OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A

General Certificate of Secondary Education

Unit **A216/02:** Modules B5, C5, P5 (Higher Tier)

Mark Scheme for June 2012

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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:

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
(1)	separates marking points
not/reject	answers which are not worthy of credit
ignore	statements which are irrelevant - applies to neutral answers
allow/accept	answers that can be accepted
(words)	words which are not essential to gain credit
words	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
BOD	benefit of doubt
CON	contradiction
	incorrect response
ECF	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
NBOD	no benefit of doubt
R	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 <u>and</u> 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	
Manchester	
Paris	
Southampton	

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

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

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.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>any two from:

(lead ore) <u>dust</u> as the ore is broken/when being dug out/ mined/in contact with miners/in contact with people down the mine (a/w); (1)

(lead) <u>fumes</u> from the fire; (1)

heat burns from the molten lead/fire; (1)

sulfur dioxide/acidic gas from the fire; (1)

if candidates score at least one marking point from above, then consider awarding the final marking point:

correct statement of who is affected for both risks (1)</td><td>3</td><td>allow a description of the reaction happening for ‘fire’
accept
soil/sides of shaft might collapse crushing the miners / rope may break and basket hit/trap miners

accept correct reference to surface workers/miners/ archaeologists/people (underground/at surface) /humans/miners</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><th>Substance</th><th>State symbol</th></tr><tr><td>Oxygen</td><td>g</td></tr><tr><td>Lead sulfide</td><td>s</td></tr><tr><td>Lead oxide</td><td>s</td></tr><tr><td>Sulfur dioide</td><td>g</td></tr></table></td><td>1</td><td>all three correct for (1)</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>carbon + lead oxide ➔ carbon dioxide + lead
OR
carbon + lead oxide ➔ carbon monoxide + lead</td><td>1</td><td>reactants can be in either order
products can be in either order
check the ‘ide’ endings are correct

accept = for ➔
must be + between reactants and between products

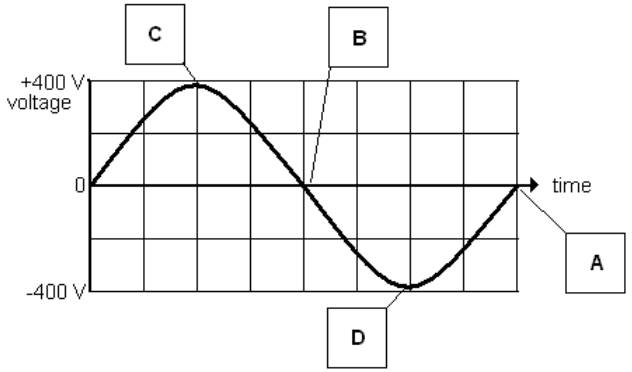
ignore symbol equation</td></tr>
</table>

Question			Answer	Marks	Guidance
		(iii)	<table><tr><td></td><td></td></tr><tr><td>It is not very reactive.</td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	1	
		(iv)	reduction	1	**accept** redox **ignore** deoxygenation
		(v)	<table><tr><td>2</td><td>PbS +</td><td>3</td><td>O_2 ➔</td><td>2</td><td>PbO +</td><td>2</td><td>SO_2</td></tr></table>	1	
	(c)		86.6%	1	**accept** anything between 86% and 87%
			Total	**9**	

Question			Answer	Marks	Guidance
2			inter molecular forces (1); weak(er) (1); less energy needed to break forces (between molecules) / forces (between molecules) broken down easily (1)	3	**accept** bonds/attractions *between* molecules/particles **ignore** covalent/ionic bonds only penalise first marking point if answer not **explicitly** about intermolecular forces **ignore** explanations that are **explicitly** about covalent or ionic bonds
			Total	**3**	

Question			Answer	Marks	Guidance
3			ions are already present before the solid dissolves OR ions only from once the solid has dissolved OR ions only from once a current is turned on ions of opposite charge come together in the liquid OR ions are spread through the liquid OR ions sink to the bottom of the liquid	2	**starting box** correct (1) **finishing box** correct (1) more than one line = 0 marks
			Total	**2**	

Question			Answer	Marks	Guidance
4	(a)		40(Ω)	1	
	(b)		*any three from:* current in resistor will be 0.07 A / the same; (1) because it has 2.8 V / same voltage / same battery across it; (1) ammeter current is sum of resistor currents / current = 0.07 × number of resistors / when you add a resistor current increases by 0.07; (1) multiple paths/branches for current / current is shared; (1) (so) reduces total resistance / total resistance smaller than resistance of individual resistor; (1)	3	**allow** charge / electron flow for current **allow** p.d./ potential difference for voltage **accept** current proportional to number of resistors **ignore** current *increases* with number of resistors **accept** less difficult for current to pass through
			Total	**4**	

