OCR
RECOGNISING ACHIEVEMENT

GCSE

Science A

General Certificate of Secondary Education

Unit **A142/01:** Unit 2: Modules B2, C2, P2 (Foundation Tier)

Mark Scheme for January 2012

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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1. **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

2. **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, eg 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, eg 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>paper
silk (1)</td><td>1</td><td>both answers needed for mark</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><td>… from synthetic materials</td><td></td></tr><tr><td>… from nanotechnology</td><td></td></tr><tr><td>… from the Earth's crust</td><td>✓</td></tr><tr><td>… from fractional distillation</td><td></td></tr></table> (1)</td><td>1</td><td>one correct tick = 1 mark
more than one tick = 0 marks</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>PVC (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>has the same properties as cotton / is flexible / has high electrical insulation (1)
lasts longer than cotton / lasts 20 years (1)</td><td>2</td><td>do not allow ‘lasts a long time’ (needs to be a comparison with cotton)</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>any plausible answer (1)</td><td>1</td><td>do not allow cotton (old) PVC (new) electric wires (use) – this is the example given on the paper

examples include:

<table><tr><th>old material</th><th>new material</th><th>use</th></tr><tr><td>bamboo</td><td>carbon fibre</td><td>pole vault</td></tr><tr><td>wood</td><td>metal / uPVC</td><td>window (frames)</td></tr><tr><td>wood</td><td>plastic</td><td>chairs</td></tr><tr><td>metal</td><td>plastic</td><td>bucket</td></tr><tr><td>animal skin</td><td>latex</td><td>condom</td></tr><tr><td>leather</td><td>PVC</td><td>clothes</td></tr><tr><td>paper</td><td>plastic</td><td>bags</td></tr><tr><td>cotton</td><td>nylon</td><td>clothes</td></tr></table></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>6</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
2	(a)		**[Level 3]** Idea of why control is needed **and** idea of why repeats are needed. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Idea of why control is needed **or** idea of why repeats are needed. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Idea of control or repeats stated. 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** Jake's plan is the best because: **Indicative points re <u>control</u> may include:** • 1 kg mass: factor controlled that might affect the outcome/idea of fair test • pieces of rubber are same length and width/size: factors controlled that might affect the outcome/idea of fair test • measures extended length: makes it more accurate/idea of fair test **ignore** 'improved reliability' linked to control **Indicative points re <u>repeats</u> may include:** • repeat test: shows outliers / shows values are repeatable / can calculate best estimate of true value **ignore** 'to calculate mean' without qualification **ignore** idea of improved accuracy (except linked to measuring extended length – see above) **ignore** 'fair test' linked to repeats **allow** Lewis for Level 1 max. • rubber the same size: factor controlled that might affect outcome/idea of fair test **reject** Kylie = level 0 **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Mark	Guidance
2	(b)	(i)	2.2 (1)	1	one correct circle around 2.2 = 1mark more than one circle = 0 marks
		(ii)	<u>outlier</u> (1) description of outlier / (outlier) unlikely to give an accurate best estimate (1)	2	 description of outlier needs idea that the outlier is **far** from the others: e.g. it lies well outside the range of the other data / far below other numbers / long way away from other numbers / completely different **allow** quoting numbers from the table to show that 0.7 is far from others **do not allow** 'is different' or 'doesn't fit in/match with others' or 'odd one out'
			Total	**9**	

Question			Answer	Mark	Guidance
3	(a)		50 nanometres ✓ (1) 250 nanometres 500 nanometres	1	one correct tick = 1 mark more than one tick = 0 marks
	(b)		true: ✓ / false: ✓ true: ✓ / false: true: / false: ✓ true: ✓ / false: (2)	2	all correct = 2 marks 3 or 2 correct = 1 mark 1 or 0 correct = 0 marks
	(c)		any plausible example of where nanoparticles are used (1) any correct change to the item (following the use of nanoparticles) (1)	2	e.g. tennis racket / paint / sunscreen / socks / plasters second mark can only be awarded if correctly linked to first mark. i.e. 'it makes the material stronger' = no marks 'it makes the tennis racket stronger' = 2 marks other examples of answer worth 2 marks include: • scratch resistant glasses • graffiti resistant paint • invisible sunscreen • stain resistant fabrics • self-cleaning windows • antibacterial wound coverings • stronger sports equipment
			Total	**5**	

Question			Answer	Mark	Guidance
4	(a)		E (1)	1	
	(b)		*(no, the student is wrong because)* CO_2 is absorbed/used/needed by plants (in photosynthesis) / B is photosynthesis (1) **OR** CO_2 is released in respiration / A is respiration (1)	1	note mark is not awarded for 'no'; it is for the explanation **ignore** CO_2 not given out **ignore** any reference to oxygen
			Total	**2**	

