



# GCSE

## Science A

General Certificate of Secondary Education

Unit **A142/02**: Unit 2: Modules B2, C2, P2 (Higher Tier)

## Mark Scheme for June 2013

---

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, Cambridge Nationals, Cambridge Technicals, 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 2013



## 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
<u>words</u>	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:

	correct response
	incorrect response
<span style="border: 1px solid red; padding: 2px;">BOD</span>	benefit of doubt
<span style="border: 1px solid red; padding: 2px;">NBOD</span>	no benefit of doubt
<span style="border: 1px solid red; padding: 2px;">ECF</span>	error carried forward
<span style="border: 1px solid red; padding: 2px;">0</span> , <span style="border: 1px solid red; padding: 2px;">L1</span> , <span style="border: 1px solid red; padding: 2px;">L2</span> , <span style="border: 1px solid red; padding: 2px;">L3</span>	indicate level awarded for a question marked by level of response
<span style="border: 1px solid red; padding: 2px;">A</span>	information omitted
<span style="border: 1px solid red; padding: 2px;">CON</span>	contradiction
<span style="border: 1px solid red; padding: 2px;">R</span>	reject

	indicate uncertainty or ambiguity
	draw attention to particular part of candidate's response

**ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

### Subject-specific Marking Instructions

- Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- 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 and 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.*

- 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	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
<b>Score:</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NR</b>

- e. For answers marked by levels of response:
- Read through the whole answer from start to finish**
  - Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
  - 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:

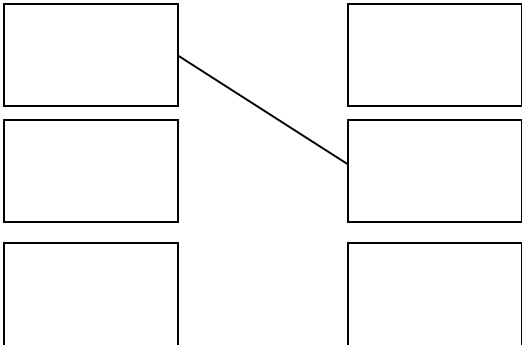
- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Question		Answer	Marks	Guidance
1	(a)	<p><b>Level 3 (5–6 marks):</b> Correct cord [C] chosen. All cords and all properties are considered in a logical order and include relevance of weight extending cord B by more than 140% noted. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks):</b> Cord B or C chosen with reference to at least 3 cords and 2 properties are considered. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks):</b> Cord chosen with a reason that uses at least one property. Answer may be simplistic. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks):</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points may include:</b></p> <ul style="list-style-type: none"> <li>• Cord A has a minimum breaking strength below that needed</li> <li>• Cord B stretches too much. Mass of 80kg should extend cord 110% to 140%, 80kg on cord B would give more than 140%</li> <li>• 10 m of cord should have a mass of 2kg so cord D is too heavy <b>OR</b> Cord D needs more mass to stretch by 110% to 140%</li> <li>• So cord C chosen.</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
	(b)	$\frac{1200 \times 2}{250} = 9.6 \text{ (1)}$ <p>10 cords used (1)</p>	2	<p>(a) is it 2 marks for “10” alone, if not look for “9.6” unrounded for 1 mark</p> <p>9.6 alone gets 1 mark</p> <p><b>ignore</b> 9.6 on response line if 10 is also there</p>
	(c)	(i)	2	<p><b>accept</b> “There is no good reason to discard the outlier”</p> <p><b>ignore</b> idea of “do more tests to confirm”</p>
		(ii)	1	
		(iii)	1	
		<b>Total</b>	<b>12</b>	

Question			Answer	Marks	Guidance
2			<p>larger molecules have stronger force / more forces;</p> <p>[forces] <b>between</b> [molecules / intermolecular forces];</p> <p>stronger force means higher boiling point;</p> <p>broken / [more] energy to separate</p>	4	<p>Link size to force/energy idea, accept bonds/attractions for forces (different fractions are different sizes is neutral) Large M - stronger intermolecular forces is 2 marks</p> <p>link size <b>OR</b> force/energy to temp idea</p> <p>molecules broken/move apart when boiled idea. (Assume answer refers to breaking molecules apart from each other, unless it clearly refers to breaking up the molecule)</p>
			<b>Total</b>	<b>4</b>	



