

Cambridge National
Science in the Workplace

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

Level 1

Mark Scheme for January 2014

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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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For answers marked by levels of response:

- a. **Read through the whole answer from start to finish**
- b. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- c. **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

- d. 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.

Annotations

Annotation	Meaning
	correct response
	incorrect response
BOD	benefit of the doubt
NBOD	benefit of the doubt not given
ECF	error carried forward
	information omitted
I	ignore
R	reject
CON	contradiction
L1	Level 1
L2	Level 2
L3	Level 3

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
()	=	words which are not essential to gain credit
<u> </u>	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Answer	Mark	Guidance
1	a	i	phenolphthalein <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	1	
		ii	Some indicators would not change colour <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1	
	b		(Sample 3) very different / anomalous result / outlier / possible error / range (too) large / wide;	1	allow all others are 3 / around the same number / sample 3 is an incorrect result / does not match others / not '3. something' ignore sample 3 is less than others / a low number
	c		Evidence of correct addition; (1) 3.4; (1)	2	(3.2 + 3.5 + 3.6 = 10.3) ignore more than 1dp correct answer scores 2
	d	i	34;	1	allow ecf from (c)
		ii	25x34; (1) 850; (1)	2	allow ecf from (di) correct answer scores 2
Total				8	

Question		Answer	Mark	Guidance
2	a	In case you make an error / in case of contamination / to take into account changing conditions/places ; (1) Repeatability / to obtain a mean result / to obtain a representative result; (1)	2	allow (more) reliable ignore (more) accurate
	b	Water quality across whole of reservoir / could be contaminated in one part; (1) Conditions change during the day; (1)	2	
	c	[Level 3] Describes both how to avoid contamination and the technique in detail. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) [Level 2] Briefly describes both how to avoid contamination and technique or gives more details about either. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) [Level 1] Briefly describes a way to avoid contamination or a technique. 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 M Relevant points include: Avoiding contamination <ul style="list-style-type: none"> • Use sterile/clean container • Idea of keeping samples separate • Put lid on container • Different collector for each sample Technique <ul style="list-style-type: none"> • Idea of consistent practice eg. Dip in water for same length of time/depth • Idea of labelling • Date, time, place

Question			Answer	Mark	Guidance
2	d	i	To avoid any systematic error in her measurements <input checked="" type="checkbox"/> To make her measurements accurate <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	2	
		ii	concentration;	1	
	e	i	0.05;	1	allow 0.41 to 0.46.
		ii	Within range;	1	
			Total	15	

Question			Answer	Mark	Guidance
3	a	i	Green;	1	
		ii	(D) A C B	1	
		iii	<p>Its colour is similar to the colour for copper</p> <p>It is present in much smaller amounts than the copper</p>	2	
	b	i	520;	1	allow 519 to 521.

Question			Answer	Mark	Guidance
3	b	ii	<p>[Level 3] Uses similarities and differences to explain both aspects of conclusion. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Uses a similarity or difference to explain an aspect of conclusion. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Describes a similarity or difference, but does not relate them to aspects of the conclusion. 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>similarities of graphs</p> <ul style="list-style-type: none"> • pattern of three peaks • in same wavelength range • much lower above and below this range <p>differences of graphs</p> <ul style="list-style-type: none"> • highest intensity at a different wavelength • different pattern below 500 nm • different pattern above 540 nm • varies a lot more • more peaks <p>aspects of conclusion</p> <ul style="list-style-type: none"> • similarities indicate presence of copper • differences indicate presence of other metals • if only copper graph would be the same • biggest at 520nm if only copper <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		iii	<p>use the spectrophotometer / get the graph; (1)</p> <p>for a sample of the other metal; (1)</p>	2	<p>allow use secondary sources for spectrophotometer graph</p> <p>allow precipitation tests</p> <p>allow 1 mark only for test other metal</p> <p>do not allow repeat / more tests</p>
			Total	13	

Question			Answer	Mark	Guidance			
4	a	i	use of calibration curve e.g. 60 μA gives 5.0 S/m; (1) conclusion e.g. between 5.5 S/m and 4.5 S/m; (1)	2	credit evidence on graph			
		ii	Test five more samples from the same bag <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table>			✓	1	
✓								
		iii	make up a solution of pure ammonium sulfate; (1) should give reading of 54 μA ; (1)	2	allow 5.5 S/m allow 1 mark only for use a solution of known value			
	b	i	C	1				
		ii	A	1				
	c		tests positive for sulfate; (1) no evidence for ammonium / needs to test for ammonium; (1)	2				
			Total	9				

Question			Answer	Mark	Guidance
5	a		Microscope;	1	
	b	i	distance moved by solvent = 8 and distance moved by B = 6.6 ; (1) R _f value = 0.83; (1)	2	Both values needed for 1 mark allow 7.9 – 8.1 cm / 6.5-6.8 allow value from 0.8(0) to 0.86 correct answer without working shown gains 2 marks
		ii	The idea that 0.61 is nearer to 0.59; (1) valine; (1)	2	1 mark for not methionine - has an R _f value of 0.55 'nearer to valine' = 2 marks
			Total	5	

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