



Mark Scheme (Results)

March 2016

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 8: Scientific Skills (20474E)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Item	Expected answers	Additional guidance	Marks
1(a)	Thermometer		1
1(b)(i)	Burns	Allow sets fire to self/hair and/or clothes Reject: scalding	1
1(b)(ii)	hot/boiling water/hot glassware/hot ball	Not 'water' /'beaker'/ 'ball' alone	1
1(c)(i)	Any two from: (same) ball (1) (same) ball material (1) (same) ball mass / weight (1) (same) ball size (1) (same) drop height (1) (same) (bounce) surface (1) No force used to drop the ball (1)		2
1(c)(ii)	Height of bounce	Ignore 'height' alone	1
Total mark			6

Item	Expected answers	Additional guidance	Marks
2(a)	<p>The longer/greater the length of the leaf the greater the number of spikes (1)</p> <p>Leaves 7cm and longer all have the same number of spikes / the maximum number of spikes on a leaf is 16 (1)</p>	<p>Allow 'the bigger the leaf' ORA</p> <p>Allow: the number of spikes is the same for large leaves (1)</p>	2
2(b)	<p>Any 6 from:</p> <p>Gives a range of three or more heights (1)</p> <p>Measure the length of each leaf (1)</p> <p>Use the same bush/tree (1)</p> <p>Same side of the bush (1)</p> <p>Select a large sample of leaves for each height (1)</p> <p>(Measure length of leaf) at same time after picking from the tree (1)</p> <p>Flatten leaf (to measure length) (1)</p> <p>Repeat the whole experiment again with a different holly bush/tree (1)</p>	<p>Allow 1 mark for 'repeat (for each height)' if it follows a method statement.</p> <p>Allow any appropriate means of measuring the length of the leaf accurately</p>	6
Total mark			8

Item	Expected answers	Additional guidance	Marks
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<p>3</p>	<p>Column labelled (metal) carbonate and a column labelled (Relative) Formula Mass / RFM (1)</p> <p>Correctly placed the numbers and names in the corresponding column (1)</p> <p>Results placed in correctly ascending/ descending order (1)</p>	<p>Columns can be in either order.</p> <p>Reject 'mass' alone for RFM column.</p> <p>Ignore any units given.</p>	<p>3</p>
		<p>Total Mark</p>	<p>3</p>

Item	Expected answers	Additional guidance	Marks
4(a)	B 10%		1
4(b)	<p>Graph</p> <p>Axes (1) Correct x and y axis labelled with units (1)</p> <p>Scaling (2) Linear scale on both x and y-axis (1) Scale appropriate (1)</p> <p>Plotting (2) All 6 points plotted correctly (2) or 4 or 5 points plotted correctly (1)</p> <p>Line of best fit (1) Single straight line of best fit</p>	<p>If numbers on the axes are taken directly from the table in the order of the table then allow a maximum of 1 mark for the question. This is awarded for correctly labelled axes.</p> <p>Allow axes reversed.</p> <p>Data spread needs to cover at least half the graph paper.</p> <p>Allow +/- 1 small square plotting error.</p> <p>+/-1 small square Reject dot to dot lines</p>	6
		Total Marks	7
Item	Expected answers	Additional guidance	Marks
5(a)	<p>Tablet B (1)</p> <p>Most carbon dioxide is produced (1)</p>	<p>Second mark point dependent on the first</p> <p>Allow '185 is the highest (amount of carbon dioxide produced)' Must have a comparative, ie 'most' , 'highest'</p>	2

5(b)(i)	<p>Any 2 from:</p> <p>Not all tablets the same size/mass (1)</p> <p>Tablets had different contents (1)</p> <p>Incorrect timing (1)</p> <p>Different volumes/amount of hydrochloric acid (1)</p> <p>Different concentrations of hydrochloric acid (1)</p> <p>Stirred differently (1)</p> <p>Recorded measurement incorrectly (1)</p>		2
5(b)(ii)	Repeat (the experiment) (1)	<p>Allow 'use line of best fit'</p> <p>Allow compare to secondary data.</p>	1
		Total Mark	5

Item	Expected answers	Additional guidance	Marks
6 (a)(i)	Identify 225 (1) The result does not fit the others in the row (1)	Allow: dim test 2	2
6(a)(ii)	223 (2) OR $\frac{220 + 222 + 227}{3} \text{ (2)}$ OR $(220+222+227) \div 3 \text{ (2)}$ OR $\frac{669}{3} \text{ (2)}$ OR $220 + 222 + 227 \text{ (1)}$ OR A number divided by 3 (1)	669	2
6(a)(iii)	The answer is to too many significant figures/too many numbers after the decimal point (1) All the values given are to three significant figures/the ohm meter cannot measure to that level of accuracy/only measures to 3 significant figures (1)	Allow 'should be 192'	2
6(b)(i)	4 (V)		1
6(b)(ii)	Current and voltage are directly proportional (2)		2

	<p>OR</p> <p>The voltage increases as the current increases/there is a positive correlation (1)</p> <p>Directly proportional (1)</p>	<p>ORA</p> <p>Ignore 'the trend is going up'</p>	
6(b)(iii)	<p>5 (ohms) (2)</p> <p>OR</p> <p>1.5/0.3 (2)</p> <p>OR</p> <p>1.5 = 0.3 x Resistance (1)</p> <p>OR</p> <p>Voltage / current = resistance (1)</p>		2
		Total Mark	11

Item	Expected answers	Additional guidance	Marks
7(a)	<p>The increase in antibiotic resistance is not steady / there are times when there is no increase/ there are times when it is increasing rapidly (1)</p> <p>because the graph is level or the rise has slowed e.g. between 1992 and 1998 (1)</p> <p>There is no way of knowing if MRSA steadily becomes more resistant after 2004 (1)</p> <p>Because the graph is incomplete / graph does not go past 2004 / 2016 is not on the graph (1)</p>	<p>For the second mark, dates must be used</p> <p>Allow 'after 2001'</p>	4

Item	Expected answers	Additional guidance
7(b)	<p>Indicative Content</p> <ul style="list-style-type: none"> • Use inoculation loop/cotton buds to spread the bacteria evenly/cover the plate. • Use tweezers/cotton buds/pipette to place/drop antibiotics to prevent contamination. • Same size agar plate to get same spread of bacteria. • Use same size disc to ensure same amount of antibiotic. • Use pipette to ensure same amount of antibiotic. • Seal the plate to prevent contamination. • Use incubator/under light (suitable methods) to maintain temperature/growth rate. • Use square paper/ruler to measure how much bacteria is killed/measure clear zones. • Leave for set amount of time to allow antibiotic to kill bacteria. 	
Total mark		10
Level	0	No rewardable material
Pass	1-2	<p>Identifies an appropriate improvement and explains simply or identifies a second improvement.</p> <p>E.g. Leave for set amount of time to allow antibiotic to kill bacteria</p>

Merit	3-4	Identifies appropriate improvements and explains them. E.g. Use pipette to ensure same amount of antibiotic and seal the plate so no other bacteria can get in.
Distinction	5-6	Identifies a range of improvements and explains them. E.g. Use inoculation loop. This helps cover the plate evenly with bacteria. Then use the same size discs to use the same amount of antibiotic. Measure the clear zones using squared paper so we know how much bacteria is killed.

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