
(b)	Suitable control variable chosen eg speed of rotation / number of magnets / number of turns on coil		1 mark
4(a)	Source of largest error correctly identified	This will depend on the nature of the investigation, but is likely to be the recording of the maximum induced p.d. because of its transient nature	1 mark
(b)	Sensible suggestion, related to the above eg use data logger or recording oscilloscope	Allow perform more repeats <b>and</b> calculate new mean  Do <b>not</b> allow repeat using different equipment unless this equipment is identified	1 mark
5	To see if chosen values will give sensible readings		1 mark
6	Amplified statement for <b>2</b> marks eg the strength of the magnets affects the output voltage for <b>1</b> mark <b>plus</b> the stronger the magnets the greater the voltage for <b>2</b> marks <b>or</b> eg the speed of rotation affects the output voltage for <b>1</b> mark <b>plus</b> the faster the speed the greater the voltage for <b>2</b> marks <b>or</b> eg there is no effect on the output voltage for 1 mark plus e.g. because there is no pattern/ the results are random for 2 marks.	Simple correct statement gains <b>1</b> mark only  <b>NB</b> statement <b>must</b> relate to the candidate's own results	2 marks

	Answer	Additional Guidance	
7	<p><b>Table:</b></p> <p>Correct headings AND units all correct for all measured variables</p> <p><b>Graph/chart:</b></p> <p>X axis: suitable scales chosen and labelled with quantity and units</p> <p>Y axis: suitable scales chosen and labelled with quantity and units</p> <p>Points or bars plotted correctly to within <math>\pm 1</math> mm</p> <p>Suitable line drawn on graph or bars correctly labelled on bar chart</p> <p>If wrong type of graph / chart, maximum <b>3</b> marks</p> <p>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)</p>	<p>Table with incomplete headings or units for the measured variables gains <b>1</b> mark eg all headings present = 1 eg all units present = 1</p> <p>Accept axes reversed</p> <p>Allow <b>one</b> plotting error out of every 5 points plotted. Allow error carried forward from incorrect plots</p>	<p>2 marks</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p>
			<b>Max 18 marks</b>

## SECTION 2

	Answer	Additional Guidance	
8(a)	Values at 10 and 25 km/h <b>both</b> circled		1 mark
(b)	<p>Any <b>two</b> from</p> <ul style="list-style-type: none"> <li>• idea of discarding anomalous results</li> <li>• idea of repeating to replace discarded values</li> <li>• idea of calculating new mean without the anomalous results</li> </ul>	Do not allow suggestion that results for 10 and 25 km/h have been interchanged	2 marks
(c)	Smooth curve of best-fit drawn in	Allow 2 straight lines	1 mark
(d)	As the wind speed increases, so does the mean output voltage		1 mark
	Up to 40 km/h		1 mark

	<b>Answer</b>	<b>Additional Guidance</b>	
<b>8 (e)</b>	5 (km/h)		1 mark
<b>(f)</b>	<p>Correct reasons given</p> <p>Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>generator should be producing 12 volts</li> <li>in order to charge battery</li> <li>at low wind speeds it is less than this</li> <li>actual values quoted, eg only reaches 12 volts at 40 km/h</li> <li>opinion not supported by scientific evidence</li> </ul> <p><b>Quality of written communication</b></p> <p>Candidates should use at least <b>two</b> technical terms: eg</p> <ul style="list-style-type: none"> <li>data</li> <li>evidence</li> <li>opinion</li> <li>range</li> </ul>	<p>No mark for <b>Yes</b> or <b>No</b>. Mark is for the reason</p> <p>The mark is to be awarded for the correct use of technical terms</p> <p>The marker should circle these terms Annotate below candidate answer with <i>Q✓</i> for mark given or <i>Q×</i> for mark not given</p> <p><b>NB</b> ensure that candidates are not just copying part of the question</p>	<p>2 marks</p> <p>1 mark</p>
<b>9(a)</b>	<p>Comparing the two sets of results would check their reliability</p> <p>The first company manufactured the generator, and so may be biased</p>	<p>If more than two responses have been ticked, each wrong answer cancels out one correct answer</p>	<p>1 mark</p> <p>1 mark</p>
<b>(b)(i)</b>	<p>Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>comparison of results</li> <li>will show if one method may be faulty</li> <li>helps to highlight any errors</li> <li>particularly systematic errors</li> <li>if one set of equipment is biased / poorly calibrated</li> </ul>		2 marks
<b>(ii)</b>	Add them together and divide by three		1 mark
<b>10</b>	Idea that this is one of those questions that science cannot answer / depends on other considerations, eg variable cost of mains electricity, weather conditions, type of usage	<p>No mark for <b>Yes</b> or <b>No</b>. Mark is for the reason</p>	1 mark

**Max 16 marks**

**ISA Total 34 Marks**