

# **Mark Scheme for January 2013**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.







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**Annotations**

Used in the detailed Mark Scheme:

<b>Annotation</b>	<b>Meaning</b>
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
<b>not/reject</b>	answers which are not worthy of credit
<b>ignore</b>	statements which are irrelevant – applies to neutral answers
<b>allow/accept</b>	answers that can be accepted
(words)	words which are not essential to gain credit
<u>words</u>	underlined words must be present in answer to score a mark
ecf	error carried forward
AW/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response

	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

### Subject-specific Marking Instructions

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:


*This would be worth  
1 mark.*


*This would be worth  
0 marks.*


*This would be worth  
1 mark.*

- c. The list principle:  
 If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

- d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes. If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

Edinburgh	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

- e. For answers marked by levels of response:
- i. **Read through the whole answer from start to finish**
  - ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
  - iii. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question			Answer	Marks	Guidance
1	(a)	(i)	D	1	
		(ii)	C	1	
	(b)		Y	1	
	(c)			2	one mark name to wave one mark wave to description
	(d)		<p>Visible light has no photons. <input type="checkbox"/></p> <p>Visible light cannot travel through empty space. <input type="checkbox"/></p> <p>Visible light is not absorbed much by glass. <input checked="" type="checkbox"/></p> <p>Visible light travels at very high speed. <input checked="" type="checkbox"/></p>	2	
<b>Total</b>				<b>7</b>	

Question		Answer	Marks	Guidance
2	(a)	an analogue signal can take all values/is continuously changing (1) a digital signal is a series of off and on/0 and 1's/two values (1)	2	these points may be shown on the diagrams however if diagrams and writing contradict then lose mark(s). the candidate must have indicated the type of signal on at least one diagram to gain marks from the diagrams. <b>allow</b> 1 mark for correct diagrams unlabelled <b>allow</b> 1 mark if labels reversed <b>ignore</b> references to quality of signal, noise, decoding etc.  <b>allow</b> on diagram of digital signal small indications of noise. <b>ignore</b> small errors in drawings eg backward sloping curves
	(b)	amplified (1)  quality (1)  digital (1)	3	
<b>Total</b>			<b>5</b>	

Question		Answer	Marks	Guidance
3	(a)	arc shaped waves <b>and</b> spreading out after narrow gap, to be wider than the gap (1)	1	<b>ignore</b> wavelength
	(b)	diffraction (1)	1	
<b>Total</b>			<b>2</b>	



Question		Answer	Marks	Guidance
4	(a)	<p>any three from:</p> <p>burnt fuel / (hot) gases go down / downwards;                      there is an equal and opposite (thrust) on the rocket;                      weight / gravitational force / gravity acts down;                      upwards force / thrust greater than weight / gravity / downwards force.</p>	3	<p>owtte                      idea of interaction pair force pushing rocket up</p> <p><b>allow</b> upthrust</p>
	(b)	800 000 (kJ) (1)	1	<b>allow</b> 800 000 000 J
<b>Total</b>			<b>4</b>	

Question		Answer	Marks	Guidance
5	(a)	<p>measure the mass (of the dummy) (1);                      measure the velocity of the dummy / car (before the crash) (1);                      multiply the mass by the velocity (1)</p>	3	<p><b>allow</b> weight and speed.</p> <p><b>accept</b> measurements and calculations based on (change in) momentum = force x time</p>
	(b) (i)	<p>increase (1)                      decrease (1)</p>	2	
	(ii)	<p>electric windows <input type="checkbox"/></p> <p>seat belts <input checked="" type="checkbox"/></p> <p>registration plates <input type="checkbox"/></p> <p>exhaust pipes <input type="checkbox"/></p>	1	
<b>Total</b>			<b>6</b>	

Question		Answer	Marks	Guidance															
6		<table border="1"> <thead> <tr> <th>what bob is doing</th> <th>part of the graph</th> <th></th> </tr> </thead> <tbody> <tr> <td>standing still</td> <td>C</td> <td>(1)</td> </tr> <tr> <td>walking at fastest speed</td> <td>D</td> <td>(1)</td> </tr> <tr> <td>negative velocity</td> <td>D</td> <td>(1)</td> </tr> <tr> <td>buying the newspaper</td> <td>C</td> <td>(1)</td> </tr> </tbody> </table>	what bob is doing	part of the graph		standing still	C	(1)	walking at fastest speed	D	(1)	negative velocity	D	(1)	buying the newspaper	C	(1)	4	
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<b>Total</b>			<b>4</b>																

Question		Answer	Marks	Guidance							
7	(a)	<p>The power of the kettle is the rate at which energy is transferred to the kettle. When electric charge flows through the kettle, energy is transferred to the kettle.</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	one mark for each box correctly ticked then lose one mark for each additional tick			
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	(b)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tbody> <tr> <td> <math>3000 \times 3 \div 60 = 150\text{kWh}</math>  <math>3 \times 3 \div 60 = 0.15 \text{ kWh}</math>  <math>3000 \times 3 \times 60 = 540\,000 \text{ J}</math>  <math>3000 \times 3 = 9000 \text{ J}</math>  <math>3 \times 3 = 9\text{J}</math> </td> <td> <table border="1"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table> </td> </tr> </tbody> </table>	$3000 \times 3 \div 60 = 150\text{kWh}$ $3 \times 3 \div 60 = 0.15 \text{ kWh}$ $3000 \times 3 \times 60 = 540\,000 \text{ J}$ $3000 \times 3 = 9000 \text{ J}$ $3 \times 3 = 9\text{J}$	<table border="1"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	one mark for each box correctly ticked then lose one mark for each additional tick
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<b>Total</b>			<b>4</b>								

Question		Answer	Marks	Guidance
8		light (1); resistance changes (1); link LDR change to more current/buzzer comes on (1); (resistance) goes down with more light (or vice versa) (1)	3	
<b>Total</b>			<b>3</b>	

Question			Answer	Marks	Guidance
9	(a)	(i)	3 A	1	
		(ii)	12 V (1)	1	
		(iii)	$V_2$	1	
		(iv)	<p style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input checked="" type="checkbox"/>  <input checked="" type="checkbox"/> </p> <p style="text-align: center;">           The voltage of the battery... (1)            The bigger the voltage across... (1)         </p>	2	
	(b)	(i)	Z	1	
		(ii)	1 $\Omega$ (1)	1	
<b>Total</b>				<b>7</b>	

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