



Mark Scheme (Results)

June 2014

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.

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1 (a) (i)	(gas) syringe (1)			1
1 (a) (ii)	Thermometer (1)			1
1 (b)	To measure the gas/so that carbon dioxide goes into the gas syringe (1) To prevent the bung being pushed out (1)	To allow the gas out of the flask (1) To allow the gas/ oxygen/ air through Ignore reference to gas going into the flask To prevent the gas building up/stop it exploding (1)		2
1 (c) (i)	Same volume/ mass (of yeast) (1) Same type (of yeast) (1)	Same/ measure amount (of yeast) (1) Same species of yeast (1)		2
1 (c) (ii)	Time to collect (fixed volume of) the gas (1)	Volume of gas (1)		1

1 (d)	<p>Control temperature (using water bath) (1)</p> <p>Given volume/mass of yeast or glucose (1)</p> <p>Measure gas produced/time how long it takes to produce (volume) of a gas (1)</p> <p>Range of temperatures (1)</p> <p>Specifies temperatures below and above 40°C (1)</p> <p>Repeat to find a {mean/average} for each temperature (1)</p>	<p>Control temperature (using Bunsen burner/ heat plate) (1)</p> <p>Same amount of yeast/ glucose (1)</p> <p>Given examples e.g. start at 20 and go up in 5's (1)</p> <p>Provides enough {evidence/results} to {test the hypothesis/draw a conclusion/plot a graph} (1)</p>		6
Total				13 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)	<p>Cuts (1)</p> <p>Burns/ Scalds (1)</p>	<p>Answers must relate to risk to people.</p> <p>Ignore: Hazards e.g. sharp needle/ hot glassware</p>		2

2 (b)	<p>Axes (1) Labels and units (1)</p> <p>Scaling (2) Correct numbers scaled appropriately on X axis(1) Correct numbers scaled appropriately on Y axis not starting at 0 (1)</p> <p>Plotting (2) All 6 points plotted correctly (2)</p> <p>Line (1) Single straight line of best fit (1)</p>	<p>Accept reversal of axes</p> <p>If graph does not cover at least half of the graph paper (max 1 mark for scaling)</p> <p>If numbers on Y axis are directly taken from the table and evenly spaced e.g 21, 24, 27 then: Allow a max of up to 2 marks, 1 for correct X axis and 1 from correctly labelling units on both axes.</p> <p>4 or 5 points plotted correctly (1) +/- a small square ECF on plotting points from scaling/numbering error(s)</p> <p>Accept vertical lines instead of line graph – which could score 5 out of 6 marks if correctly drawn. Results that should be plotted for reference</p>	6
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2 (c)	<p>Any 1 mark from either:</p> <p>There is a temperature increase/rise of the water for both foods (1)</p> <p>Or the temperature of the water for potato rises more quickly (1)</p> <p>And</p> <p>Potato gives 8°C higher rise in water temperature (than pasta)/difference of 8°C (1)</p>	<p>Ignore pasta or potato temperature rising.</p> <p>Pasta increases the water temperature by 19°C and potato chip increases the water temperature by 27°C.</p> <p>(1)</p> <p>Any suitable interpretation of the data e.g. after 20 seconds the water temperature due to the potato is 4°C higher than pasta. (1)</p>		2	
				Total	10 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3 (a)	<p>Column labelled Pressure and Column labelled height(1)</p> <p>Correctly places the numbers in the corresponding column (1)</p> <p>Results placed in ascending/ descending pressure (1)</p>	<p>These are independently marked points</p> <p>Accept distance in place of height</p> <p>Pressure and height can be in either column.</p> <p>Ignore units.</p>		3
3 (b)	<p>28 (2)</p> <p>or</p> <p>$\frac{28 + 29 + 29 + 27}{4}$ (1)</p> <p>or</p> <p>113/4 (1)</p>	<p>28.0 (1)</p> <p>28.25 (1)</p>		2
			Total	5 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4 (a)	(speed) increases (1)			1
4 (b) (i)	The point at 1cm or 3cm is circled (1)		Any incorrect points circled.	1
4 (b) (ii)	<p>Any two of the following linked pairs:</p> <p>Second mark for each pair is dependent on the first.</p> <p>The ramp was steeper/smoother than it should have been (1) which meant the car went faster (than it should have done) (1) ORA</p> <p>The car has been changed/ started from a different position (1) which makes the speed of the car faster/ slower (1)</p> <p>Measured the time incorrectly (1) which meant the speed was incorrect (1)</p> <p>Recorded the results incorrectly (1) which meant the point was plotted incorrectly (1)</p> <p>Made an error in the calculation (1) making the result higher/ lower than it should be (1)</p>	<p>The ramp bends more/ direction of the car changes (1) which makes the speed of the car faster/ slower (1)</p> <p>The car was pushed (1) which meant the car went faster (than it should have done) (1)</p>		4
4 (c)	1.6 (1)	Any number between 1.55 and 1.65 (1)		1

