

Cambridge National

Science

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

Level 1

Mark Scheme for June 2017

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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.

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These are the annotations, (including abbreviations), including those used in RM Assessor, which are used when Marking

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

Annotation	Meaning of annotation
	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
	benefit of doubt not given
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

Here are the subject specific instructions for this question paper

- 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

✓
✓

This would be worth 1 mark.

Put ticks (✓) in the two correct boxes.

✓	
	✓

This would be worth 0 marks.

Put ticks (✓) in the correct boxes. two correct boxes.

	✓
	✓
✓	
✓	

This would be worth 1 mark.

Question			Answer	Marks	Guidance																
1	a	i	microscope.		1																
			naked eye.	✓																	
			quadrant circle.																		
			telescope.																		
		ii	(They believed that) the position of the stars affected people's lives	1																	
		iii	sometimes moved irregularly / opposite direction	1																	
		iv	<table border="1"> <thead> <tr> <th></th> <th>Planet</th> <th>Star</th> <th>Neither</th> </tr> </thead> <tbody> <tr> <td>Mars</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Sun</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>a comet</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>		Planet	Star	Neither	Mars	✓			Sun		✓		a comet			✓	2	all correct = 2 marks two correct = 1 mark 0
	Planet		Star	Neither																	
Mars	✓																				
Sun			✓																		
a comet			✓																		
	b	i	Better / large instruments / quadrant circle	1																	
		ii	(used the data to show that) orbits of planets do go around sun; discovers elliptical orbit shape / not circular	2	Accept laws (of planetary motion) Accept not invisible spheres / an action of God OK																
		iii	(He used a) telescope	1	Accept use of lenses																
	c			2	All correct = 2 marks One or two lines correct = 1 mark																
	d		<table border="1"> <tbody> <tr> <td>mass of the Sun</td> <td>✓</td> </tr> <tr> <td>size of the Sun</td> <td></td> </tr> <tr> <td>distance from Sun to Earth</td> <td>✓</td> </tr> <tr> <td>size of the Earth</td> <td></td> </tr> <tr> <td>time taken for the Earth to orbit Sun</td> <td></td> </tr> </tbody> </table>	mass of the Sun	✓	size of the Sun		distance from Sun to Earth	✓	size of the Earth		time taken for the Earth to orbit Sun		2							
mass of the Sun	✓																				
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	e		Bonnie; Claude;	2																	
Total				15																	

Question	Answer	Marks	Guidance
2	<p>[Level 3] A clear description of the change in both populations related to the effect of the environment. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] A clear description of the change in both populations OR a description of the change in one population related to the effect of the environment. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] A description of the change in one population OR an explanation of how the areas affect the population. 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 D</p> <p>Indicative scientific points may include:</p> <p>Speckled population:</p> <ul style="list-style-type: none"> • Not many survive • Between 10-15% • Survival rate is similar in both areas • Others may have been eaten by birds <p>Dark population:</p> <ul style="list-style-type: none"> • Few survive in woodland A • More survive in woodland B • Most may have been eaten • <p>Effect of area:</p> <ul style="list-style-type: none"> • Area A favours speckled moths • Dark moths can be seen against speckled tree bark • Area B favours dark moths • Speckled moths can be seen against dark tree bark <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
3	a	Amount of pasta / sauce / other food /	1	Accept any other sensible controlled variable same time every day / same volunteers
	b	increase confidence / reliability; Remove/reduce the effect of outliers/anomalies;	2	Accept to see if they get similar results Accept people (react) differently
	c	ANY FOUR FROM: All three groups increase (immediately after meal); All three groups return to (near) baseline; Maximum is different for each sample; chilled and fresh level off at maximum BGL; freshly cooked has the highest maximum; chilled & reheated is lowest maximum;	4	Ignore references to energy Allow 1 mark for full description of one group (increase and decrease)
	d	(Blood glucose level) goes higher than usual; (Blood glucose level) takes longer to drop back;	2	Ignore: unqualified high
Total			9	

