



Pearson



Mark Scheme (Results)

June 2019

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.
- 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 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 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.
- Phonetic spelling should be accepted.

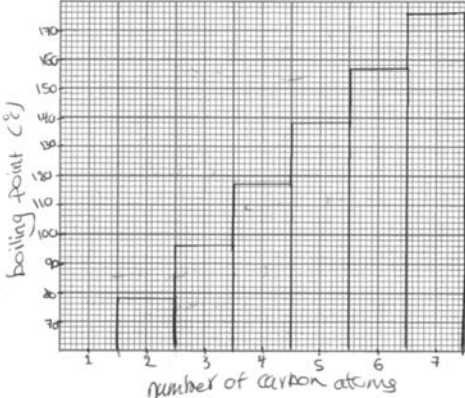
## BTEC Next Generation Mark Scheme

Item	Expected answers	Additional guidance	Marks				
1 (a)	<p><b>One</b> mark for each correct line</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 50%;">equipment</th> <th style="text-align: left; width: 50%;">use</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">electronic balance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">stopclock</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">thermometer</div> </td> <td style="vertical-align: top;"> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures time</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures sound</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures mass</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures pH</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures temperature</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures distance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">measures volume</div> </td> </tr> </tbody> </table>	equipment	use	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">electronic balance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">stopclock</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">thermometer</div>	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures time</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures sound</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures mass</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures pH</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures temperature</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures distance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">measures volume</div>	do not allow more than one line from each piece of equipment	3
equipment	use						
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">electronic balance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">stopclock</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">thermometer</div>	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures time</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures sound</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures mass</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures pH</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures temperature</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">measures distance</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">measures volume</div>						
1 (b)(i)	(skin) burns/ blistering	do not allow 'scalding'	1				
1 (b)(ii)	wait for the water to cool down	<p>wait for the beaker to cool down</p> <p>allow keep the equipment away from the edge of the bench/move the equipment further away/stay or stand a safe distance away</p> <p>allow (use/wear heatproof) gloves</p> <p>ignore safety goggles/PPE</p> <p>ignore don't put your finger in the water</p> <p>do not allow use tongs/beaker holder to lift the beaker</p>	1				
1 (b)(iii)	<p>Any one from</p> <p>to stir / mix the water (1)</p> <p>to get an even temperature (1)</p>	<p>ignore glass is not a conductor /bad conductor</p> <p>allow it will not react with water/unreactive/will not contaminate the experiment</p>	1				

<b>Total mark</b>			<b>6</b>

Item	Expected answers	Additional guidance	Marks
2 (a)	direction of light	allow 'light' alone	1
2 (b)	<p><b>Growth of Plants</b></p> <p>Any three from:</p> <p>three or more different pH (soils) / named as acidic / neutral / alkaline/specific pH values (1)  place one plant at each pH (1)  measure the initial height of the plant (1)  wait a specified amount of time (1)  record the height after a time (1)</p> <p>AND</p> <p>Any three from:</p> <p>keep room at the same temperature (1)  add the same volume of the solutions to the soil (1)  keep the plants in the same lighting conditions (1)  same volume of water given to each plant (at the same time) (1)  use the same type of soil (1)  same type of plant (1)</p> <p><b>Germination of seeds</b></p> <p>Any three from:</p> <p>three or more different pH soils / named as acidic / neutral / alkaline/ specific pH values (1)  plant a seed at each pH (1)  wait a specified amount of time (1)  record the number that have grown (1)</p> <p>AND</p> <p>Any three from:</p> <p>keep seeds at the same temperature (1)  add the same volume of the solutions to the soil (1)  keep the seeds in the same lighting conditions (1)  plant seeds at the same depth in the soil (1)  use the same type of soil (1)  same type of seed (1)</p>		6
<b>Total mark</b>			<b>7</b>

Item	Expected answers		
3 (a)	<p>column labelled (radioactive) element(s) and column labelled half-life (1)</p> <p>correctly places the numbers and names in the corresponding column (1)</p> <p>results placed in correctly ascending order of half-life / alphabetically but then the numbers must match the element name, so may then not be in numerical order (1)</p>	<p>ignore 'name'</p> <p>ignore time/days</p> <p>ignore units</p> <p>allow descending order</p>	3
3 (b)(i)	<p>372 (2)</p> <p>OR</p> <p><math>362 + 374 + 367 + 385</math> (2)</p> <p style="text-align: center;">4</p> <p>OR</p> <p>1488 (2)</p> <p style="text-align: center;">4</p> <p>OR</p> <p><math>362 + 374 + 367 + 385</math> (1)</p> <p>OR</p> <p>a number divided by 4 (1)</p>	<p>allow 1488 seen</p>	2
3 (b)(ii)	<p>368 (1)</p> <p>because it is to the same number of significant figures as the other recorded values (1)</p>	<p>allow rounds to a whole number</p>	2
<b>Total mark</b>			<b>7</b>