4 (d)	0.035 (J) (2) or $0.05 \times 10 \times 0.07$ (2) or $7/100$ (1) or $0.05 \times 10 \times 7$ (1)	0.07m (1) 3.5 (1)		2
			Total	9 marks

Question Number	Correct Answer	Acceptable Answers	
5 (a) (i)	3.8 (1)		1
5 (a) (ii)	C (1)		1
5 (a) (iii)	(pH) increases (1)		1

5 (b)	<p>Any one linked explanation:</p> <p>Choose/ measure the volume/ amount/ mass of the acid (1) to ensure there is a comparison/ to see a pattern in the results. (1)</p> <p>Measure the volume/ amount/ mass of the carbonate (1) to ensure there is a comparison/ to see a pattern in the results. (1)</p> <p>Specify/ name the acid (1) to ensure there is a comparison/ to see a pattern in the results. (1)</p> <p>Repeat the experiment (1) to ensure reliable results/concordance/to calculate a mean (1)</p> <p>Use universal indicator/ pH meter (1) to obtain a pH reading (1)</p>	<p>Same/Given volume/ amount/ mass of the acid (1) to ensure there is a comparison/ to see a pattern in the results. (1)</p> <p>Given volume/ amount/ mass of the carbonate (1) to ensure there is a comparison/ to see a pattern in the results. (1)</p> <p>Ignore same amount of carbonate.</p>	2
Total			5 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (a)	<p>Any two from:</p> <p>Make sure it is safe/ no side effects (1)</p> <p>Make sure it works/ improve it (1)</p> <p>Work out correct dosage (1)</p>	Allergies/ named allergens		2

6 (b)	<p>Strengths:</p> <p>They used a large number of volunteers to give increased reliability The same number of volunteers in each group to make a comparison The same volume of saline solution was used in each group to make a comparison Group A were given an injection with no vaccine/ placebo as a control All had one injection to be able to compare/ to ensure the trial was kept blind Tested a range of doses to see which dose was most effective/worked best</p> <p>Weaknesses:</p> <p>Information was not given on age/sex/ethnicity etc of people tested, so not sure if there was a cross section of people used/ representative No time frame is given, they could have developed flu after the trail had ended Volunteers may not have been exposed to the virus. Negative results do not necessarily mean the flu jab was effective</p> <p>No information on previous medical history/ allergies/immune response so the natural defence is unknown</p>	
Level	Mark	Descriptor
	0	No rewardable material
Pass	1-2	A simple description and explanation or a few key points identified. E.g the same number of volunteers in each group to make a comparison or using 8000 people is a strength and they didn't say how long they would do the trial for is a weakness.
Merit	3-4	A description and explanation of two strengths or weaknesses or a simple description of three strengths or weaknesses with at least one explained. E.g. a strength is to use 8000 volunteers as this gives increased reliability, use the same number of volunteers in each group, there was no information given on the age or the sex of the people tested.
Distinction	5-6	A detailed description of three points which must come from strengths and weaknesses, two of the points should be explained. E.g they used the same number of volunteers in each group to make a comparison. They tested a range of doses. No information on previous medical history was given so their natural defence to the flu virus was unknown.
		Total Mark 6
Total mark for question 6		8

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