

Cambridge National

Science

Unit **R072/01**: How Scientific Ideas Have Developed

Level 1

Mark Scheme for January 2018

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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 RM Assessor 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

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

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

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 should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question		Answer	Marks	Guidance
1	a	<p>Any TWO from:</p> <p>Can see (inside patient) / can see on the screen / can store image on computer;</p> <p>only need to make a small hole / no need to cut patient open;</p> <p>Reduces time for operation/recovery</p>	2	
	b	Radio waves – microwaves - (infra-red) - visible light	1	
	c	<p>Signals.... straight lines (1);</p> <p>The Earth....curved (1)</p>	2	
	d	<p>stops core being scratched / stops surface of glass being scratched / keeps glass surface smooth (1);</p> <p>so that (glass) surface acts as a perfect mirror / reflects the light(1);</p> <p>scratched surfaces do not work well / light/signal scatters / light/signal escapes (1)</p>	3	
	e	<p>shows one reflection of light (1);</p> <p>shows at least two reflections with roughly correct angles (1)</p>	2	For MP1 ignore angle
	f	<p>Shows both 300 000 000 and 200 000 000 in working (1);</p> <p>100 000 000 (1)</p>	2	Correct answer without working gets 2 marks

Question			Answer	Marks	Guidance
	g	i	7 000 000	1	
		ii	$7\,000\,000 / 200\,000\,000(1);$ $=0.035 (1)$	2	Allow ecf from (i) Allow use of 300 000 000 leading to answer 0.0233 for (1) mark Correct answer without working gets 2 marks

Question		Answer	Marks	Guidance
2	a	Any TWO from: Both scientists ; Idea that Volta repeated (Galvani's work) / checked / did the same idea; (repeated) Galvani's experiments	2	'Volta repeated Galvani's experiment' gets 2 marks
	b	(i) same results	1	
		(ii) Galvani thought animal electricity caused movement / electricity travelling inside the leg (1); Volta thought movement was caused by rubbing / metal (1); Volta thought it was due to God (1)	3	ORA ORA ORA
	c	Did not have the equipment idea / couldn't generate electricity / couldn't test nerves / couldn't make electricity without rubbing skin (1); cannot prove God / can't test God (1)	2	
	d	He needed to change..... battery	1	

Question		Answer	Marks	Guidance
3	a	convection mantle molten apart	3	All correct gets 3 marks 3 correct gets 2 marks 2 correct gets 1 mark 1 or none correct gets 0
	b	mountains (1); volcanoes (1)	2	
	c	i continents / plates move	1	
		ii fossils.....the same (1); The continents.... jigsaw (1)	2	
	d	He was not qualified.....rocks (1); He could not explainhappened (1)	2	

Question		Answer	Marks	Guidance		
4	a		2	All correct gets 2 marks 2 or 3 correct gets 1 mark 1 or none correct gets 0		
					True	False
		Signals travel to and from the spinal cord along the same neurone.				✓
		Signals travel to the spinal cord through sensory neurones.			✓	
		Signals travel to muscles through motor neurones.	✓			
		Motor neurones sense changes in the environment.		✓		
	b	use the same ruler / hold it the same way / put hands in same place	1			
	c	<p>[Level 3] Makes statements about the reaction times of both Joe and Eve, including data and identifies a weakness in the data. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Makes statements about the reaction times of both Joe and Eve, including data, OR makes a statement about the reaction times of Joe or Eve, including data and identifies a weakness in the data. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p>	6	<p>This question is targeted at grades up to MM</p> <p>Indicative scientific points may include:</p> <p>Weakness in Data</p> <ul style="list-style-type: none"> • Difficult to see a clear trend for Eve • Not enough repeats / tests / need to do more tests <p>Reaction times Joe</p> <ul style="list-style-type: none"> • Joe's reaction times get shorter/faster • First test takes much longer than others / he's slower • Second and third tests are the same. • Joe reaction times faster than Eve • Data Joe: reaction times are 0.20s; 0.14s 		

Question	Answer	Marks	Guidance
	<p>[Level 1] Makes a statement about the reaction times for Joe and Eve without reference to data OR identifies a weakness in data. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>		<p>Reaction times Eve</p> <ul style="list-style-type: none"> • First test is the longest time/slowest • Eve reaction times longer/slower than Joe • Reaction times go down then up • Data Eve: reaction times are 0.25s; 0.17s; 0.20s <p>Allow Eve slower than Joe OR Joe faster than Eve as one statement only</p> <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>

Question		Answer	Marks	Guidance
5	a	might be able to develop idea further / do more research / extend study (1); to treat people (1)	2	
	b	change diet / eat seeds/fenugreek (1); reduce sugar / carbohydrate (1)	2	
	c	i pancreas	1	
		ii Endocrine	1	
	d	<i>Any THREE from:</i> idea of continuous / all day ; people don't have to take blood sample / less danger of infection / no needles ; more accurate / no human error ; don't have to do their own insulin injections	3	

Question		Answer	Marks	Guidance
6	a	<p>[Level 3] Makes a statement about correlation and discusses aspects of the data to explain why scientists are unsure. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Makes a statement about correlation and a statement about why scientists are unsure. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Makes a statement about correlation or why scientists are unsure. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to DD</p> <p>Indicative scientific points may include:</p> <p>Scientists unsure</p> <ul style="list-style-type: none"> • correlation does not mean cause • other factors may also cause climate change • data is only from USA • data is only maximum day time temperature, not global average temperatures • data is only for a (relatively) short time <p>Correlation</p> <ul style="list-style-type: none"> • as one goes up/down so does the other / pattern is similar <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	b	i	carbon dioxide	1
		ii	The gases stop radiation..... space	1

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