

**Additional Science A**

General Certificate of Secondary Education

Unit **A152/01**: Modules B5, C5, P5 (Foundation Tier)

**Mark Scheme for June 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.

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## Annotations

Used in the detailed Mark Scheme:

Annotation	Meaning
/	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:

	correct response
	incorrect response
<span style="border: 1px solid red; padding: 2px;">BOD</span>	benefit of doubt
<span style="border: 1px solid red; padding: 2px;">NBOD</span>	no benefit of doubt
<span style="border: 1px solid red; padding: 2px;">ECF</span>	error carried forward
<span style="border: 1px solid red; padding: 2px;">0</span> , <span style="border: 1px solid red; padding: 2px;">L1</span> , <span style="border: 1px solid red; padding: 2px;">L2</span> , <span style="border: 1px solid red; padding: 2px;">L3</span>	indicate level awarded for a question marked by level of response
<span style="border: 1px solid red; padding: 2px;">^</span>	information omitted

	contradiction
	reject
	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

**ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

### Subject-specific Marking Instructions

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- 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:

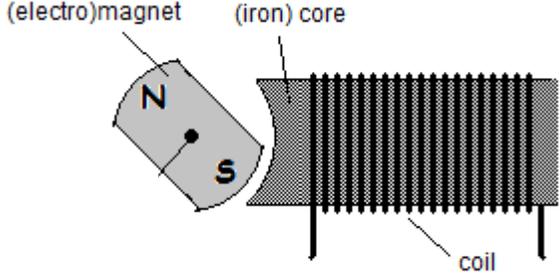
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question		Answer	Marks	Guidance
1	(a)	carbon monoxide, iron, carbon dioxide	1	words must be in correct order
	(b)	2	1	
	(c)	28	1	
	(d)	56 x 2 (1)  =112g (1)	2	Give 1 mark if final answer incorrect but 112 shown in the working  Correct answer with no working = 2 marks
	(e)	reduction	1	
	(f)	<b>any two from:</b> Al more reactive ; carbon (monoxide) is less reactive than aluminium ; carbon (monoxide) is more reactive than iron ; difficult to remove the oxygen( from aluminium oxide) ; no reaction takes place	2	
<b>Total</b>			<b>8</b>	

Question		Answer	Marks	Guidance
2	(a)	insoluble	1	
	(b) (i)	calcium zinc	1	Both correct for 1 mark
	(ii)	zinc	1	
<b>Total</b>			<b>3</b>	

Question	Answer	Marks	Guidance
3	<p><b>Level 3 (5–6 marks)</b> The candidate discusses both uses to the properties of graphite, and links at least one property to the structure / bonding. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> The candidate discusses one use in outline and links it to either a property or to the structure / bonding. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Identifies a correct property for a use or gives correct details about the structure of graphite without linking it to a use. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>Relevant points include:</b></p> <p><b>lubrication</b></p> <ul style="list-style-type: none"> <li>• identifies layers as significant</li> <li>• discusses separation between layers</li> <li>• (layers) slide (easily)</li> <li>• linked to lubricant</li> </ul> <p><b>electrolysis</b></p> <ul style="list-style-type: none"> <li>• discusses electrical conductivity (in context of electrodes)</li> <li>• links to movement of charge (electrons)</li> <li>• along layers.</li> <li>• high temperatures linked to high melting point</li> <li>• Because of strong/covalent bonds between carbon atoms</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>6</b>	

Question	Answer	Marks	Guidance
4	<p><b>any three from:</b></p> <p><i>(George)</i> graphs show there is a link/correlation/pattern ; description of correlation between graphs ; so trees damaged by (sulfur dioxide) fumes</p> <p><i>(Maria)</i> there could be another explanation ; perhaps not enough data ; not enough information (to prove cause) ; possible causes e.g.</p> <ul style="list-style-type: none"> <li>• trees grow better in summer (anyway) ;</li> <li>• temperature changes during year ;</li> <li>• wind changes during the year ;</li> <li>• rain changes during the year ;</li> <li>• trees less able resist insects / disease in winter</li> </ul>	3	<p><b>accept</b> all three points from just Maria</p> <p><b>not</b> just pollution</p> <p><b>accept</b> any plausible cause, up to maximum of [3]</p>
	<b>Total</b>	<b>3</b>	

