RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A211/02:** Unit 1: Modules B1, C1, P1 (Higher Tier)

Mark Scheme for January 2012

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2012

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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

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 boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	☒
☐	☐	☒
☒	✓	✓
☒	☒	✓
☐	☐	☐
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 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	

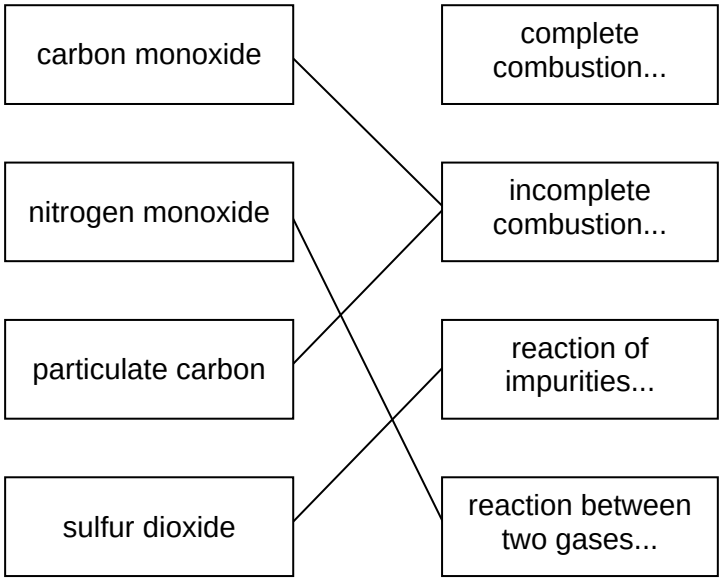
the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

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

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>a short section of DNA ☐
an instruction for making DNA ☐
a short section of protein ☐
an instruction for making a protein ✓</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>testing an embryo (produced by IVF) for faulty allele/to see if it's healthy</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>no need for an abortion / unethical to abort/test a fetus (1); testing fetus carries a risk of harm to fetus/accidental abortion (1)</td><td>2</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><td></td><td>H</td><td>h</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr><tr><td>h</td><td>Hh</td><td>hh</td></tr></table> OR <table><tr><td></td><td>h</td><td>H</td></tr><tr><td>h</td><td>hh</td><td>Hh</td></tr><tr><td>h</td><td>hh</td><td>Hh</td></tr></table></td><td>1</td><td>As soon as you find one mistake, it's 0 marks and move on to the next question.
First, check the left-hand and top boxes for the h, h, H and H are as shown.
Next, check the other four boxes for the correct two-letter combinations. If candidate writes hH instead of Hh in either or both of the two places, that is equally correct. Note that Hh (or hH) is in each of the two cells under the H in the top row.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>50:50</td><td>1</td><td>accept 1:1, 50%, 2/4, ½, 1 in 2 or any expression which indicates they have an even chance of getting the disease.</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>circle round 7440</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td><table><tr><th>reason</th><th>tec</th><th>val</th></tr><tr><td>some people with HD</td><td>✓</td><td></td></tr><tr><td>the allele responsible</td><td>✓</td><td></td></tr><tr><td>insurance companies</td><td></td><td>✓</td></tr></table></td><td>1</td><td>all correct = 1 mark</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
2			**any three from:** inherits (23) chromosomes from each parent (1); sex cells only contain one copy of each chromosome pair (1); he will have different alleles from each parent (1); Adam's combination of alleles gives him his characteristics/makes him unique(1); dominant alleles (can) make a characteristic more like one parent (1); X from mother and Y from father (so male) (1);	3	may give example of this
			Total	**3**	

3	(a)		…can only develop unspecialised CCH [ ] …can only divide to from… [ ] …can develop into any… [✓] …an unfertilised egg cell [ ]	1	
	(b)	(i)	Jon (1)	1	
		(ii)	Philip (1)	1	
			Total	**3**	

