OCR
Oxford Cambridge and RSA

Cambridge National

Science

Unit **R075/02:** How Scientific Data is Used

Level 2

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	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris 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

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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:
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 Scoris 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)		45.0	1	do **not allow** 45 **allow** if put next to question
	(b)		results close together / titration 2 and 3 within 0.1 / no trend up (or down)	1	**allow** consistent
	(c)	(i)	22.6 (cm^3)	1	
		(ii)	0.2 / 22.5 to 22.7 / 22.7 to 22.5	1	Unit not required
	(d)		0.75	1	**allow** 0.74 to 0.76 **allow** ecf from c(i)

Question			Answer	Marks	Guidance
1	(e)		**[Level 3]** Uses mean and range to make conclusions about both juices by stating amount in 100ml for both juices. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Uses mean and range to find concentration of one juice **OR** uses mean only to find concentration and amount in 100ml for one juice. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Uses mean only to find concentration of both juices. 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:** **[For level 3 only] Conclusions :** • 100ml fresh contains enough vitamin C /more than RDA / more than 40mg • long life mean shows just enough / cannot be sure / range shows not enough at lower amount **Amount in 100ml of each juice:** • fresh – 68 mg from mean • fresh –65 to 72 mg from range • long life – 40 mg from mean • long life – 37 to 44 from range **Concentration from mean only:** • fresh 0.68 mg/cm^3 • long life 0.40 mg/cm^3 **Concentration from mean and range:** • fresh 0.65 – 0.72 mg/cm^3 • long life 0.37 – 0.44 mg/cm^3 **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	**11**	

Question			Answer	Marks	Guidance
2	(a)	(i)	prevent drink moving down/into solvent	1	
		(ii)	spots move as far as possible (1); (bigger distances give) better accuracy (1)	2	**allow** (bigger distances make it) more precise
	(b)		*Any **TWO** from:* both contain fructose only drink 1 contains sucrose drink 2 has unknown sugar, but drink 1 doesn't	2	Comparisons needed for marks If no marks then allow 1 mark for full description of drink 1 **and** 2 eg drink 1 contains sucrose and fructose, drink 2 contains fructose and an unknown sugar
	(c)		known value / comparison	1	
	(d)	(i)	4.4/10 (1); 0.44 (1)	2	**allow** 4.2 to 4.6 **allow** 0.42 to 0.46 0.44 without working gets 2 marks
		(ii)	glucose	1	**allow** ecf from part (i)
		(iii)	repeatable √ secondary sensitive qualitative	1	
		(iv)	*Any **TWO** from:* different solvent different technique consult secondary data (eg book/internet)	2	**allow** named technique that would work
			Total	12	

Question			Answer	Marks	Guidance
3			**[Level 3]** Identifies most minerals correctly in all samples with reference to data. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies minerals correctly in at least two samples with some reference to data. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies all possible minerals correctly in at least one sample without reference to data **OR** identifies some possible minerals in all samples without reference to 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:** **Sample A:** • aegrine • peak at 420 and 780 • could be dioptase as well • peak at 780 **Sample B:** • could be dioptase • peak at 780 • could be emerald • wide peak across 430 + 600 • could be aegirine • wide peak across 420 + 780 **Sample C:** • dioptase • peak at 780 • something else • peaks do not fit any of four minerals **All samples:** • no match for tourmaline **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
			Total	6	

Question			Answer	Marks	Guidance
4	(a)		Cell: light mic (1); Bacterium: light **and** electron mic (1)	2	need both for mark
	(b)	(i)	Advantage: (1) Easier to use / less training needed Quicker to use Less preparation of specimen Can view live specimens In colour More portable Disadvantage: (1) Less magnification Less detail Image is only 2D	2	need **one** advantage need **one** disadvantage
		(ii)	larger field of view / see whole sample (ORA)	1	
	(c)	(i)	*Any **TWO** from:* Gender Age Surgery	2	
		(ii)	Keep specimens separate / Does not touch specimens / Does not breath on specimens / Seal container / Use a sterile container	1	**allow** wear gloves **allow** wear (face) mask

Question			Answer	Marks	Guidance
	(d)		*Any **THREE** from:* (no because) (only) one sample/B contains adenovirus One sample/C contains two different viruses Three samples contain unknown virus None of the viruses are common to all four specimens	**3**	No marks just for conclusion no
	(e)		*Any **TWO** from:* Look in book/internet Compare with shape of known viruses (OWTTTE) Ask other scientists/colleagues/doctors	**2**	**allow** any secondary source
	(f)		D = 0.001 x 0.030 x 300000 (1) 9mm (1)	**2**	
			Total	**15**	

Question			Answer	Marks	Guidance
5	(a)		yellow-green is pH6 (1) pH6 ranges from 6.0 to 6.9 (1); goldfish OK as ideal pH range falls in yellow/green range **OR** not OK as ideal pH range is nearer / goes into pH7(1); angelfish OK as pH is mainly within range of pH required (1);	4	**allow** 1 mark for sensible comment on pH range if no other mark
	(b)		*Any **TWO** from:* (results are) quantitative not subjective / do not rely on observer's vision more sensitive / more accurate / read to (at least) 1decimal place easier to match with data for fish (OWTTTE)	2	**allow** more precise **allow** can use pH meter more than once.
			Total	6	

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