Question	Answer	Marks	Guidance
5	<p><b>Level 3 (5–6 marks)</b> Describes how spinning the magnet changes the magnetic field in the coil to generate electricity in it. All labels provided are correct. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Describes the magnet as spinning/moving and links this to idea of producing electricity. There are likely to be some errors in the science. Other labels provided may be incorrect. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Uses keywords. Ideas about the operation of a generator may be confused. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to E:</b></p> <p><b>Indicative science points may include:</b></p> <p><b>operation:</b></p> <ul style="list-style-type: none"> <li>• magnet spins</li> <li>• changing magnetism/field of core/coil</li> <li>• (inducing) voltage across coil/current in coil</li> <li>• core makes this more effective</li> <li>• electricity / current comes out of coil.</li> </ul> <p><b>labels:</b></p> <div style="text-align: center;">  </div> <p><b>keywords are:</b></p> <p>magnet coil core induction</p> <p><b>ignore</b> charge</p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance					
6	(a)	<table border="1"> <tr> <td>P</td> <td rowspan="4"> </td> </tr> <tr> <td>Q</td> </tr> <tr> <td>R</td> </tr> <tr> <td>S</td> </tr> </table>	P		Q	R	S	2	All 3 lines correct (2) one or two lines correct for (1)
P									
Q									
R									
S									
	(b)	<p>resistance at 0.12 A (0.60 V) is 5.0 (ohms) (1)</p> <p>resistance at 0.45 A (0.90 V) is 2.0 (ohms) (1)</p> <p>so resistance decreases with increasing p.d./current (1)</p>	3	<p><b>accept</b> 5 anywhere</p> <p><b>accept</b> 2 anywhere</p> <p><b>ecf</b> from incorrectly calculated values</p> <p><b>accept</b> ohms / R for resistance</p> <p><b>accept</b> voltage for p.d.</p> <p><b>accept</b> correct substitution but incorrect answer twice for [1]</p>					
	(c) (i)	Bess	1						
	(ii)	Carlos	1						
<b>Total</b>			<b>7</b>						

Question		Answer	Marks	Guidance
7	(a)	0.24 W	1	
	(b)	<p>doubles</p> <p>doesn't change</p> <p>doubles</p>	2	<p>all three correct for (2)</p> <p>two or one correct for (1)</p>
<b>Total</b>			<b>3</b>	

Question		Answer	Marks	Guidance
8	(a)	name of appliance eg disc drive, DVD player, car ... (1)  what the motor does eg spins hard disk, spins CD, moves windscreen wipers ... (1)	2	Any correct appliance will gain marks  <b>accept</b> the motor spins / rotates / turns even if no appliance is named  If car alone (ie not electric car) is given do not accept 'make it move'
	(b)	<b>any two from:</b>  magnets surround the coil ; (magnets give a) magnetic field ; current passes through a coil ; there is a force on the coil (which makes it spin)	2	Do not give any credit if confused with a generator,
<b>Total</b>			<b>4</b>	

Question		Answer	Marks	Guidance
9	(a)	double A order	2	3 correct = 2 marks 1 or 2 correct = 1 mark
	(b)	(i) Some correct working shown $10000 \div 5000 = 2$ $5000 \div 10000 = 1/2$ $2.86 \div 2$ $2.86 \times 5000 \div 10000$ (1)  1.43 (1)	2	Any of these with the wrong answer = 1 mark  Correct answer with no working = 2 marks <b>accept</b> 1 as the correct answer
		(ii) test a much larger sample for the correlation (1)  test people without dystrophy for the protein (test negative correlation in healthy people) (1)	2	Allow test adults/test different ages as the first marking point
<b>Total</b>			<b>6</b>	

Question		Answer	Marks	Guidance										
10	(a)	<table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td>chromosomes separate</td><td>✓</td></tr> <tr><td>nucleus divides</td><td>✓</td></tr> <tr><td></td><td></td></tr> </table>					chromosomes separate	✓	nucleus divides	✓			2	
chromosomes separate	✓													
nucleus divides	✓													
	(b) (i)	0.08	1	<b>Allow</b> any correct fraction eg 16/200 <b>Allow</b> 16÷200										
	(ii)	No because the value is below 0.1	1	ecf from (b)(i)										
	(iii)	0.6	1	ecf from (b)(i) <b>ignore</b> units										
		<b>Total</b>	<b>5</b>											

Question	Answer	Marks	Guidance
11	<p><b>Level 3 (5–6 marks)</b> Describes a cutting method which would work. <b>Either</b> justifies use of cuttings <b>or</b> not use of seeds. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Describes a practical cutting method with a significant error or omission. <b>Either</b> justifies use of cuttings <b>or</b> not use of seeds. Could be <b>just</b> a description of a cutting method which would work. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> <b>Either</b> brief description of cutting method <b>or</b> justifies use of cuttings <b>or</b> justifies not use of seeds. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Relevant points may include:</b></p> <p><b>method</b></p> <ul style="list-style-type: none"> <li>• cut off (small) shoot / branch</li> <li>• dip in (hormone) powder</li> <li>• place in soil / compost</li> <li>• water regularly</li> <li>• until roots develop / leaves grow</li> </ul> <p><b>justification</b></p> <ul style="list-style-type: none"> <li>• (mature) plants are clones with inherited resistance</li> <li>• because they have same genes / DNA as parent tree</li> <li>• seeds formed by meiosis / sexual reproduction</li> <li>• not all seeds will have resistance</li> <li>• as they have genes from two trees</li> </ul> <p><b>ignore</b> argument based on the relative speed of each method  <b>ignore</b> discussions about meristems, unspecialised cells ...  <b>ignore</b> argument based on cost</p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	<b>Total</b>	<b>6</b>	

Question		Answer	Marks	Guidance
12		unspecialised specialised genes proteins genes	3	5 correct = 3 3 or 4 correct = 2 1 or 2 correct = 1
		<b>Total</b>	<b>3</b>	

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

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**OCR (Oxford Cambridge and RSA Examinations)**  
**Head office**  
**Telephone: 01223 552552**  
**Facsimile: 01223 552553**

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