OCR
Oxford Cambridge and RSA

Cambridge National

Science

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

Level 1

Mark Scheme for June 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.

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

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, 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 <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**

Question			Answer	Marks	Guidance
1	a		homeostasis	1	
	b	i	as outside temperature increases body temperature increases (ORA)	1	**Allow:** snake's temperature goes up
		ii	stays the same (1); idea that it is lower at very low temperatures (1)	2	
		iii	accept values 37 to 40(^{o}C)	1	
	c	i	body temperature is higher than outside temperature ;	1	
		ii	15:00 to 17:00 (any value in between)	1	
		iii	idea of repeating experiment on more lizards / on more days / over a longer period during the day / during the night	1	
	d		True False True False	2	All correct = 2 2 or 3 correct = 1 1 correct = 0
	e		when temperature is low, they shiver / hairs rise / capillaries contract (1); at high temperatures they sweat / capillaries increase in size (1)	2	
	f	i	idea that people maintain their own internal temperature / people are warm-blooded / people are mammals (1); can survive extreme temperatures for short periods of time (1)	2	
		ii	Cannot control temperature / cannot get warm afterwards idea	1	Ignore they are cold-blooded
			Total	**15**	

Question			Answer	Marks	Guidance
2	a	i	mercury thermometer	1	
		ii	could not go there / did not have the equipment idea / equipment not invented / space travel not possible	1	**Ignore:** "too far"
	b		(yes because) Earth and moon should be the same temperature (based on distance from Sun) (1) ; Average surface temperature of the Earth is higher than the moon / The Earth is warmer than the Moon ORA (1); Earth has an atmosphere and moon does not (1)	3	**Ignore:** 'they are the same distance from the Sun' alone **Allow:** Links atmosphere to hotter ORA if no other marks
	c	i	Jupiter Venus	1	Need both
		ii	(planets with (almost) no atmosphere have) similar (actual) temperatures to predicted / 'they' are similar / 'they' are the same	1	
	d		Robots use temperature probes to take measurements of surface temperature. ☐ The journey of the robot to other planets takes many months. ✓ Robots take samples of the planet atmosphere for analysis. ☐ Reception of radio signals from the probes is strongest when they are near Earth. ✓	2	
	e		Can't go back in time idea / Can't measure God / beliefs can't always be tested	1	
			Total	**10**	

Question			Answer	Marks	Guidance
3			**[Level 3]** Describes some differences between the elephants **AND** describes evolution. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes some differences between the elephants **OR** describes evolution. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies at least two features of the elephants that are different. 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 DD** **Indicative scientific points may include:** **Different features** • Different weights / primelephas smallest, African largest. • Different sizes of ears/ primelephas smallest, African largest. • Different tusk sizes / primelephas longer than African/Asian • Back shape is different. **Description of differences** • primelephas lower weight, African larger. • primelephas smaller ears, African larger. • primelephas longer tusk than African • Back shape sloping for primelephas and hollow for African **Evolution** • Idea that changes have slowly occurred over time • Due to change in environment **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	**6**	

Question			Answer	Marks	Guidance
4	a	i	diameter of **legs and arms** at the **end**	1	
		ii	same food	1	
		iii	Joe's arms bigger (diameter) (ORA) (1); Adam's legs bigger (diameter) (ORA) (1)	2	
	b	i	rats got better at doing the maze through the generations (1); implying that the learned behaviour was passed on (1)	2	
		ii	peer review	1	
		iii	(to check that) they are the same / that the experiment is reliable/reproducible	1	
	c		best adapted animals survive / less well adapted die (1); fittest breed offspring (1)	2	
			Total	**10**	

Question			Answer	Marks	Guidance
5	a		quickly neurones contract	2	All 3 correct = (2) 2 correct = (1) 1 correct = 0
	b	i	Galvani	1	
		ii	(Leg) twitched / moved / reacted	1	
		iii	be able to do more experiments / easier to do experiments (1); do not have to wait for particular weather / electricity supply can be used whenever you want idea / always available (1)	2	**Ignore:** 'easier' alone
	c		Rapid response/reaction (1); Change conditions to help survival (1)	2	**Allow:** named response eg run away
			Total	**8**	

Question			Answer	Marks	Guidance
6	a		Based on appearance of living thing / can see characteristics / don't need special equipment / qualitative	1	
	b	i	black bear and grizzly bear (1) ; both in same genus (1)	2	 **Allow:** both bears **Ignore:** both in the same groups / boxes etc
		ii	they are not mammals	1	**Allow:** named characteristics eg do not have legs / live young / warm blood etc.
		iii	they do not have a backbone	1	**Allow:** They have an exoskeleton
			Total	**5**	

Question			Answer	Marks	Guidance
7			**[Level 3]** Describes how radio signals travel and gives some reasons why their use is limited. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Describes how radio signals travel and gives a reason why their use is limited. OR describes some reasons why their use is limited. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Makes a correct statement about how radio signals travel or why their use is limited. 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 D** **Indicative scientific points may include:** **How radio signals travel** • travel is in straight lines • from transmitter directly to receiver • ignore mention of satellites **Why their use is limited** • short range only / limited in distance they can travel • cannot 'bend' • cannot 'bend' around curve of Earth • are blocked by curve of Earth • gives data: have a maximum range of 40 km / cannot be used for signals of over 40 km • cannot travel across the Atlantic **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	**6**	

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