

Cambridge National

Science

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

Level 1

Mark Scheme for June 2014

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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

	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	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.

✗
✗

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

✓
✗

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

✗
✗
✓
✓

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	Mark	Guidance	
1	a	i			[1]	
			Without thinking	✓		
		ii	(D) A E B (C)	[1]		
	b	i			[1]	
			Simple	✓		
		ii	some are faster than average; so some must be slower than average;	[2]	Ignore yes/no Allow: close to the mean/average/above below Needs a comparison of both higher and lower for 2 marks	
		iii`	any 2 from Repeat test (more times); getting more good/below average times; compare his times with others	[2]	Allowt: To obtain a range of reaction times	
c					[1]	
			Auditory faster than visual	✓		
d			12 years	[1]		
e	i		Control / for comparison	[1]	ignore to make it a fair test Idea of control/ comparison	
			ii	Slower reactions / longer response time More likely to make errors/mistakes;	[2]	Allow slower response time Allow more likely to have an accident
f	i		$(45+40+40+35+40) \div 5 / 200 \div 5$; 40 cm;	[2]	Correct answer alone = 2 marks	
			ii	286 ms	[1]	270-295 inclusive Allow ecf from part (i)
Total				[15]		

Question		Answer					Mark	Guidance		
2	a	Geocentric	✓				[4]	Mark each row separately		
		Heliocentric		✓	✓	✓			✓	
		Gravity				✓			✓	
		Expanding							✓	
	b						[2]			
Telescopes		✓								
Satellites		✓								
	c	i	Distance too short (for a measurable time); reactions not fast enough/are different					[2]	allow: light travels too fast allow idea of testing reaction times	
			ii	Any two from: Could not measure/know the distance to Jupiter; refer to speed = distance / time; distance underestimated;					[2]	Allow Jupiter was further away than thought
				iii			300,000		[1]	
	d	Improved/better/modern equipment/technology available; easier to look for/find evidence after prediction					[2]	Allow more instruments		
	e	Straight lines	✓				[2]			
		carry data	✓							
Total						[15]				

Question		Answer	Mark	Guidance
3	a	<p>[Level 3] Correctly explains working of dominant and recessive allele, or explains how dominant flower may contain recessive gene but not vice versa. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes idea that a gene comes from each parent or may bring different characteristics. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Recognises existence of genes or a mechanism for handing down characteristics to next generation. 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 Level one Distinction Indicative scientific points may include:</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • Dominant allele is always expressed as a characteristic • Recessive allele may not be expressed as a characteristic • Purple flower may have white allele (as well as purple) • White flower has only white alleles. • Each allele may be associated with a specific characteristic • Both alleles the same means one characteristic only in offspring • Two different alleles means either characteristic is possible <p>Indicative scientific points at Level 2 may include:</p> <ul style="list-style-type: none"> • Seed has two copies of each gene, one from each parent • Each gene associated with a characteristic (eg flower colour) <p>Indicative scientific points at Level 1 may include:</p> <ul style="list-style-type: none"> • Characteristics are passed on in genes/DNA <p>Candidates may draw a Punnett Square &/or offer estimates of ratio of purple: white flowers to explain the required points for a level three answer. However this is a Level 2 spec statement, so cannot be required.</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>

Question		Answer	Mark	Guidance	
3	b		[2]		
		Repeat experiments			✓
		Check results			✓
	c	Any 2 from More ideas; share workload; check each other's work; more experiments done / more results/data; quicker	[2]		
		Total	[10]		

Question		Answer	Mark	Guidance
4	a	Increases/more concentrated; Idea of increasing rate / faster/bigger each (10)each years	[2]	rises from 316 to 388 gets 1 mark Allow calculations to show this Increases by 72 gets 1 mark But Increases more every (10) years gets 2 marks
	b	Any two from fossil fuels/coal/oil/natural gas; named example of use(eg.cars,factories) deforestation	[2]	do NOT allow two marks for two forms of fuel do NOT allow two marks for two named examples allow increased population
	c	i	[1]	
	c	ii	[1]	
		Increased over 40 years	✓	
	d	<p>[Level 3] Explains the warming mechanism and gives at least 2 ways in which it could impact on the Earth. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Describes warming mechanism and an effect of warming on the Earth. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Outlines how warming may happen or gives an effect of warming on the Earth. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p>	[6]	<p>This question is targeted at grades up to Level one Distinction</p> <p>Indicative scientific points may include:</p> <p>Mechanism for warming:</p> <ul style="list-style-type: none"> • The Sun radiates heat to the Earth • Earth radiates (IR) energy • CO₂ can absorb this energy • Less heat lost (than gained) • Overall temperature rises • The Greenhouse effect <p>ignore ref to ozone layer</p> <p>Effects of warming:</p> <ul style="list-style-type: none"> • Ice caps melt • Rising sea levels • Increased risk of extreme weather

Question			Answer	Mark	Guidance
			[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)		<ul style="list-style-type: none"> • Increased risk of flooding • increased risk of drought/desertification <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
			Total	[12]	

Question		Answer	Mark	Guidance
5	a	<p>Any three from: Fossils;</p> <p>Found in (sedimentary) rocks; (Skeleton) reassembled; Computer generated image</p>	[3]	<p>Allow bones/remains of skeleton Ignore DNA</p> <p>Allow visit museum / look on internet/book Ignore carbon dating</p>
	b	Comparison with other fossils in same strata/rocks	[1]	Allow (radio) carbon dating
	c	<p>Select (two) horses which can run fast/(have a named sensible characteristic); Allow them to breed/produce offspring; (Repeat by) selecting fastest offspring; QWC clear answer in a logical sequence</p>	[4]	Allow selective breeding (1)
		Total	[8]	
		Overall Total	[60]	

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