Cambridge National

Science

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

Level 1

Mark Scheme for June 2014

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/owtte	credit alternative wording / or words to that effect
ORA	or reverse argument

Available in scoris to annotate scripts:

BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
?	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
✖	incorrect response
ECF	error carried forward
⬭	draw attention to particular part of candidate's response
NBOD	no benefit of doubt
R	reject

✔	correct response
L1 , L2 , L3	draw attention to particular part of candidate's response
∧	information omitted
?	indicate uncertainty or ambiguity
BOD	benefit of doubt
CON	contradiction
✘	incorrect response
ECF	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
NBOD	no benefit of doubt
R	reject
✔	correct response
⧘	draw attention to particular part of candidate's response
∧	information omitted

Subject-specific Marking Instructions

a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).

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.

   e.g. for a one-mark question where ticks in the third <u>and</u> fourth boxes are required for the mark:

| *This would be worth 1 mark.* | *This would be worth 0 marks.* | *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, e.g. 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-box questions:

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 and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. 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.

e.g. if a question requires candidates to identify cities in England:

Edinburgh

Manchester

Paris

Southampton

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

Edinburgh			✔			✔	✔	✔	✔	
Manchester	✔	✘	✔	✔	✔				✔	
Paris				✔	✔		✔	✔	✔	
Southampton	✔	✘		✔		✔	✔		✔	
Score:	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**NR**

e. For answers marked by levels of response:
   i.   **Read through the whole answer from start to finish**
   ii. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor
   iii. **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

iv.   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.

Question			Answer	Marks	Guidance
1	(a)	(i)	8	1	
	(a)	(ii)	chick peas	1	**Allow** ecf from part (i)
	(b)		repeatable	1	
	(c)	(i)	reproducible	1	
	(c)	(ii)	confirm result using second method	1	**Allow** quicker / more accurate / easy / more precise **Do NOT allow** better
	(d)	(i)	any sensible answer eg soil type / rainfall / how quickly it grows / price / profit / demand / pests / disease resistance / other necessary elements in soil	1	
	(d)	(ii)	use reference material / use internet / do another experiment	1	
			Total	**7**	

Question			Answer	Marks	Guidance
2	(a)	(i)	sodium is yellow/orange (1) barium is green (1)	2	**Allow** colour (of flame) (1); **Allow** different elements/cations give different colours (1)
	(a)	(ii)	qualitative	1	
	(b)	(i)	**AnionTest** add dilute acid to the powder ✓ add dilute barium chloride to a solution of the powder add dilute silver nitrate to a solution of the powder	1	
	(b)	(ii)	use lime water (1); goes milky/white precipitate/cloudy (1)	2	

Question	Answer	Marks	Guidance
2 (c)	**[Level 3]** Gives the steps in the procedure in the correct order **AND** explains at least one way of avoiding contamination. No significant errors in science or use of scientific terms. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Gives most of the steps in the procedure in the correct order **AND** describes one way of avoiding contamination. Some errors in science. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Some steps in the procedure are given but may not be sequenced correctly **OR** describes one way of avoiding contamination. 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** **Indicative scientific points may include:** Procedure: • dip platinum loop in powder in beaker • put loop into flame • observe colour of flame Contamination avoidance: • put some of powder from bag in a clean beaker • dip platinum loop in acid • check no colour in flame Explanation: • putting some powder in clean beaker avoids contamination of bag of powder • dipping platinum loop in acid and heating • cleans loop / removes traces of previous test **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	12	

Question			Answer	Marks	Guidance
3	(a)		bromothymol blue methyl orange phenolphthalein √	1	
	(b)	(i)	independent (1); dependent (1); controlled (1)	3	
	(b)	(ii)	evaluate repeatability / take mean / check results / to make it more reliable	1	**Do NOT allow** fair test / accurate
	(c)	(i)	(McNairs) 3.0 (g) (1); (Scrumpi's) 4.4 (g) (1)	2	Allow 2.9 - 3.1 (g) Allow 4.3 - 4.5 (g)
	(c)	(ii)	(too much) McNairs (1); (strongest) Allgoods (1)	2	

Question	Answer	Marks	Guidance
3 (d)	**[Level 3]** Calculates **BOTH** range and mean rejecting outlier **AND** concludes that it is not watered down. Quality given and decision made. No significant errors in science. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Calculates **BOTH** range and mean **AND** concludes that it is not watered down. Decision made on whether watered down. Some errors in the use of scientific terms. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Calculates **EITHER** range or mean **OR** takes one value to make a 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** **Indicative scientific points may include:** **Ignoring test 3** • range: 22.0 to 22.5/0.5 • mean: 22.2 • omit 15.0 • test 3 is outlier / made mistake in reading • not watered down • use of graph **Not Ignoring test 3** • range: 15.0 to 22.5/7.5 • mean: 20.4 • include all tests • poor quality due to large range • not watered down **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**15**	

Question			Answer					Marks	Guidance
4	(a)		**Phase**		**Component**			2	
			Stationary		Drink spot				
			Mobile		Paper				
					Pencil line				
					Solvent				
	(b)	(i)				**True**	**False**	2	
			Drink 1 contains more than one substance.			√			
			Drink 1 contains fructose.			√			
	(b)	(ii)	known sugar/value (1); for comparison (1)					2	
	(b)	(iii)	3.0/10 (1); 0.3 (1)					2	**Allow** 0.28 to 0.32 0.3 without working gets 2 marks
	(b)	(iv)	galactose (1); the Rf values match (1)					2	**Allow** ecf from b(iii) **Allow** nearest sugar within 0.04
	(c)	(i)	Edward (1): Comment about why Edward is correct eg. another sugar present with similar R_f/R_f of about 0.3 (1)					2	**Do NOT allow** Philip or Ann **Allow** answer saying why Philip **AND** Ann are wrong
	(c)	(ii)	Different solvents move at different speeds up the paper.					2	
			The R_f value for a sugar depends on the solvent.			√			
			It gives more data about the sugars present.			√			
			It makes it a fair test.						
	(c)	(iii)	gas chromatography /GC / HPLC / mass spectrometer (1); more sensitive (1)					2	**Allow** clinisticks/clinistix **Allow** precise / accurate / gives more evidence / less human error
							Total	16	