Question		Answer	Marks	Guidance	
4	(a)	(i)	characteristics/red inherited from parents (1); red gene passed through gamete (1)	2	Accept All parental alleles are red / not yellow (2)
		(ii)	repeat experiment / use other red plants	1	Ignore: do another experiment
	(b)		recessive	1	
	(c)	(i)	Both parents have two red alleles <input type="checkbox"/> Both parents have two yellow alleles. <input type="checkbox"/> Both parents have one red and one yellow allele. <input checked="" type="checkbox"/> One parent has two red alleles and the other parent has two yellow alleles. <input type="checkbox"/>	1	
		(ii)	All plants would have red tomatoes. <input type="checkbox"/> All plants would have yellow tomatoes. <input checked="" type="checkbox"/> A few of the plants would have red tomatoes. <input type="checkbox"/> A few of the plants would have yellow tomatoes. <input type="checkbox"/>	1	
			Total	6	

Question		Answer	Marks	Guidance
5	(a)	<p>electromagnetic wave</p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 5px; width: 15%;">infra-red</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">telephone link between Europe and America through the atmosphere by over the horizon reflection</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 15%;">microwaves</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">telephone link between a mobile phone and its base station through the air</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 15%;">radio waves</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">telephone link between cities in Britain through optical fibres</div> </div>	2	All correct get 2 1 or 2 correct get 1
	(b) (i)	not invented / technology not developed	1	
	(ii)	<p>An optical fibre is thicker. <input type="checkbox"/></p> <p>An optical fibre is straighter. <input type="checkbox"/></p> <p>Data travels faster along an optical fibre. <input type="checkbox"/></p> <p>Data does not spread out or get lost from an optical fibre. <input checked="" type="checkbox"/></p> <p>More data can be sent every second .. optical fibre <input checked="" type="checkbox"/></p>	2	
	(c) (i)	control variable / same size file / same running time	1	Ignore: "Fair test"
	(ii)	(84+76+84+80)/4 (1); 81 (1)	2	correct answer without working gets 2 marks

		(iii) Ignore yes / no. Sam's mean is lower (1); ANY ONE FROM: ranges overlap; Sam has 2 lowest times; Mia has 2 highest times; some of Mia's same / smaller than Sam's; data doesn't indicate testing at same time of day; internet speed varies at diferent times;	2	Allow ECF
	(d)	Any two from: working together idea / sharing ideas (1); to check / build on each others' work (1); get results quicker (1)	2	
		Total	12	

Question	Answer	Marks	Guidance
6	<p>[Level 3] Gives comparisons including quantitative and describes greenhouse effect and links correlation to cause and effect. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Gives at least one comparison and outlines greenhouse effect. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Gives at least one comparison OR outlines greenhouse effect mechanism. 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 D</p> <p>Indicative scientific points may include:</p> <p>Compare variations:</p> <ul style="list-style-type: none"> • Similar • When CO₂ goes up so does temp (or vice versa) • Greater change in CO₂ produces greater temp change • Correlation – positive <p>Greenhouse effect:</p> <ul style="list-style-type: none"> • CO₂ is a greenhouse gas • higher concentration/amount in atmosphere • allow ‘acts like’ a blanket • Keeps heat/radiation in • More CO₂ keeps more heat/radiation in so higher temp • Cause and effect <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
7	(a)	circle <input type="checkbox"/>	1	
		square <input type="checkbox"/>		
		double helix <input checked="" type="checkbox"/>		
	(b)	A-C and T-G <input type="checkbox"/>	1	
		A-G and T-C <input type="checkbox"/>		
		A-T and C-G <input checked="" type="checkbox"/>		
	(c)	X-ray diffraction photographs <input checked="" type="checkbox"/>	1	
		speed of nerve impulses <input type="checkbox"/>		
		microscope images <input type="checkbox"/>		
		records of fossils <input type="checkbox"/>		
			Total	3

Question		Answer	Marks	Guidance
8	(a)	All animals are the same on every continents. <input type="checkbox"/>	1	
		The same types of fossils ... different continents. <input checked="" type="checkbox"/>		
		Some mountains on different ..same height. <input type="checkbox"/>		
		There are the same number of continents. <input type="checkbox"/>		
(b)	They could not find any active volcanoes. <input type="checkbox"/>	2		
	The theory did not explain climate change. <input type="checkbox"/>			
	New mountains were being formed too quickly. <input type="checkbox"/>			
	They could not feel ..movement of the continents. <input checked="" type="checkbox"/>			
	They could not identify a force ... move a continent. <input checked="" type="checkbox"/>			
		Total	3	

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

www.ocr.org.uk

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OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

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