

Cambridge National

Science

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

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
<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
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	no benefit of doubt
	reject
	correct response

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

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 and 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:
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	<input type="checkbox"/>
Manchester	<input type="checkbox"/>
Paris	<input type="checkbox"/>
Southampton	<input type="checkbox"/>

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

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)	both have pH greater than 7	1	
		(ii)	neutral	1	
		(iii)	A pH meter is less sensitive. <input type="checkbox"/>	1	
			A pH meter is quicker to use. <input checked="" type="checkbox"/>		
			A pH meter needs more calibration. <input type="checkbox"/>		
	(b)	(i)	G: iron II chloride F: copper chloride	2	If both incorrect then allow 1 for both chloride; 1 if both metals correct
		(ii)	same colour / both white	1	
			Total	6	

Question	Answer	Marks	Guidance
2	<p>[Level 3] Describes and explains all three of collection, storage and identification. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] EITHER describes all three of collection, storage and identification OR describes and explains two of collection, storage and identification. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] EITHER describes two of collection, storage and identification OR describes and explains one of collection, storage or identification. 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>Collection: Description</p> <ul style="list-style-type: none"> • Use tweezers, not hands • Wear gloves <p>Explanation</p> <ul style="list-style-type: none"> • Prevent contamination • Avoid altering evidence <p>Storage: Description</p> <ul style="list-style-type: none"> • Put fibres in clean container • Seal container <p>Explanation</p> <ul style="list-style-type: none"> • Prevent contamination • Prevent deterioration of fibres • Avoid tampering of evidence <p>Identification: Description</p> <ul style="list-style-type: none"> • Label container <p>Explanation</p> <ul style="list-style-type: none"> • Date • Where found <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
3	(a)	2.5÷50 (2 nd answer)	1	
	(b)	Electron microscopes not lines. <input type="checkbox"/>	1	
		Electron microscope images..... magnified. <input type="checkbox"/>		
		The drawing would get damaged. <input checked="" type="checkbox"/>		
	(c) (i)	green (3 rd answer)	1	
	(ii)	no numbers / colour only	1	
	(iii)	Any TWO from: cheap; easy to do / little/no training needed quick; simple apparatus	2	
	(d) (i)	(peaks) same as data (1); both wavenumbers 1400 and 1580 quoted (1)	2	
	(ii)	more than 2 peaks / another peak besides copper ones (OWTTE)	1	allow peak at 400
	(iii)	lead	1	
	(e) (i)	no peak at 1050	1	
	(ii)	find spectrum with same peaks or WTTE	1	Allow search for same relative intensities
		Total	12	

Question	Answer	Marks	Guidance
4	<p>[Level 3] Matches additives to all three drinks and names substances in those additives. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Matches additive to at least one drink and names substances in that additive OR names substances in all three drinks. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] EITHER matches additives to at least two drinks OR names substances in at least two additives OR names substances in at least two drinks. 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>X</p> <ul style="list-style-type: none"> • Matches to A1 • Allura red – dot at 0.30 • Glucose – dot at 0.79 <p>Y</p> <ul style="list-style-type: none"> • No additives match • Vitamin C – dot at 0.40 <p>Z</p> <ul style="list-style-type: none"> • Matches to A3 • Tartrazine – dot at 0.68 • Vitamin C – dot at 0.40 <p>A1: Allura red 0.30 & Glucose 0.79 A2: Vitamin C 0.40 & Brilliant blue 0.62 A3: Vitamin C 0.40 & Tartrazine 0.68 A4: DHMO 0.50</p> <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
5	(a)	by sealing the top of each tube <input checked="" type="checkbox"/>	2	
		by using a clean tube for each patient <input checked="" type="checkbox"/>		
		by using the same needle for all patients <input type="checkbox"/>		
		by taking only a small amount <input type="checkbox"/>		
		by taking blood from the same part <input type="checkbox"/>		
(b)	(i)	known concentration	1	
	(ii)	so there is no outlier <input type="checkbox"/>	1	
		so all the concentrations are whole numbers <input type="checkbox"/>		
		so she can find concentrations without <input checked="" type="checkbox"/>		
(c)	(i)	6.2	1	allow 6.1–6.3
	(ii)	no line	1	allow no data / no detail on graph
	(iii)	(recalibrate using) standard solution above 8(.0) mg/dL	1	allow extrapolate the straight line
(d)	(i)	19 (%)	1	allow 18-20
	(ii)	between 1.2 and 1.6 (3 rd answer)	1	
(e)		Perf: 24 (1): Level: severe	2	allow 23-25 allow ecf from performance to level
Total			11	

Question		Answer	Marks	Guidance
6	(a)	an indicator (2 nd answer)	1	
	(b)	(i) because the range of values is too large <input checked="" type="checkbox"/> because the variables are not controlled <input type="checkbox"/> because there are not enough results <input type="checkbox"/> because the range of values are not large <input type="checkbox"/>	1	
		(ii) outlier (1); sample 3 very different from rest (1)	2	allow range of 8.2
		(iii) Any TWO from: reduce human error; objective / not subjective / does not rely on Ben's sight; more sensitive; more samples used	2	allow more accurate / precise
	(c)	correct substitution: $(5 \times 2.2) / 43.6$ (1); 0.25 (1); comment to show value lies within accepted range (1)	3	correct answer without working shown gets 2 allow ecf from stated value
		Total	9	

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