OCR

Oxford Cambridge and RSA

Cambridge National

Science

Unit **R075/01:** How Scientific Data is Used

Level 1

Mark Scheme for June 2016

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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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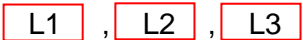
1.   **Annotations**

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 RM Assessor to annotate scripts:

?	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
✖	incorrect response
ECF	error carried forward
⬭	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject
✔	correct response

L1 , L2 , L3	draw attention to particular part of candidate's response
^	information omitted

?	indicate uncertainty or ambiguity
BOD	benefit of doubt
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✖	incorrect response
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⬭	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
NBOD	no benefit of doubt
R	reject
✔	correct response
∫	draw attention to particular part of candidate's response
^	information omitted

2.   **Subject-specific Marking Instructions**

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

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 the third <u>and</u> 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.*

c.   The list principle:
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 ☐

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**

e.   For answers marked by levels of response:
    i.   **Read through the whole answer from start to finish**
    ii.   **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
    iii.   **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 RM Assessor 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)	(i)	one box of each chemical ✔ every box of every chemical ☐ some boxes of one chemical only ☐ the whole contents from one box ☐	1	
		(ii)	uses clean containers ✔ uses a fume cupboard ☐ puts a lid on the containers ✔ uses the same apparatus for every test ☐ uses an accurate balance to weigh her samples ☐	2	
		(iii)	label	1	
	(b)		Bunsen burner — flame test filter paper — chromatography burette — titration (anion test unconnected)	3	each correct line 1 mark
	(c)	(i)	Copper (3rd answer)	1	
		(ii)	Sulfate (3rd answer)	1	
		(iii)	copper sulfate (1); sulfate test positive / test C/3 positive / test C/3 shows sulfate (1)	2	**allow** ecf from (i) AND/OR (ii) **do not allow** ecf from (ii)

Question			Answer	Marks	Guidance
	(d)	(i)	to make the test faster ☐ to test different compounds ☐ to make her conclusion more secure ✓	1	
		(ii)	Spectrophotometry (4th answer)	1	
			Total	13	

Question			Answer	Marks	
2	(a)			3	all three lines correct 2 marks two or one line correct 1 mark
	(b)	(i)	D (4th answer)	1	
		(ii)	B (2nd answer)	1	
	(c)		use of more than one space (1); divide scale reading by correct number of spaces (1); 3(.0) (micrometre) (1)	3	seen in working or explained eg 5 eg 15/5 no ecf from line above
	(d)		cannot view living things / expensive / need training takes time to set up / (only) black and white / needs electricity / not portable	1	
			Total	**9**	

Question			Answer	Marks	
3	**(a)**		(A) 8	**1**	
	(b)		see colours differently / depends on person	**1**	
	(c)	**(i)**	cheap(er) / easi(er) to use / quick(er)	**1**	**ALLOW** no need for calibration
		(ii)	pH 7.8 is closer to 8	**1**	
		(iii)	Quantitative (2nd answer): It's numerical	**2**	

Question			Answer	Marks	Guidance
3	(d)		**[Level 3]** Calculates mean and range **ignoring** rough trial **AND** makes appropriate comment on hypothesis using data. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Calculates mean and range **including** rough trial **AND** makes appropriate comment on hypothesis using data. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Calculates mean and range **including** rough trial **OR** makes appropriate comment on hypothesis using some data. 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:** **Ignoring rough trial** **Calculation:** • mean 64.8 • range 0.7 / 64.4-65.1 **Comment:** • agree with hypothesis **Explanation using data:** • 2x32.3=64.6 • range 64.1 – 65.5 **Including rough trial** **Calculation:** • mean 65.0 • range 1.2 / 64.4-65.6 **Comment:** • agree with hypothesis **Explanation using data:** • 2x32.3=64.6 • range 63.8 – 66.2 Look for mean and range in table **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
			Total	**12**	

Question			Answer	Marks	
4	**(a)**		to find out if the apparatus is working ☐ to get quantitative results ☐ to make her results accurate ☑	**1**	
	(b)	**(i)**	ring around 0.23/test 3	**1**	
		(ii)	outlier / very different to others / anomalous result	**1**	
	(c)		1.6 (g/l)	**1**	**allow** 1.55 – 1.65
	(d)		book / internet / manufacturer's data / other scientists' results	**1**	
			Total	**5**	

Question	Answer	Marks	Guidance
5	**[Level 3]** Identifies infected food **and** bacteria causing food poisoning **and** states which foods are safe **AND** gives explanation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies infected food **and** bacteria causing food poisoning **and** safe foods **OR** identifies infected food or bacteria or safe meals **and** gives explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies **EITHER** infected food **OR** bacteria causing food poisoning (ORA) **OR** safe foods. 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:** **Food poisoning:** • infected meal is Chicken • Caused by Listeria **Safe meals:** • Omelette, curry **Explanation:** • Compare pattern for person to food patterns • Compare pattern for person to bacteria patterns • Look for similarity between patterns • Person same pattern as chicken and listeria • Food not matching person's pattern is safe **Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.**
	Total	6	

Question			Answer	Marks	
6	**(a)**	**(i)**	spot at 0.1(0)	**1**	
		(ii)	Another /2 spots / 2 Rf values	**1**	
		(iii)	valine (4th answer)	**1**	
	(b)			**2**	all 4 correct 2 marks
					If not all correct allow 1 mark for *A* before **C and** *E* after **C** (any position)
			Total	**5**	

Table for (b):

A	*D*	**C**	*B*	*E*

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