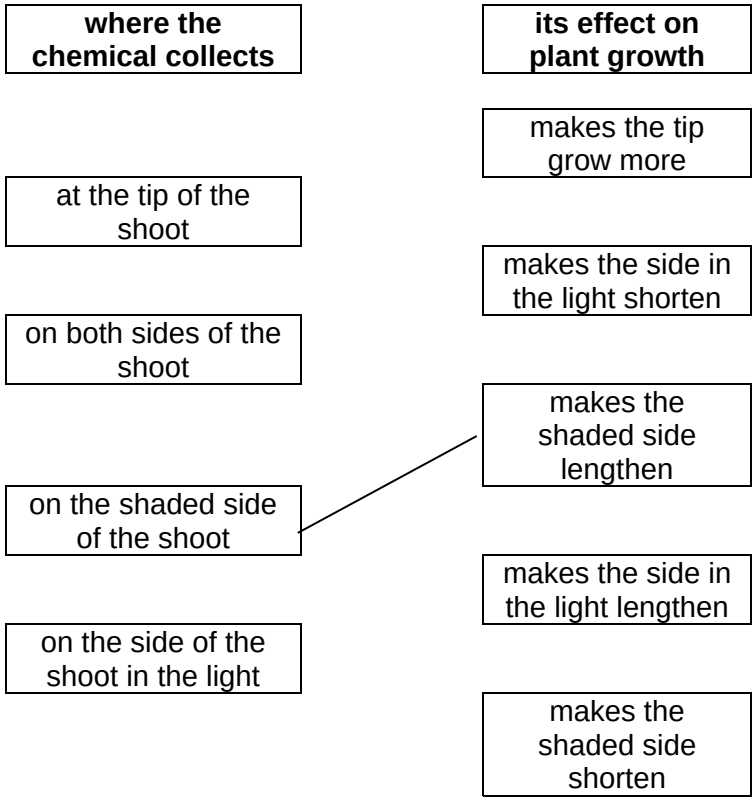
Question			Answer	Marks	Guidance
5	(a)		a.c. is much safer than d.c. ☐ d.c. can only come from batteries ☐ a.c. is easier to generate than d.c. ✓ a.c. can be at a much higher ... ☐ a.c. can be distributed more ... ✓	2	two ticks required **minus one** mark for each extra tick
	(b)	(i)	iron faster more	1	**all three** correct for [1]
		(ii)		1	**all three** correct for (1)
	(c)		2000 A	1	
			Total	**5**	

Question			Answer	Marks	Guidance
6	(a)	(i)	fan heater	1	
		(ii)	840 p	1	**accept** £8.40 **do not accept** 8.40
	(b)	(i)	iron / cobalt / nickel	1	**reject** steel / magnet
		(ii)	400	1	
		(iii)	10 J	1	
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>7</td><td>(a)</td><td></td><td>
<table>
<tr><td>DNA is cut up into lengths of protein.</td><td></td></tr>
<tr><td>A copy of the DNA is carried to where proteins are made.</td><td>✓</td></tr>
<tr><td>Parts of the protein are made next to the DNA then taken away to be put together.</td><td></td></tr>
<tr><td>DNA is changed into amino acids, which then move around the cell.</td><td></td></tr>
</table>
</td><td>1</td><td>more than one tick = 0</td></tr>
<tr><td></td><td>(b)</td><td></td><td>DNA strand
chromosomes
DNA strands</td><td>2</td><td>3 correct = 2 marks
2 correct = 1 mark
1 correct = 0 marks</td></tr>
<tr><td></td><td>(c)</td><td></td><td>
<table>
<tr><td>Each parent cell produces four new cells.</td><td></td></tr>
<tr><td>The new cells are genetically different from each other.</td><td></td></tr>
<tr><td>The new cells are genetically identical to the parent cell.</td><td>✓</td></tr>
<tr><td>The parent cell has more genes than the new cells.</td><td></td></tr>
</table>
</td><td>1</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
	(d)		*any three from:* idea of bases/ATGC in an order/code; (1) affect/code for/determine (order of) amino acids; (1) order of amino acids determines/makes up protein; (1) change (in order of) bases/extra base changes **order** of amino acids **OR** change (in order of) amino acids changes protein/protein function/protein shape; (1) idea of frame shift; (1)	3	 **accept** triplet code (1) **do not accept** the code is broken **ignore** changes the sequence **ignore** change in order of bases changes protein/protein function/protein shape **accept** idea that one change can have knock on effects on rest of code/amino acid sequence
			Total	**7**	

Question			Answer	Marks	Guidance
8	(a)		in every cell; many;	2	
	(b)		meiosis 37 mitosis	2	3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks
			Total	**4**	

Question			Answer	Marks	Guidance
9	(a)		Michael, Adam	1	**accept** in either order
	(b)		auxin, hormone	1	both required for the mark
	(c)			1	more than one line = 0 marks
			Total	**3**	

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