

Mark Scheme (Final)

March 2017

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 8: Application of Science (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.

BTEC Next Generation Mark Scheme

Item	Expected answers	Additional guidance	Marks
1a	Bunsen burner	allow Bunsen	1
1bi	time (taken to dissolve)	allow any reasonable units of time allow minutes/seconds allow 'how long it takes (to dissolve)' ignore references to speed	1
1bii	Any two from: mass of salt (used each time) volume of water (in the beaker) rate of stirring	allow amount of salt allow amount of water	2
1c	(the hot water can) {burn/scald} (1) because the water is {90°C/nearly boiling/ hot} (1) OR Burn/hair catching fire (1) because there is a {flame/hot Bunsen/hot beaker} (1)	ignore burns clothes, equipment etc.	2
Total mark			6

Item	Expected answers	Additional guidance	Marks
2a	<p>as the BMI increases (from 16) to {21, 22, 23} the blood pressure may fall / the blood pressure will be at its lowest at a BMI of {21, 22, 23} (1)</p> <p>as the BMI increases past {21, 22, 23} the blood pressure may rise / the blood pressure will be at its highest at BMI 34 (1)</p> <p>(on average) the blood pressure is {lower/less/smaller} than for older adults (1)</p>	<p>allow each mark if drawn graphically</p> <p>allow the pattern will be the same as the other lines on the graph for 1 mark</p> <p>ORA</p>	3
2b	<p>Any six from:</p> <p>use a large group (1)</p> <p>(of) males and females (1)</p> <p>scales (to measure mass) (1)</p> <p>ruler/tape/height measurer (to measure height) (1)</p> <p>measure the blood pressure when resting OWTTE (1)</p> <p>use groups that represents a range of BMI (1)</p> <p>measure the blood pressure at the same time of day/not after taking a stimulant (1)</p> <p>Maximum of 2 marks for control variables:</p> <p>similar age</p> <p>underlying health problems</p> <p>same blood pressure gauge</p> <p>same resting position</p> <p>same time of day</p> <p>check that a stimulant has not been taken e.g. caffeine</p> <p>they have all rested for the same amount of time</p>	<p>allow 5 or more of each gender for large</p> <p>allow weight</p>	6
Total mark			9

Item	Expected answers	Additional guidance	Marks
3a	column labelled (electrical) {appliance/device/object} and a column labelled power (1) correctly places the names and numbers in the corresponding column (1) results placed in correctly ascending/ descending order (1)	ignore units alone ie 'watts' columns can be in either order allow alphabetical ordering of electrical appliances	3

3b	<p>6.3 (A) (4)</p> <p>OR</p> <p>0.0063 (3)</p> <p>OR</p> <p>6.25 (A) 3</p> <p>OR</p> <p>(Current =) $\frac{1500}{240}$ (3)</p> <p>OR</p> <p>1500 = 240 x Current (2)</p> <p>OR</p> <p>(Current =) $\frac{1500}{\text{Voltage}}$ (2)</p> <p>OR</p> <p>$\frac{1.5}{240}$</p> <p>OR</p> <p>1.5 = 240 x Current (1)</p> <p>OR</p> <p>(Current =) $\frac{\text{Power (1)}}{\text{Voltage}}$</p> <p>OR</p> <p>1.5 x 1000</p>	<p>0.00625</p> <p>1500</p> <p>If no other mark is scored, allowed incorrect working <u>rounded correctly</u> to 2 sig figs gains one mark</p>	4
		Total Mark	7

Item	Expected answers	Additional guidance	Marks
4a	<p>Axes (1) X- axis: Speed (of car) km/h and Y -axis: braking distance m (1)</p> <p>Scaling (2) scale appropriate (1) correct numbers on both axes (1)</p> <p>Plotting (2) all 6 points plotted correctly (2)</p> <p>OR</p> <p>4 or 5 points plotted correctly (1)</p> <p>Line (1) line of best fit (1)</p>	<p>allow reversal of axes</p> <p>scale must be linear on both axes</p> <p>if numbers on the x and/or y-axis are taken directly from the table in the order of the table then allow a maximum of 1 mark for correct axes (1)</p> <p>+/- one small square</p> <p>line of best fit must be a smooth curve not dot to dot, not tram lined</p> <p>if bar chart drawn 1 mark max for axes label (1)</p>	6
4bi	<p>repeat the reading (1)</p> <p>remove the anomalous result and average just the two readings (1)</p>	<p>allow ignore it OWTTE</p>	2
4bii	8.5 (m)	<p>allow no tolerance</p>	1
Total Marks			9

