



Mark Scheme

November 2016

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 8: Application of Science (20474E)

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Publications Code 20474E_1611_MS

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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.
- All marks on the mark scheme should be used appropriately.
- All 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 a candidate's response is not worthy of credit according to the mark scheme.
- Where some judgment is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt about applying 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
1	<p style="text-align: center;">use</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>measures volume</p> <p>measures mass</p> <p>measures distance</p> </div> <div style="text-align: center;"> <p>equipment</p> </div> </div>	<p>Do not allow more than one line from each box.</p> <p>Ignore extra lines from measure distance to test tube, thermometer, stop clock.</p>	2
Total mark			2

Item	Expected answers	Additional guidance	Marks
2 (a)	infection/sickness/illness		1
2 (b)	<p>where 2 (or more) woodlice go (1)</p> <p>show the most favoured conditions (for the woodlice) (1)</p> <p>OR</p> <p>if one goes in each section (1)</p> <p>the fifth one can show which is the most favourable condition (1)</p>	<p>less than 5 woodlice might not show a majority in any section (1)</p> <p>Haroon will not therefore know which section is favoured (1)</p>	2

Total mark**3**

Item	Expected answers	Additional guidance	Marks
3(a)(i)	current		1
3(a)(ii)	any two from: same lamp (1) same ammeter (1) same wires (1) same (variable) resistor (1) same voltage	accept same light/bulb accept same meter	2
3(b)(i)	as the lamp brightness increases the resistance decreases (1) ORA the brightness of the lamp and the resistance are not proportional (1) OWTTE	do not allow changes for increase/decrease	2

3(b) (ii)	<p>Any 6 marks from method 1 OR method 2:</p> <p>Method 1 change the current/variable resistor settings / voltage (1)</p> <p>use three or more different settings of {current /brightness/voltage} / three or more different settings on the variable resistor (1)</p> <p>measure the resistance of the light dependant resistor (LDR) (1)</p> <p>{LDR/lamp} in fixed position/same distance from LDR to the lamp (1)</p> <p>shade LDR/carry out in a darkened room/avoid shadows (1) allow same LDR / bulb / wires/ ammeter / variable resistor (1)</p> <p>Method 2 change the distance from the bulb to the LDR (1)</p> <p>use three or more different distances (1)</p> <p>measure the resistance of the light dependant resistor (LDR) (1)</p> <p>same current /voltage /brightness (1)</p> <p>shade LDR/carry out in a darkened room/Avoid shadows (1)</p> <p>allow same LDR / bulb / wires/ ammeter / variable resistor (1)</p>	<p>reject measure the resistance of the lamp</p> <p>allow a specified distance</p>	6
Total mark			11

Item	Expected answers		
4 (a)	<p>column labelled substance/material and column labelled heat capacity (1)</p> <p>correctly places the numbers in the corresponding column (1)</p>	<p>columns can be in either order</p> <p>ignore units</p>	3

	results placed in correctly ascending/ descending order (1)		
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4 (b)	<p>Axes (1) X and Y axis labelled with units</p> <p>Scaling (2) linear scale on both x and y axis (1)</p> <p>scale appropriate (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>if numbers on the ethanol axis are taken directly from the table in the order of the table, then allow a maximum of 1 marks for: correctly labelled axes (1)</p> <p>data spread needs to cover at least half the graph paper</p> <p>+/- one small square</p> <p>line of best fit must be a straight line, not dot to dot.</p> <p>if bar chart drawn 2 marks max for : correctly labelled axes (1) scale appropriate (1)</p>	6
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4 (c)	<p>3.1 (K) (4)</p> <p>OR</p> <p>3.0952 (3)</p> <p>OR</p> <p>$\frac{260}{84}$ (3)</p> <p>OR</p> <p>$\frac{(260 \div 0.02)}{4200}$ (3)</p> <p>OR</p> <p>$\frac{260}{20 \times 4200}$ (2)</p> <p>OR</p> <p>260 = 0.02 x 4200 x temperature change (2)</p> <p>OR</p> <p>260 = 20 x 4200 x temperature change (1)</p> <p>OR</p> <p>correct rearrangement of the word equation (1)</p>	<p>3.1 to any power of 10 = 3 marks</p> <p>3.0952 to any power of 10 = 2 marks</p> <p>0.003095</p> <p>if no other mark scored allow 1 mark for 0.02 seen</p>	4
Total mark			13

