

Cambridge National

Science

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

Level 1

Mark Scheme for January 2017

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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.

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Question			Answer	Marks	Guidance												
1	(a)	(i)	21.4 to 28.8	1	allow 28.8 to 21.4												
		(ii)	large difference in the range ;	1													
	(b)		before titration 2 ; before titration 4 ;	2													
	(c)		final answer 0.4(%) ; (2) shows $\div 25.0$ anywhere in answer ; (1)	2													
	(d)		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%; text-align: center;">.... higher ...</th> <th style="width: 25%; text-align: center;">.... lower ...</th> </tr> </thead> <tbody> <tr> <td>Eve uses less vinegar than she should...</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td>The burette tap leaks alkali.</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td>Eve misses the endpoint of the titration</td> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>	 higher lower ...	Eve uses less vinegar than she should...		✓	The burette tap leaks alkali.	✓		Eve misses the endpoint of the titration	✓		2	All correct (2) Two correct (1)
 higher lower ...															
Eve uses less vinegar than she should...		✓															
The burette tap leaks alkali.	✓																
Eve misses the endpoint of the titration	✓																
	(e)		values are close / similar results / reliable / within 0.1 / concordant ;	1													
			Total	9													

Question			Answer	Marks	Guidance
2	(a)	(i)	<p><i>Any 2 from:</i> many places; random places ; multiple samples from same place ; different times of the day; same depth; same distance from shore; (deliberately) near industry / range of type of places ; lakes and streams / still water and running water ;</p>	2	
		(ii)	<p><i>Any 2 from:</i> clean equipment (for each sample) ; labelled tubes ; containers not metal ; care that containers are not broken ; sealed container / check for leaks / watertight ; care not to contaminate ;</p>	2	

Question		Answer	Marks	Guidance
2	(b)	<p>[Level 3] States one correct point about each water sample AND the safety of the water. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] States one correct point about one water sample AND the safety of the water OR states a correct point about 2 water samples. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] States one correct point about one water sample OR the safety of the water. 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> <ul style="list-style-type: none"> • Test results only qualitative • Concentration of metals unknown • Only one test so not reliable <p>Point about A and B</p> <ul style="list-style-type: none"> • A contains either zinc or lead • B contains copper ions <p>Points about C</p> <ul style="list-style-type: none"> • C does not contain zinc, lead or copper • C contains an unknown (metal) ion <p>Safety of the water</p> <ul style="list-style-type: none"> • A may contain harmful ion / don't know it it's safe • C may contain harmful ion / don't know it it's safe • B is (possibly) safe to drink / could be unsafe / at high concentration could contain harmful ions <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
		Total	10	

Question		Answer	Marks	Guidance												
3	(a)	<p>look for a colour <input checked="" type="checkbox"/></p> <p>measure the mass change in the rock <input type="checkbox"/></p> <p>compare to test results for known metals <input checked="" type="checkbox"/></p> <p>compare the height of the flame <input type="checkbox"/></p> <p>measure the temperature change <input type="checkbox"/></p>	2													
	(b)	<p><i>Any 2 from:</i> idea of more accurate technique / results; gives quantitative results; gives a print out; identifies more ions / many cations do not colour a flame so cannot be identified by a flame test; check/compare results; see if both results are the same to increase confidence idea;</p>	2	Allow more reliable												
	(c)	<table border="1"> <thead> <tr> <th>type of data</th> <th>primary</th> <th>secondary</th> </tr> </thead> <tbody> <tr> <td>results of Ben's flame tests on more rocks.</td> <td>✓</td> <td></td> </tr> <tr> <td>data about local rocks found on the internet.</td> <td></td> <td>✓</td> </tr> <tr> <td>results of tests published by another geologist.</td> <td></td> <td>✓</td> </tr> </tbody> </table>	type of data	primary	secondary	results of Ben's flame tests on more rocks.	✓		data about local rocks found on the internet.		✓	results of tests published by another geologist.		✓	2	All three correct gets 2 marks Two correct gets 1 mark
type of data	primary	secondary														
results of Ben's flame tests on more rocks.	✓															
data about local rocks found on the internet.		✓														
results of tests published by another geologist.		✓														
Total			6													

Question			Answer	Marks	Guidance
4	(a)	(i)	does not move / leak / run /ORA /mix with dye	1	
		(ii)	all dots start at same place / control starting place	1	
		(iii)	A and C (1); dots in same positions (1)	2	need both Ignore: similar dots
		(iv)	all contain same dye/colour	1	
	(b)	(i)	0.3(0)	1	allow 0.28 to 0.32
		(ii)	sunbrite and eijon (3 rd answer)	1	
			Total	7	

Question	Answer	Marks	Guidance
5	<p>[Level 3] Makes use of data in both graphs AND dates them with reference to relative intensity. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Makes use of data in both graphs AND correctly dates them without reference to relative intensity. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Makes use of data in one graph AND correctly dates it OR makes use of data in both graphs OR correctly dates both graphs. 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>Music Y:</p> <ul style="list-style-type: none"> • Line at 3.8=Ca, Intensity 0.4 • 6.3=Fe, Intensity 1.0 • 8.4=Zn, Intensity 0.5 • No line at 5.9=no Mn • Rel int fit 18th Cent <p>Music Z:</p> <ul style="list-style-type: none"> • Line at 5.9=Mn, Intensity 0.2 • 6.3=Fe, Intensity 1.0 • 8.4=Zn, Intensity 0.5 • No line at 3.8=no Ca • No Ca does not match 18th or 19th Cent • Rel int does not match 18th or 19th Cent • Unknown as does not fit 18th or 19th Cent <p>Use the L1, L2, L3 annotations in RM Assessor; do not use ticks.</p>
	Total	6	

Question		Answer	Marks	Guidance
6	(a)	stage → the glass slide objective lens → this is changed eyepiece lens → you look through	3	
	(b)	(i) A (1 st answer)	1	
		(ii) C and D (3 rd and 4 th answers)	1	both needed
		(iii) D (4 th answer)	1	
	(c)	Electron (microscope)	1	
		Total	7	

Question		Answer	Marks	Guidance
7	(a)	She uses the same stirrer and wipes it with her hands each time <input type="checkbox"/> She uses the same stirrer without wiping it. <input type="checkbox"/> She uses a sterile stirrer for each container. <input checked="" type="checkbox"/>	1	
	(b)	(i) X and Y	1	both needed
		(ii) people see colours differently / subjective	1	
	(c)	(i) 0.5	1	
		(ii) 2 days (2 nd answer)	1	
		Total	5	

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