



Cambridge National

Science

Level 2

Unit **R075/02:** Science in the Workplace

Mark Scheme for June 2013

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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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1. Multiple Responses:

- a. **Short Answer Questions** (requiring only a list by way of a response, usually worth only **one mark per response**)
- Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked.
 - The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered.
 - The remaining responses should not then be marked.
 - Examiners will have to apply judgement as to whether a ‘second response’ on a line is a development of the ‘first response’, rather than a separate, discrete response.
- b. **Short Answer Questions** (requiring a more developed response, worth **two or more marks**)
- If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards
- c. **Longer Answer Questions** (requiring a developed response)
- Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked.
 - Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a ‘new start’ or simply a poorly expressed continuation of the first response.

2. Contradictory Responses:

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

3. 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/owt/e	alternative wording
ORA	or reverse argument

Available in scoris to annotate scripts

Annotation	Meaning
	indicate uncertainty or ambiguity
	benefit of doubt
	contradiction
	incorrect response
	error carried forward
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	draw attention to particular part of candidate's response
	no benefit of doubt

Annotation	Meaning
	reject
	correct response
	draw attention to particular part of candidate's response
	information omitted

4. Subject-specific Marking Instructions

- a. If a candidate alters his/her response, examiners should accept the alteration.
- 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.

Eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the
two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

This would be worth
1 mark.

Put ticks (✓) in the
two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

This would be worth
0 marks.

Put ticks (✓) in the
two correct boxes.

✓
<input type="checkbox"/>

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, eg 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 boxes:

Always check the additional guidance.

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. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. 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.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓	✓			✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Answer	Marks	Guidance
1	(a)	(i)	samples mixed/some of one sample in another; idea of small amounts;	2	allow specific examples
		(ii)	wear gloves; keep equipment clean; use bags/sealed bags; idea of keeping separate;	any 2	
	(b)	(i)	both give blue precipitates (with dilute sodium hydroxide);	1	
		(ii)	no reaction with silver nitrate;	1	
		(iii)	Mineral 1 = malachite Mineral 2 = bluestone 1 mark for each reason: Mineral 1 malachite because fizzes with dilute acid (1) Mineral 2 bluestone because gives white precipitate with barium chloride (1)	1 2	if copper carbonate and copper sulphate are used scores 0 for first marking point but can get 2 explanation marks if minerals are reversed max 2 marks (for correct reason) if mineral 2 is the only one left ie elimination scores 0
	(c)		Box 3	1	
			Total	10	

Question		Answer	Marks	Guidance
2	(a)	take samples from some bushes; calculate the mean of sample bushes; multiply to estimate the amount on all bushes	3	allow idea of taking a sample from a part of the bush for 1 mark
	(b)	0.9; (2) or 1.8; (1) $/2 = 0.9(\text{mm})$ (1)	2	
	(c) (i)	bush with similar number of greenfly but not sprayed	1	
	(ii)	number of greenfly on bushes before spraying; number of (live/dead) greenfly on bushes after spraying; comparison with control	any 2	allow ideas about volume of pesticide needed
		Total	8	

Question		Answer	Marks	Guidance
3	(a)	<p>Level 3 (5–6 marks) Links most characteristics to the evidence and identifies evidence for relationships. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Links most characteristics to the evidence. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Links a characteristic clearly to evidence or states 2 pieces of evidence. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to M</p> <p>Indicative scientific points may include:</p> <p>Characteristic: Age</p> <ul style="list-style-type: none"> • both mummies only had adult teeth • mummy 1 young linked to no wisdom teeth • mummy 1 young linked to no wear on teeth • mummy 1 young linked to no bone growths • mummy 2 older linked to worn teeth • mummy 2 older linked to extra bone growth. <p>Characteristic: Cause of Death</p> <ul style="list-style-type: none"> • M1 accident evidence leg broken • M2 old age – no evidence of accident/no broken bones. <p>Characteristic: Wealth</p> <ul style="list-style-type: none"> • both have jewellery linked to wealthy • M2 more jewellery than M1. <p>Characteristic: Height</p> <ul style="list-style-type: none"> • both mummies length > 1.7m • mummy 2 longer than mummy 1. <p>Characteristic: Related</p> <ul style="list-style-type: none"> • both have unusual jaw shape • both unusually tall • both teeth turned inward. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>

Question		Answer	Marks	Guidance
(b)		can look at large area/do not need a lot of equipment/fast to use/portable/cheap/easy to use more detail/greater magnification/gives a computer image/photo;	2	allow look at live specimens allow can see in situ
		Total		8

Question		Answer	Marks	Guidance
4	(a)	random sampling; evenly spread; different times of the day; from all batches;	any 2	
	(b)	box 1	1	
	(c) (i)	box 1; box 3;	2	
	(ii)	good	1	
	(iii)	has a range of 0.20/data is within the range for good	1	allow ecf
	(iv)	20.34; (2) For (1) mark either all 5 accurate readings shown to be added together and divided by 5; or rough trial included in mean (giving 20.45);	2	
	(d) (i)	199mg	1	allow 198.5 to 199.5
	(ii)	yes (it is within 2% of 200mg); the allowable range is 196 to 204/evidence of working out;	2	use answer from 4d(i)
	(e)	more accurate; more sensitive; automatic data input/calculation; no human error; can do many titrations at one time; saves operator time/labour cost	any 2	
			Total	14
5	(a)	TTFT	2	All correct (2)

Question		Answer	Marks	Guidance
				2/3 correct (1)
(b)		<p>Level 3 (5–6 marks) Makes points about safety of drink 2 and makes points about both drinks. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Makes points about the contents of both drinks. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Makes points about the contents of a drink. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to D*</p> <p>Indicative scientific points may include:</p> <p>Drink 1</p> <ul style="list-style-type: none"> • Has spot at Rf 0.8 • Has spot at Rf 0.5 • Contains food colour D • Contains food colour E • D is a safe colour • E is a safe colour. <p>Drink 2</p> <ul style="list-style-type: none"> • Has spot at Rf 0.9 • Has spot at Rf 0.6 • Has spot at Rf 0.3 • Contains food colour C • Food colour C is safe. <p>Safety of Drink 2</p> <ul style="list-style-type: none"> • Drink 2 has unknown/other spots • Do not know what food colours they are • Do not know if they are safe or harmful. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
(c)		box 1; box 3;	2	
		Total	10	

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