OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A141/01:** Unit 1: Modules B1, C1, P1 (Foundation 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	alternative wording
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
NBOD	no benefit of doubt

R	reject
✓	correct response
L1 , L2 , L3	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**

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

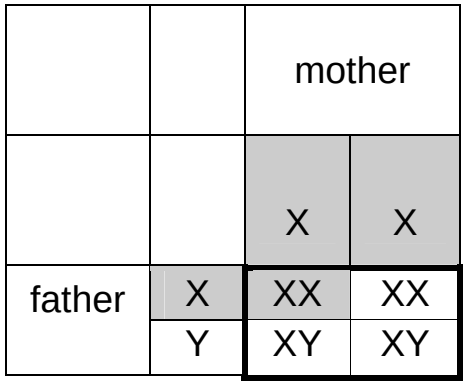
iii. **To determine the mark within the level**, consider the following:

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	Mark	Guidance
1	(a)		protein(s) (1)	1	**allow** enzyme(s) / polypeptide(s) / collagen / amylase / protease / lipase / haemoglobin / other named protein **do not allow** DNA / chromosomes / alleles / cell **do not allow** how you look/characteristics
	(b)	(i)	 (2)	2	first mark is for correct father genotype (XY) second mark is for the completed Punnett square, consistent with father genotype given: e.g. if father genotype is XX, allow ecf in Punnett square (all offspring XX) = 1 mark **allow** YX in place of XY **allow** x and y in place of X and Y
		(ii)	0.5 (1)	1	
	(c)	(i)	358 (1)	1	
		(ii)	1 : 1 (1)	1	**allow** 50:50 **do not allow** 350:350 or any other ratio
		(iii)	C (1) big difference between number of boys and girls / lots more girls than boys / you would expect the same number of each / results furthest away from 1:1 ratio (1)	2	must gain first mark to gain second mark **allow** D only if supported by the explanation that there are exactly the same number of boys and girls
			Total	**8**	

Question			Answer	Mark	Guidance
2			**(Level 3)** Gives a feature **AND** an example of a living organism for one type of reproduction **AND** gives a feature **OR** an example of a living organism for the other type of reproduction. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Gives a feature or an example of a living organism for **BOTH** sexual and asexual reproduction. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Gives a feature or an example of a living organism for **EITHER** sexual **OR** asexual reproduction. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **(Level 0)** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to E** **Indicative scientific points related to sexual reproduction include:** features: • two parents • sex cells fuse / fertilisation • variation in offspring (due to mixture of genes from parents) Note: look for more than just the idea that organisms 'have sex' in sexual reproduction examples: • humans / most animals / flowering plants **Indicative scientific points related to asexual reproduction include:** features: • one parent • one cell divides into two • produces offspring with identical genes • clones • ref to runners / bulbs examples: • bacteria / plants / some animals **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**6**	

Question			Answer	Mark	Guidance
3	(a)	(i)	Den (1)	1	
		(ii)	Bek (1)	1	
		(iii)	Eve (1)	1	
	(b)		*for:* find out if the baby has the disease (1) find out if the baby is a carrier (1) enables parents to plan (1) may decide to terminate the pregnancy (1) *against:* risk of miscarriage / damage to fetus / damage to mother (1) results may not be reliable / idea of false positives or false negatives (1) it's better not to know (1) interfering with the course of nature/playing God (1)	3	max 2 for each argument may have two points in a single sentence, e.g. 'be prepared if the baby has the disease' = 2 marks 'so they can terminate if it has the disease' = 2 marks e.g. "it's better to know" this could imply '' you should have the baby whether or not it has c.f." or " it would be too stressful to find out that the baby has it"
			Total	**6**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td>(i)</td><td>  (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>where the sulfur atoms come from:
(fossil) fuel / named fossil fuel (1)

how sulfur atoms turn into sulfur dioxide:
react/combine with oxygen (atoms) / oxidation (1)</td><td>2</td><td>do not allow burning (fossil) fuel

do not allow mix</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><th>true</th><th>false</th></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td></td></tr><tr><td></td><td>✓</td></tr></table>(3)</td><td>3</td><td>all five correct = 3 marks
four correct = 2 marks
three correct = 1 mark
two or one correct = 0 marks</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>decreases / goes down (1)
reference to fluctuation / levelling off / increase in 2000 (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td><table><tr><td>The mean electricity generated…</td><td></td></tr><tr><td>The total electricity generated in the UK for each year…</td><td>✓</td></tr><tr><td>The range of the electricity…</td><td></td></tr><tr><td>The total electricity generated from 1990 to 2007…</td><td></td></tr></table>(1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(iv)</td><td><table><tr><td>The amount of traffic…</td><td></td></tr><tr><td>Electricity generated from renewable resources…</td><td>✓</td></tr><tr><td>Some hydroelectric power stations…</td><td></td></tr><tr><td>Electricity generated by power stations…</td><td></td></tr><tr><td>More sulfur is taken out of fossil fuels…</td><td>✓</td></tr></table>(1)
(1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>11</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
5	(a)	(i)	carbon ; hydrogen ; water ✓ (1)	1	
		(ii)	*any two from:* carbon monoxide released (1) soot / (carbon) particulates / carbon (particles) produced (1) incomplete combustion (1) carbon dioxide/water (still) made (1)	2	