Item	Expected answers	Additional guidance	Marks
5ai	172 (2) OR $\frac{150+158+180+200}{4} \quad (2)$ OR $150+158+180+200 \quad (1)$ OR any number divided by 4 (1)	688	2
5aii	Any two from: Number of cans doubles/increases between weeks 1 and {2/3} (1) number of cans stays the same in weeks 2 and 3 (1) number of cans doubles/increase from week {2/3} to week 4 (1) number of cans increases overall from week 1 to week 4 (1)		2
5bi	35 (%)		1
5bii	the graph is levelling off/stays the same (1) the rate of increase (after 2007) is too small (to reach target/it in the expected time) (1)		2
		Total Mark	7

Item	Expected answers	Additional guidance	Marks
6a	Frankie may have not read the energy used correctly (1) OR Frankie may have not written the energy used down correctly (1) OR rowing machine / equipment {error/malfunction} (1)		1
6b	24 (minutes)		1
		Total Mark	2

Item	Expected answers	Additional guidance	Marks
7a	<p>Any four from:</p> <p>the hypothesis for density is wrong because the density increases with atomic number (1)</p> <p>there is enough evidence to make a conclusion about density as there are figures for a range of metals/trend in density (1)</p> <p>(however), {sodium/potassium} do not fit that pattern (1)</p> <p>the hypothesis for boiling point is correct (for lithium and sodium/for first two elements) (1)</p> <p>there is not enough evidence to make a conclusion about boiling points (as only two boiling points are given) (1)</p>		4

7b	<p>Indicative content</p> <p>use a weighed amount/state how much is used of calcium carbonate, so that you use the same amount of reactant for each temperature.</p> <p>use a set volume of acid for each experiment, so, that the same amount each time is used.</p> <p>use a water bath to maintain a specific temperature.</p> <p>use a thermometer to measure the temperature of the acid.</p> <p>use a range of temperatures (e.g. 3 or more different temperatures) to see a pattern in the data.</p> <p>crush/check that the calcium carbonate does not appear in lumps so the surface area is the same</p> <p>stir/mix the solution so that the substances can react/dissolve evenly.</p> <p>use the same concentration of acids, so that concentration does not affect the rate of reaction.</p> <p>use a stopwatch to measure the time accurately</p> <p>time from when the calcium carbonate is added to the acid (and stop it when it stops bubbling). so that that the reaction time is known.</p> <p>Use a gas syringe/ displacement over water to collect a known volume of gas. to get a more accurate end point.</p>	6
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Level	0	No rewardable material.
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Pass	1-2	<p>Identifies one appropriate variable to control/improvement/change and explains simply or identifies a second improvement/change.</p> <p>e.g. Use a set volume of acid for each experiment, so that the amount of acid is known.</p> <p>OR</p> <p>Use a set volume of acid for each experiment and use a suitable range of temperatures.</p>
Merit	3-4	<p>Identifies changes to the method/control variable and explains the reasons for the changes. Or identifies three appropriate changes and explains one.</p> <p>e.g. Use a set volume of acid for each experiment, so that the amount of acid is known. Use the same concentration of acids, so that concentration does not affect the rate of reaction. Use a suitable range of temperatures</p>
Distinction	5-6	<p>Identifies appropriate changes and discusses/explains them to show how it is repeatable.</p> <p>e.g. Use a set volume of acid for each experiment, so that the amount of acid is known. Use the same concentration of acids, so that concentration does not affect the rate of reaction. Use a suitable range of temperatures to see a pattern in the data. Collect the gas produced using a gas syringe/by displacement over water and use a stopwatch.</p>
		Total mark 10

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