Cambridge National

Science in the Workplace

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

Level 1

Mark Scheme for January 2014

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
__	=	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 ✓	1	
		ii	Some indicators would not change colour …… ✓	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** • Use sterile/clean container • Idea of keeping samples separate • Put lid on container • Different collector for each sample **Technique** • 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 ✓ To make her measurements accurate ✓	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	Its colour is similar to the colour for copper ✓ It is present in much smaller amounts than the copper ✓	2	
	b	i	520;	1	**allow** 519 to 521.

Question			Answer	Mark	Guidance
3	b	ii	**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to D** **similarities of graphs** • pattern of three peaks • in same wavelength range • much lower above and below this range **differences of graphs** • highest intensity at a different wavelength • different pattern below 500 nm • different pattern above 540 nm • varies a lot more • more peaks **aspects of conclusion** • 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 **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
		iii	use the spectrophotometer / get the graph; (1) for a sample of the other metal; (1)	2	**allow** use secondary sources for spectrophotometer graph **allow** precipitation tests **allow** 1 mark only for test other metal **do not allow** repeat / more tests
			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 ✓	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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