Question			Answer	Mark	Guidance
5	(b)		**(Level 3)** Applies data in the table **either** to explain damage caused by pollutants **or** to describe chemical changes in the converter, and answer is full and accurate. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Applies data in the table **either** to explain damage caused by pollutants **or** to describe chemical changes in the converter, but answer is incomplete or inaccurate. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Comments on data in table. May refer to damage/harm, but in an unqualified manner. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **(Level 0)** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** This answer can be tackled either by discussion of the damage caused by the pollutants or by discussion of the chemical changes in the catalytic converter. **Indicative scientific points related to damage caused by the pollutants may include:** • CO is poisonous • CO reduces the oxygen-carrying capacity of the blood • NO causes breathing problems • NO reacts with more oxygen to make NO_2 which dissolves in water in the air to give acid rain. Acid rain damages buildings/plants/fish • CO_2 is a greenhouse gas • CO_2 is less harmful than CO/NO **Indicative scientific points related to chemical changes in the catalytic converter may include:** • CO can be oxidised • this changes it to CO_2 • NO can be reduced • this converts it to $N_{(2)}$ • CO is oxidised by the oxygen removed from the NO / CO reacts with NO **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**9**	

Question			Answer	Mark	Guidance
6	(a)		line/arrow near the bottom (1)	1	line must end in area **below** red line **allow** a line that does not link to the 'oldest fossil' label
	(b)		*the layers are no longer straight:* rocks are folded / twisted / bent / compressed (1) *they are no longer buried deep underground:* erosion / weathering / earthquakes (1)	2	one mark is for the idea of rocks being distorted by force and one mark for the idea of exposure **allow** descriptions of weathering or erosion, e.g. rocks washed away
	(c)		reference to religious reasons / do not believe the evidence (1)	1	**do not allow** there is not enough evidence
			Total	**4**	

Question			Answer	Mark	Guidance
7	(a)		10 (2)	2	if incorrect, look for evidence of method for one mark, i.e. distance = speed x time or 5x2 **do not allow** method mark if there are further stages shown, e.g. 5x2 = 10 and then 10/0.5
	(b)	(i)	6 (2)	2	if incorrect, look for evidence of method for one mark, i.e. speed = frequency x wavelength or 3x2
		(ii)	*if answer to **(b)(i)** is greater than 5:* speed gets higher when the rope is tighter *if answer to **(b)(i)** is less than 5:* speed gets lower when the rope is tighter *if answer to **(b)(i)** is 5:* speed not affected by tightness (1)	1	look for an answer that follows on from **(b)(i)**
			Total	**5**	

Question			Answer	Mark	Guidance
8	(a)		<table><tr><td>Dr Adams</td><td></td></tr><tr><td>Dr Baker</td><td>✓</td></tr><tr><td>Dr Curtis</td><td></td></tr><tr><td>Dr Das</td><td>✓</td></tr><tr><td>Professor Eddington</td><td>✓</td></tr></table> (2)	2	two marks for all three correct one mark for 2 correct
	(b)		<table><tr><td>Dr Adams</td><td>✓</td></tr><tr><td>Dr Baker</td><td></td></tr><tr><td>Dr Curtis</td><td>✓</td></tr><tr><td>Dr Das</td><td></td></tr><tr><td>Professor Eddington</td><td>✓</td></tr></table> (2)	2	all 3 correct = 2 marks 2 correct (only one error) = 1 mark 1 correct = 0 marks 'one error' could be an extra tick, or a tick missing, or a tick in the wrong box
	(c)		<table><tr><td>less than 3.8 thousand Myears old</td><td></td></tr><tr><td>between 3.8 and 5 thousand Myears old</td><td></td></tr><tr><td>between 5 and 8 thousand Myears old</td><td>✓</td></tr><tr><td>between 8 and 12 thousand Myears old</td><td></td></tr><tr><td>between 12 and 13.7 thousand Myears old</td><td></td></tr></table> (1)	1	
			Total	**5**	

Question			Answer	Mark	Guidance
9			**(Level 3)** Gives a description of the accepted model of the solar system and suggests a reason why this model is now accepted **OR** gives a feature of the accepted model of the solar system and suggests reasons why this model is now accepted. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **(Level 2)** Gives a description of the accepted model of the solar system **OR** suggests reasons why this model is now accepted **OR** gives a feature of the accepted model of the solar system and suggests a reason why this model is now accepted. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **(Level 1)** Gives a feature of the accepted model of the solar system **OR** suggests a reason why this model is now accepted. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **(Level 0)** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to C** **Indicative scientific points related to the accepted solar system model may include:** • Sun at centre • planets orbiting the Sun • elliptical orbits • moons around (many) planets • asteroids orbiting the Sun • comets orbiting the Sun **allow** diagrams showing solar system **Indicative scientific points related to the reasons why the new model is now accepted:** • fits the observations / old model doesn't fit all the observations • more evidence today • better technology/telescopes • space exploration • use of satellites • makes predictions that work today **allow** reasons for not believing Copernicus when he proposed the model: • disagreed with accepted teaching/religious beliefs • seemed unbelievable • Copernicus lacked authority • observations don't seem to support it • not enough evidence at the time
			Total	**6**	

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