Question			Answer	Marks	Guidance																		
3	(a)		<table><tr><td></td><td></td><td></td></tr><tr><td>The forces between polymer...</td><td>✓</td><td>(1)</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td>More strength needed to pull mol apart</td><td>✓</td><td>(1)</td></tr></table>				The forces between polymer...	✓	(1)										More strength needed to pull mol apart	✓	(1)	2	3 ticks deduct 1 mark 4, 5 or 6 ticks = 0
The forces between polymer...	✓	(1)																					
More strength needed to pull mol apart	✓	(1)																					
	(b)		adding a plasticizer; (1) shortening the molecules (1)	2	any order <b>accept</b> 'reduce cross-linking' <b>accept</b> 'change chain length' alone <b>accept</b> (more) branching arguments, even though not in spec <b>ignore</b> temp change																		
			Total	4																			

Question		Answer	Marks	Guidance
4	(a)	photons electrons molecules (allow ions) ions (allow electrons)	2	4 correct = 2 marks 2 or 3 correct = 1 mark
	(b)	<div> <div>...radio photons do not have enough energy</div> <div>✓</div> <div></div> </div>	1	
	(c)	<p>Action (1) eg wear covering clothing / tee-shirts / use sunscreen (at frequent intervals) / stay indoors;</p> <p>Explanation (1) eg <b>because</b> it absorbs / reflects / blocks UV</p>	2	<p><b>allow</b> “People could move out of the area” <b>but</b> “move to another area” needs greater detail for action mark</p> <p><b>accept</b> stay indoors during mid-day hours (1) <b>because</b> UV intensity is greatest then (1)</p> <p>Explanation needs to refer to how UV (is reduced)</p> <p><b>accept</b> “protects against UV” <b>ignore</b> reference to using less CFCs <b>reject</b> ideas to reduce the amount of CO<sub>2</sub> eg “use fewer cars”</p>
	(d)		1	one line only
Total			6	

Question			Answer	Marks	Guidance
5	(a)	(i)		1	
			intensity		
		(ii)	(500 J / s / m <sup>2</sup> )	1	
		(iii)		1	
			Moon much smaller surface		

Question		Answer	Marks	Guidance
5	(b)	<p><b>Level 3 (5–6 marks):</b> Greenhouse effect clearly explained including frequency or radiation absorbed and emitted. Relevant data used to explain differences between the two planets. Recognises Venus as warning of g.e. consequences.</p> <p>Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks):</b> Explains g.e., but may be unclear about frequency differences. Uses data comparatively, probably restricted to CO<sub>2</sub>. Sees that Venus is a warning about unrestricted g.e. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks):</b> Probably explains g.e. in terms of trapping Sun's radiation. Use of data restricted to recognising CO<sub>2</sub> as most of V's atmosphere. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks):</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to A*</b></p> <p><b>Points relevant to the greenhouse effect may include:</b></p> <ul style="list-style-type: none"> <li>greenhouse gases transmit incident solar radiation</li> <li>greenhouse gases absorb lower frequency/IR radiation emitted by warm (!) planet</li> <li>this absorption results in atmosphere, and hence planet, heating up</li> </ul> <p><b>Points relevant to the use of data may include:</b></p> <ul style="list-style-type: none"> <li>CO<sub>2</sub> &amp; H<sub>2</sub>O (poss. SO<sub>2</sub>) are greenhouse gases</li> <li>Earth has more H<sub>2</sub>O but Venus has much, much more CO<sub>2</sub></li> </ul> <p><b>Points relevant to the consequences for Earth may include:</b></p> <ul style="list-style-type: none"> <li>greenhouse gases being produced in increasing quantities on Earth</li> <li>Venus as an example of runaway greenhouse effect as dire warning for the future.</li> </ul> <p><b>accept</b> comments about lack of oxygen on Venus related to lack of life</p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
		<b>Total</b>	<b>9</b>	

Question			Answer	Marks	Guidance
6	(a)	(i)	only need to see if it is 'on'/1 or 'off'/0, not the size	1	"because they are digital" alone is not quite enough
		(ii)	<b>A</b> is higher frequency / more bits per second (1); <b>B</b> is noisy (1)	2	<b>reject</b> comparisons of amplitude
	(b)		radio is used for transmission through the atmosphere <u>because</u> the atmosphere does not absorb radio (1); infrared is used for transmission along optical fibres <u>because</u> the glass used does not absorb IR (1)	2	"Circumstances" in the question stem needs a reference to a medium  IR for remote controls/PC connection, award if sensible reason given (ie "short range so absorption not important")
			<b>Total</b>	<b>5</b>	

