OCR
RECOGNISING ACHIEVEMENT

GCSE

Additional Science A

General Certificate of Secondary Education

Unit **A215/02**: Modules B4, C4, P4

Mark Scheme for January 2011

Oxford Cambridge and RSA Examinations

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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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Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.

2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.

3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).

4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	=	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
<u>words</u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW/owtte	=	alternative wording
ORA	=	or reverse argument

e.g. mark scheme shows 'work done in <u>lifting</u> / (change in) <u>gravitational</u> potential energy' (1)
"work done" = 0 marks
"work done lifting" = 1 mark
"change in potential energy" = 0 marks
"gravitational potential energy" = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.

6. 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.

The example below illustrates how to apply this principle to an objective question.

e.g. for a one mark question, where ticks in boxes 3 and 4 are required for the mark

Put ticks (✓) in the two correct boxes.

✓	
✓	

This would be worth zero marks.

Put ticks (✓) in the two correct boxes.

✓	
✓	

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

✓	
✓	
✓	
✓	

This would be worth one mark.

7. 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.

8. Marking method for tick boxes:

   Always check the additional guidance.
   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. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.
   Credit should be given for each box correctly ticked. 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 a city in England, then in the boxes

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**

Question			Expected Answers	Marks	Additional Guidance
1	a		**any two from:** other chemical/starch/ substrate is the wrong shape / has to be right shape; to fit together; mention of active site; mention of lock and key model;	[2]	**accept** 'enzyme needs to be right shape'
	b	i	C (1)	[1]	if left blank check for indication on the diagram
		ii	The frequency of collisions increases. ✓ (1) ☐ ☐ ☐ ☐	[1]	
	c		… alters the shape … — … of the oxygen … — … speeds up … … alters the speed … — … the active site … — … slightly slows … … alters the mass … — … hydrogen peroxide … — … stops the reaction.	[2]	1 mark for each correct line
			Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
2	a		**any three from:** increase in plasma concentration; detected in hypothalamus (brain); **increased** production of ADH / more ADH released from pituitary; lower volume/(more) concentrated urine produced/less water in the urine; greater reabsorption of water by kidneys;	[3]	
	b		respiring (1)	[1]	
	c		hypothalamus (1)	[1]	
			Total	[5]	

3	a		4 **or** $\frac{2\times100}{50}$ (1)	[1]	
	b		<table><tr><th>right answer</th><th>wrong answer</th></tr><tr><td>Jenny Ann</td><td>Sylvia Margaret</td></tr></table>	[2]	four correct = 2 marks three correct = 1 mark one or two correct = 0 marks **allow** either order in each column
			Total	[3]	

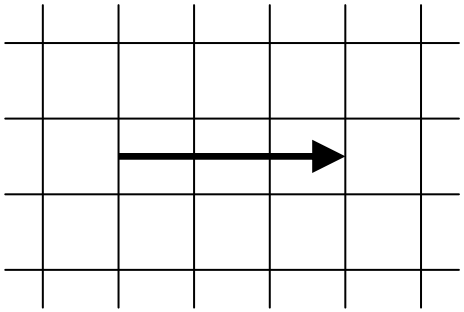
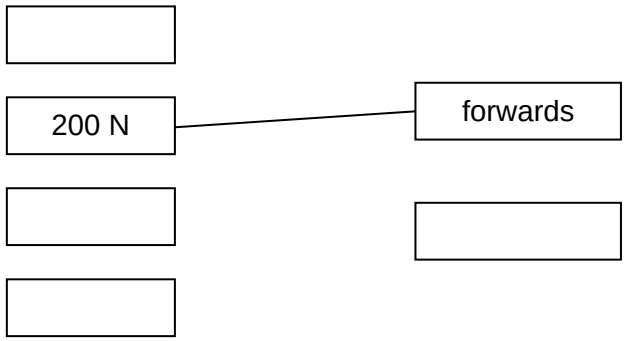
Question			Expected Answers	Marks	Additional Guidance
4	a		differences in reactivity ☐ differences in reactivity ☑ (1) differences in reactivity ☐ differences in reactivity ☐ differences in reactivity ☐	[1]	
	b		$2NaOH + H_2$	[2]	both formulae correct = 1 mark allow NaHO for NaOH do not allow NAOH '2' in front of the NaOH, nothing in front of the H_2 = 1 mark
	c		francium (1)	[1]	**accept** Fr as symbol for francium **accept** 'the bottom one'
	d		use a spectrometer / look at the spectrum (1) look at the position of the lines (1)	[2]	**accept** 'do a flame test (1) and compare with the known colours(1)' **ignore** references to just 'heat the compound'
			Total	[6]	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	11 (1)	[1]	
		ii	It loses an electron. ✓ (1) ☐ ☐ ☐	[1]	
	b		☐ 20 ✓ (1) ☐ ☐	[1]	
			Total	[3]	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>6</td><td>a</td><td></td><td>
<table>
<tr><th>element</th><th>colour</th><th>state</th></tr>
<tr><td>chlorine</td><td>green</td><td>gas</td></tr>
<tr><td>bromine</td><td>red / brown</td><td>liquid</td></tr>
<tr><td>iodine</td><td>dark grey</td><td>solid</td></tr>
</table>
</td><td>[2]</td><td>all colours correct = 1 mark
accept bromine colour as red, brown or red/brown

all states correct = 1 mark
accept g for gas
accept l for liquid</td></tr>
<tr><td></td><td>b</td><td></td><td>level of response
[3 marks]
can relate the different electron arrangements to ion formation - sodium loses (an electron) <u>and</u> chlorine gains (an electron), together with
[2 marks]
can state the electron arrangements - Group 1 have 1 outer electron and Group 7 have 7 outer electrons/one missing outer electron, together with
[1 mark]
realises that it is due to different (electron arrangements in) <u>outer</u> shells</td><td>[3]</td><td>saying only ‘sodium loses an electron and chlorine gains an electron’ with no further response scores 1 mark

a candidate who does not specify that the electrons are in the <u>outer</u> shell can still get the other two marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>[5]</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
7	a			[1]	look for an arrow to the right of length 3 squares anywhere on the grid **accept** arrow to the left **accept** an arrow of the correct length which does not start on a grid line line with no arrow head does not score the mark
	b			[1]	
	c		The vertical momentum … ✓ (1)	[1]	
	d		900 (1)	[1]	
			Total	[4]	

Question			Expected Answers	Marks	Additional Guidance
8	a		starts with steady speed of 12.5 m/s for 10 mins speeds up to 20 m/s over 15 mins stays at 20 m/s for 15 mins slows down quickly to 0 m/s for less than 1 min	[3]	complete description with at least six data items = 3 marks complete description with at least four data items = 2 marks qualitative description only of whole graph = 1 mark if candidate mis-reads time as being in seconds, penalise once only a data item is a correct value for speed, time or duration **reject** descriptions of distance – time graphs **accept** values rounded up or down to the nearest integer **accept** remains at 0 m/s for 4 minutes
	b		15 m/s (1)	[1]	
	c		A (1)	[1]	
			Total	[5]	

9	a		(exactly) 60 (N) backwards; (1)	[1]	
	b		2 s (1)	[1]	
	c	i	The work done by Marco … → … increases the kinetic energy of the water.	[1]	

Question			Expected Answers	Marks	Additional Guidance
9	c	ii	The friction of the boat … → … dissipates energy through heating.	[1]	
	d		$\sqrt{\frac{2\times 75}{150}}$ (1)	[1]	
			Total	[5]	

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