Question			Answer	Mark	Guidance
4	(a)		78% nitrogen and 21% oxygen (1); 1% argon (1)	2	**Allow** chemical symbols N, O, Ar. Ignore any spelling errors as long as the meaning is clear. **Accept** 'argon and other gases', 'argon and noble gases' for 1%
	(b)	(i)		3	all 4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks **ignore** any **left-hand** (pollutant) box with more than two lines coming from it. (number of marks = number of correct lines – 1)
	(b)	(ii)	any 3 from: oxidised / reacts with oxygen in air to make NO_2 (1); $\underline{NO_2}$ (dissolves in rainwater) to make acid rain (1); (NO_2) causes breathing problems /irritates lungs (1); acid rain is harmful to animal /plant life /causes damage to buildings (1);	3	any three mark for formation of acid rain cannot be given unless the gas responsible is either NO_2 or else the product of the reaction described in the first marking point.
			Total	**8**	

Question			Answer	Mark	Guidance
5	(a)	(i)	(10+12+15+8+10)÷5 (1); =11 (1)	2	attempt to calculate a mean (adding up some values and dividing by how many values were used, even if the values are not correct) = 1 mark correct answer with or without working = 2 marks
		(ii)	(No) mean of the morning values lies within range of the evening values (1); mean of the evening values lies within range of the morning values (1) OR lowest morning value within range of evening values (1); highest morning value within range of evening values (1)	2	no marks for 'yes' or 'no': mark on reasoning. 'No, because the values overlap' = 1 mark only 'No, because the morning values are all within the range of evening values' = 2 marks. **Allow** also (both) ranges are wide (1); compared with the differences in means (1)
	(b)		how many hours the sun was shining for [ ] the colour of particulates in an ash cloud [ ] direction of the wind [✓] the location of the volcano and airport [✓] the size of the particulates [✓] the speed of the ash cloud [✓]	2	4 correct boxes and no incorrect boxes = 2 3 correct boxes and at most 1 incorrect box = 1 2 correct boxes ticked and at most 1 incorrect box = 1
			Total	**6**	

Question			Answer	Mark	Guidance
6	(a)		Anna ☐ Brian ✓ Chandra ✓ Daniel ☐	1	**both** needed for the mark
	(b)		Anna ☐ Brian ☐ Chandra ☐ Daniel ✓	1	
	(c)		Anna ✓ Brian ☐ Chandra ☐ Daniel ☐	1	
			Total:	**3**	

7	(a)		EBCAD	1	
	(b)		14 000 (1); 5000 (1); 4000 (1)	3	
			Total:	**4**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>8</td><td></td><td></td><td>
<table>
<tr><th>example</th><th>factor</th></tr>
<tr><td>erosion</td><td>mountains/cliffs have been worn down</td></tr>
<tr><td>(sedimentary) rocks</td><td>layers (laid down at different times)</td></tr>
<tr><td>magnetic stripes on seafloor</td><td>spread of seafloor/changes in Earth’s magnetic field</td></tr>
<tr><td>similar rock layers in different continents</td><td>were once joined</td></tr>
<tr><td>fossils</td><td>can date rocks/shows extinctions / climatic change / evolution</td></tr>
<tr><td>folding</td><td>Earth movements</td></tr>
<tr><td>radioactive dating</td><td>age of rocks</td></tr>
<tr><td>craters</td><td>asteroid impacts</td></tr>
</table>
-
</td><td>2</td><td>one mark for each example and the factor which could be used to show change

if several examples given, mark the best two.

give credit for any reasonable factor not given in the table

an example can be used twice if the factor discussed is distinct, e.g. fossils to show both the age of rocks (by the species present) and continental drift (same fossils in different continents)</td></tr>
<tr><td></td><td></td><td></td><td>Total:</td><td>2</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
9			**likely existence of life:** (very) many galaxies in Universe (1); each contains (very) many stars /many stars have planets (1); possibility of life arising has many chances (1); suitable conditions (temperature, energy source, water) have been found elsewhere (1) **not yet discovered:** planets/stars are very far apart (1); (radio) signals takes a long time to reach us/ too far to go to by rocket (1); we've not been 'listening' for long enough yet (1); other life may not be sending signals (1); (radio) signals from distant stars may be too weak to detect (1)	3	no more than 2 marks in either category
			Total:	**3**	

10			A telescope in space can … ✓ Light left these distant stars long ago Small parallax movements … The Earth's atmosphere varies … ✓ The stars are very far away …	2	
			Total:	**2**	

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

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

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

© OCR 2012