Question			Answer	Mark	Guidance
5	(a)		A = visible light (1) B = gamma (rays) (1)	2	
	(b)	(i)	right hand end / X-ray / gamma / B (1) no radiation gets through / idea that line remains at 0 / at the bottom / drops to 0 (1)	2	**allow** ultraviolet **allow** high frequency radiations **allow** all/100% gets absorbed **ignore** 'completely absorbed' as in the question **ignore** 'more likely to get absorbed'
		(ii)	100% / all (1) (of radio / (lower frequency) microwaves) gets through the atmosphere / do not get absorbed by the Earth's atmosphere (1)	2	
	(c)		(percentage of UV reaching Earth) drops/decreases (1) as frequency increases (1)	2	for this mark point, we are looking for the idea of a drop not just that it is low second mark can only be awarded if first marking point scored **allow** some low frequency (UV light) gets through the atmosphere /reaches the Earth (1) no high frequency (UV light) gets through the atmosphere/ reaches the Earth (1)
			Total	**8**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>6</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th>T</th><th>F</th></tr>
<tr><td>If you don’t feel hot…</td><td></td><td>✓</td></tr>
<tr><td>Ozone…</td><td>✓</td><td></td></tr>
<tr><td>..damage cells…</td><td>✓</td><td></td></tr>
<tr><td>Using a cream…</td><td>✓</td><td></td></tr>
<tr><td>The British summer…</td><td></td><td>✓</td></tr>
</table>
(2)
</td><td>2</td><td>all correct = 2 marks
one error = 1 mark
more than one error = 0 marks</td></tr>
<tr><td></td><td>(b)</td><td></td><td>
Prefer pale
Sun-tan attractive ✓ (1)
Cloudy in summer
Afraid of skin cancer
Don’t think it’ll happen ✓ (1)
</td><td>2</td><td>two correct ticks = 2 marks
one correct tick = 1 mark

three ticks = max 1 mark
four of five ticks = 0 marks</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
</table>

Question			Answer	Marks	Guidance
7			**[Level 3]** States an explicit difference between analogue and digital signal **AND** suggests an advantage of using digital signals (for television). Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** States a feature of analogue or digital signals **AND** states an advantage of using digital signals. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** States a feature of analogue or digital signals **OR** states an advantage of using digital signals. 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 points re <u>features</u> may include:** • digital does not change continuously • digital is on & off/0 & 1 • appropriate diagram to show differences **allow** unlabelled diagram **Indicative points re <u>advantages</u> may include:** • digital less affected by noise / better signal / better quality picture • digital has more channels • digital can be stored/processed/downloaded more easily • digital allows high definition TV • digital has greater range • digital less affected by obstacles **allow** if candidate describes disadvantage of analogue **do not allow** digital is faster **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

Question			Answer	Mark	Guidance
8	(a)		<table><tr><td>harmful</td><td></td></tr><tr><td>resistant</td><td></td></tr><tr><td>safe</td><td>✓</td></tr></table> <table><tr><td>dead</td><td></td></tr><tr><td>memory</td><td>✓</td></tr><tr><td>stem</td><td></td></tr></table> <table><tr><td>antibiotics</td><td></td></tr><tr><td>antibodies</td><td>✓</td></tr><tr><td>antigens</td><td></td></tr></table>	2	3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks four ticks = max 1 mark five or more ticks = 0 marks
	(b)	(i)	50 (1)	1	**allow** any value between 47 and 53
		(ii)	100% (1)	1	
	(c)		(number of people vaccinated) decreases (1) **then** (number of people vaccinated) increases (1)	2	description must relate to the bars (number of people vaccinated) and not the line (number of cases of measles) i.e. up, down, up is a description of the line = 0 marks
	(d)		number of people having the MMR vaccination is increasing/higher/high (1) so (cases of measles) will decrease (1)	2	**ignore** cases of measles goes up **allow** idea that a prediction cannot be made if linked to a valid comment on the limitations of the data (2)
			Total	**8**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>9</td><td>(a)</td><td></td><td>
<table>
<tr><td>Take fewer breaks so that you can go home earlier.</td><td></td></tr>
<tr><td>Use the stairs instead of the lift.</td><td>✓</td></tr>
<tr><td>Snack on fresh fruit instead of crisps</td><td>✓</td></tr>
<tr><td>Drink lots of tea and coffee</td><td></td></tr>
<tr><td>Take more cigarette breaks</td><td></td></tr>
<tr><td>Use the gym at lunchtime</td><td>✓</td></tr>
</table>
(2)
</td><td>2</td><td>3 correct = 2 marks
2 correct = 1 mark
1 correct = 0 marks

four ticks = max 1 mark
five or more ticks = 0 marks</td></tr>
<tr><td></td><td>(b)</td><td></td><td>(fatty deposits) lead to blockage/clogging (of arteries/blood vessels) (1)

less blood / oxygen to heart (1)

heart tissue / muscle dies (1)</td><td>2</td><td>do not allow veins / capillaries

do not allow ‘less blood flow’ without qualification that it is going to the heart
do not allow ‘less blood flow through the heart’

ignore ‘heart attack’</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><u>peer review</u> (1)</td><td>1</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
9	(c)	(ii)	Scientists like sharing their results. ☐ The methods and results need to be checked. ✓ (1) So other scientists can publish the work first. ☐ All scientists have to look at the results. ☐	1	one correct tick = 1 mark more than one tick = 0 marks
			Total	**6**	

Question			Answer	Marks	Guidance
10			**[Level 3]** Identifies a need for balance by recognising that decrease in urine production is linked to breathing/sweating increase. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Explains how data indicates more activity on Day 2. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** States any comparative difference between data in tables. 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 at Level 3 may include:** • less urine produced because more water has been lost from sweating/breathing • body works to balance water levels • total water out on both days is the same • may recognise role of kidney/ADH in water balance **Indicative scientific points at Level 2 may include:** • sweating more **because** they are exercising • breathing more **because** they are exercising • less urine produced • may describe reasons for increased sweating/breathing **Indicative scientific points at Level 1 may include:** • more water lost from sweating/breathing on Day 2 • less water lost from urine on Day 2 • sweats/breathes more on Day 2 • quote comparative data from tables **ignore** references to faeces **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**

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