

**Cambridge National**  
**Science in the Workplace**

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

Level 1

**Mark Scheme for January 2014**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 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
<b>BOD</b>	benefit of the doubt
<b>NBOD</b>	benefit of the doubt <b>not</b> given
<b>ECF</b>	error carried forward
	information omitted
<b>I</b>	ignore
<b>R</b>	reject
<b>CON</b>	contradiction
<b>L1</b>	Level 1
<b>L2</b>	Level 2
<b>L3</b>	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
<b>allow</b>	=	answers that can be accepted
<b>not</b>	=	answers which are not worthy of credit
<b>reject</b>	=	answers which are not worthy of credit
<b>ignore</b>	=	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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td></tr><tr><td> </td></tr><tr><td>✓</td></tr></table>			✓	1		
✓									
		ii	Some indicators would not change colour ..... <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>✓</td></tr><tr><td> </td></tr><tr><td> </td></tr><tr><td> </td></tr></table>	✓				1	
✓									
	b		(Sample 3) very different / anomalous result / outlier / possible error / range (too) large / wide;	1	<b>allow</b> 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)  <b>ignore</b> more than 1dp correct answer scores 2				
	d	i	34;	1	<b>allow</b> ecf from (c)				
		ii	25x34; (1)  850; (1)	2	<b>allow</b> ecf from (di)  correct answer scores 2				
			<b>Total</b>	<b>8</b>					

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	<b>allow</b> (more) reliable <b>ignore</b> (more) accurate
	b	Water quality across whole of reservoir / could be contaminated in one part; (1)  Conditions change during the day; (1)	2	
	c	<b>[Level 3]</b> 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)  <b>[Level 2]</b> Briefly describes <b>both</b> how to avoid contamination <b>and</b> technique or gives more details about either. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)  <b>[Level 1]</b> Briefly describes a way to avoid contamination <b>or</b> a technique. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)  <b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	<b>This question is targeted at grades up to M</b>  <b>Relevant points include:</b>  <b>Avoiding contamination</b> <ul style="list-style-type: none"> <li>• Use sterile/clean container</li> <li>• Idea of keeping samples separate</li> <li>• Put lid on container</li> <li>• Different collector for each sample</li> </ul> <b>Technique</b> <ul style="list-style-type: none"> <li>• Idea of consistent practice eg. Dip in water for same length of time/depth</li> <li>• Idea of labelling</li> <li>• Date, time, place</li> </ul>

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	<b>allow</b> 0.41 to 0.46.
		ii	Within range;	1	
			<b>Total</b>	<b>15</b>	



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><b>[Level 3]</b> Uses similarities <b>and</b> 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><b>[Level 2]</b> Uses a similarity <b>or</b> 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><b>[Level 1]</b> Describes a similarity <b>or</b> 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><b>[Level 0]</b> Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p><b>This question is targeted at grades up to D</b></p> <p><b>similarities of graphs</b></p> <ul style="list-style-type: none"> <li>• pattern of three peaks</li> <li>• in same wavelength range</li> <li>• much lower above and below this range</li> </ul> <p><b>differences of graphs</b></p> <ul style="list-style-type: none"> <li>• highest intensity at a different wavelength</li> <li>• different pattern below 500 nm</li> <li>• different pattern above 540 nm</li> <li>• varies a lot more</li> <li>• more peaks</li> </ul> <p><b>aspects of conclusion</b></p> <ul style="list-style-type: none"> <li>• similarities indicate presence of copper</li> <li>• differences indicate presence of other metals</li> <li>• if only copper graph would be the same</li> <li>• biggest at 520nm if only copper</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>
		iii	<p>use the spectrophotometer / get the graph; (1)</p> <p>for a sample of the other metal; (1)</p>	2	<p><b>allow</b> use secondary sources for spectrophotometer graph</p> <p><b>allow</b> precipitation tests</p> <p><b>allow</b> 1 mark only for test other metal</p> <p><b>do not allow</b> repeat / more tests</p>
			<b>Total</b>	<b>13</b>	

Question			Answer	Mark	Guidance			
4	a	i	use of calibration curve e.g. 60 $\mu\text{A}$ 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 $\mu\text{A}$ ; (1)	2	<b>allow</b> 5.5 S/m <b>allow</b> 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				
			<b>Total</b>	<b>9</b>				

Question			Answer	Mark	Guidance
5	a		Microscope;	1	
	b	i	distance moved by solvent = 8 <b>and</b> distance moved by B = 6.6 ; (1)  R <sub>f</sub> value = 0.83; (1)	2	Both values needed for 1 mark  <b>allow</b> 7.9 – 8.1 cm / 6.5-6.8  <b>allow</b> 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 <sub>f</sub> value of 0.55  'nearer to valine' = 2 marks
			<b>Total</b>	<b>5</b>	

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
**is a Company Limited by Guarantee**  
**Registered in England**  
**Registered Office; 1 Hills Road, Cambridge, CB1 2EU**  
**Registered Company Number: 3484466**  
**OCR is an exempt Charity**

**OCR (Oxford Cambridge and RSA Examinations)**  
**Head office**  
**Telephone: 01223 552552**  
**Facsimile: 01223 552553**

© OCR 2014