Question			Answer	Marks	Guidance																								
7	(a)	(i)	(her blood pressure is) <u>normal</u>	1																									
		(ii)	11	1																									
		(iii)	idea of <b>partial</b> effectiveness / success (1)  comment on <b>both</b> category (changes) (1)	2	drug has not been completely effective / only partially successful, no mark for “effective” or “not effective” alone <b>accept</b> a description of where it has succeeded/been effective <b>AND</b> where it hasn't  higher value <b>remains</b> in moderate hypertension category whereas lower value is <b>reduced</b> to mild hypertension category / nearly at normal category  <b>ignore</b> “reduces values” as that is in stem of question, must link to categories																								
	(b)	(i)	positive correlation	1	line must have highest point at the end <b>reject</b> line with zigzags/plateau(s) <b>ignore</b> minor deviations in freehand drawn lines																								
		(ii)	<table><tr><td></td><td>More confident</td><td>Less confident</td><td>Makes no difference</td></tr><tr><td>the study was carried out in the USA</td><td></td><td></td><td>✓</td></tr><tr><td>100 000 people took part</td><td>✓</td><td></td><td></td></tr><tr><td>the study was peer reviewed</td><td>✓</td><td></td><td></td></tr><tr><td>it was carried out in 2011</td><td></td><td></td><td>✓</td></tr><tr><td>the study was funded by a company that sells fresh fruit juices</td><td></td><td>✓</td><td></td></tr></table>		More confident	Less confident	Makes no difference	the study was carried out in the USA			✓	100 000 people took part	✓			the study was peer reviewed	✓			it was carried out in 2011			✓	the study was funded by a company that sells fresh fruit juices		✓		2	all correct = 2 marks one mistake = 1 mark
	More confident	Less confident	Makes no difference																										
the study was carried out in the USA			✓																										
100 000 people took part	✓																												
the study was peer reviewed	✓																												
it was carried out in 2011			✓																										
the study was funded by a company that sells fresh fruit juices		✓																											

Question			Answer	Marks	Guidance
7	(c)		older you are, more risk of dying from heart disease (1)  difference between men and women gets less as age increases (1)	2	<b>accept</b> a correct correlation referring to 1 gender only for first mp <b>accept</b> "female risk rises more quickly" <b>ignore</b> "Male risk always higher" - age doesn't affect this in this context
			<b>Total</b>	<b>9</b>	

Question			Answer	Marks	Guidance
8	(a)		pituitary (gland)	1	<b>accept</b> reasonable attempt at spelling <b>ignore</b> references to brain, <b>reject</b> other body parts if also named
	(b)	(i)	concentrated increases more more more	1	
		(ii)	E B D C A	1	
	(c)		as water level changes, ADH levels change (1)  (negative feedback is where the) body works to reverse a change away from the normal (1)	2	Feedback(1) - Links water amount to ADH ie less water (in plasma) gives more ADH <b>OR</b> more ADH means less urine ( <b>accept</b> wrong correlation for this mark)  Negative(1) - returns to normal idea
			<b>Total</b>	<b>5</b>	



Question			Answer	Marks	Guidance
9			<p><b>Level 3 (5–6 marks):</b> Answer fully describes the various reasons why the vaccination programmes has continued, looking at the benefit vs risk and the idea that the one case is not linked to the vaccination. Includes the idea that this leads to the best outcome for the greatest number of people. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks):</b> Answer describes some reasons why the vaccination programme has continued and considers the benefits and risks. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks):</b> Answer includes one reason why the programme has not been stopped or why it should continue. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks):</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to A*</b></p> <p><b>Indicative scientific points may include:</b></p> <ul style="list-style-type: none"> <li>• vaccination provides protection against the cancer</li> <li>• prevents a large number of women dying each year</li> <li>• continuing vaccination programme leads to the best outcome for the greatest number of people</li> <li>• it has been fully tested</li> <li>• side effects are only minor and more severe reactions are very unlikely</li> <li>• vaccinations can never be completely safe as side effects will vary due to genetic differences</li> <li>• benefit from vaccination outweighs the risk, ie it saves more lives than it may put at risk</li> <li>• no evidence to suggest that the vaccine caused the death of the girl</li> <li>• the one case of the girl dying does not provide sufficient evidence to believe that the vaccine is unsafe</li> <li>• need more data to be certain of a link between the vaccine and the death.</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
			<b>Total</b>	<b>6</b>	

**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](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://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 2013