Item	Expected answers	Additional guidance	Marks
5(a)	6000		1
5(b)	<p>the rise and fall in the number of zebra repeats regularly every 15 to 20 years (2)</p> <p>OR</p> <p>the rise and fall in numbers of zebra is approx. 5000 per cycle (2)</p> <p>or any two from:</p> <p>the number of zebra rises and falls (in a regular pattern) (1)</p> <p>there is a cycle every 15 to 20 years (1)</p> <p>the number of zebra increases/never rises above 9,500 (1)</p> <p>the number of zebra falls to/never falls below 3,000 (1)</p> <p>number of zebra change by 5000 per cycle (1)</p>		2
Total mark			3

Item	Expected answers	Additional guidance	Marks
6 (a)(i)	0.82 circled	allow 0.82 written next to the question	1
6 (a)(ii)	distraction/ not paying attention tiredness / computer programme /computer running slowly/ changing the distance between initial hand position and the computer compared to the previous occasion/misread computer screen (1)		1

6 (c)(ii)	<p>Colin needs to find out the amount of caffeine present in the cola he drank previously (1)</p> <p>and any one linked pair from:</p> <p>compare it to different samples of cola with different amounts of caffeine (1)</p> <p>to see whether it is the caffeine that affects reaction time (1)</p> <p>OR</p> <p>compare it to different drinks with different amounts of caffeine (1)</p> <p>to see whether it is the drink or the caffeine that affects reaction time (1)</p> <p>OR</p> <p>compare cola containing sugar with types of cola that are sugar free (1)</p> <p>to see whether it is the sugar rather than the caffeine that affects reaction time (1)</p>	<p>ignore repeat investigation with different people</p> <p>each second mark in the linked pair is dependent on the first</p>	3
Total mark			10

Item	Expected answers	Additional guidance	Marks
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7 (a)(i)	B		1
7 (a) (ii)	A number greater than 10(s)		1
7 (b)	<p>Indicative content</p> <p>the time of fall for iron, stone and plastic remains the same with increased mass rather than getting faster/less time to fall.</p> <p>however with the feather ball the time does change with increasing mass but the time gets longer/slower not faster.</p> <p>the time of fall for iron, stone and plastic remains the same with increased diameter rather than getting faster.</p> <p>however with the feather ball the time does change with increasing diameter but the time gets longer/slower not faster.</p> <p>more than one variable changed at once, you can't say whether mass, diameter or material is affecting the speed.</p> <p>the time to fall has only been measured to one decimal place, so is not accurate enough.</p> <p>each experiment has only been done once, so the results are not reliable.</p> <p>there is not a wide range of masses for each material, so she cannot see a pattern.</p> <p>the feather ball is much bigger than the other balls in terms of diameter, so they cannot be compared.</p> <p>the feather ball has a much larger diameter as well as increasing in mass, so there are two factors that are affecting how fast it falls.</p>		6

Level	0	No rewardable material.
Pass	1-2	A few key points identified, or one point described in some detail. The answer is likely to be in the form of a list. E.g. the time of fall for iron, stone and plastic remains the same with increased mass rather than taking less time to fall.
Merit	3-4	Some points described, or a few key points explained. The answer is unbalanced. Most points made will be relevant to the situation in question, but the link will not always be clear. Maybe some inaccurate science. E.g. The time of fall for iron, stone and plastic remains the same with increased diameter rather than getting faster. However with the feather ball the time does change with increasing diameter but the time gets slower not faster.

Distinction	5-6	<p>A detailed description and explanation of evidence. The majority of points made will be relevant and there will be some clear link to the situation in question. It will be clear how the evidence does or does not support the hypothesis. E.g. The time of fall for iron, stone and plastic remains the same with increased mass and diameter rather than getting faster. However with the feather ball the time does change with increasing mass and diameter but the time gets slower not faster. Each experiment has only been done once, so the results are not reliable.</p>
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