Item	Expected answers	Additional guidance	Marks
4 (a)	<p><b>Axes (2)</b></p> <p>correct y axis label including unit – boiling point of alcohol °C (1)</p> <p>x axis correctly labelled (1)</p> <p><b>Scaling (2)</b></p> <p>scale appropriate (1)</p> <p>correct numbers on both axes (1)</p> <p><b>Plotting (2)</b></p> <p>all 6 bars drawn correctly (2)</p> <p>OR</p> <p>4 or 5 bars drawn correctly (1)</p> 	<p>max 4 for plotting a scatter/line graph</p> <p>allow horizontal bars, i.e. axes reversed</p> <p>scale must be linear on both axes</p> <p>data range needs to cover at least half the graph paper in the direction of the boiling point.</p> <p>if numbers on the y axis are taken directly from the table in the order of the table then allow a maximum of 2 marks for correct axes</p> <p>accept bars/columns drawn touching</p> <p>allow +/- one small square</p>	6

4 (b)(i)	90 (°C)		1
4 (b)(ii)	<p>as { height/altitude} increases the boiling point decreases (1)</p> <p>AND</p> <p>negative correlation (1)</p> <p>OR</p> <p>the relationship is linear/straight (line)/steady decrease (1)</p>	<p>allow ORA</p> <p>accept { negative/indirect} proportional relationship</p>	2
<b>Total marks</b>			<b>9</b>





		100 seen for 1 mark if no other points scored	
5 (c)	<p>Ball A (1)</p> <p>AND</p> <p>because it is the highest (line)on the graph</p> <p>OR</p> <p>ball A speed increased the most (1)</p> <p>OR</p> <p>ball A reaches (approx.) 55m/s but ball B reaches 38 m/s and C 20 m/s (1)</p>	<p>ignore 'it has the highest speed'</p> <p>ORA</p>	2
<b>Total marks</b>			<b>11</b>

Item	Expected answers	Additional guidance	Marks
6	<p>Any two linked pairs:</p> <p>measure the { mass / size / amount } of the magnesium ribbon (1)</p> <p>so the amount is the same each time (1)</p> <p>OR</p> <p>use an excess volume / same volume of acid (1)</p> <p>so that there is always sufficient acid for all the magnesium to react (1)</p> <p>OR</p> <p>keep the starting temperature of the acid the same (1)</p> <p>as a higher temperature will make the reaction faster (1)</p> <p>OR</p> <p>stir the reactants the same way for each experiment (1)</p> <p>so that the reactants will mix the same way (1)</p> <p>OR</p> <p>define the end point (1)</p> <p>by when magnesium ribbon disappears / fizzing stops (1)</p>	ignore 'to make it a fair test'	4
<b>Total marks</b>			<b>4</b>

Item	Indicative Content		Marks
7	<p><b>Conclusion 1</b></p> <p>the first conclusion is incorrect, the risk is always greater for women.</p> <p>the risk for women is only slightly greater than for men for body types in the normal range.</p> <p>in the normal range the risk for men and women is approximately 3% greater than for men.</p> <p>the risk for women is more than twice that of men in the overweight / obese group.</p> <p>the risk for men stays nearly the same for normal range body types.</p> <p>the risk increases at a faster rate for women as their BMI increases compared to that of men.</p> <p><b>Conclusion 2</b></p> <p>the second conclusion is correct for both men and women as graph shows the greater the BMI the greater the risk.</p> <p>the risk increases at a far greater rate as the body type moves towards obesity.</p>		6
Level	0	No rewardable material.	
Pass	1-2	A few key points identified, <b>or</b> one point described in some detail. The answer is likely to be in the form of a list. Only one viewpoint considered. Points made will be superficial/generic and not applied/directly linked to the situation in the question.	
Merit	3-4	Some points identified, <b>or</b> a few key points described. Consideration of more than one viewpoint but there will be more emphasis on one of them. The answer is unbalanced. Most points made will be relevant to the situation in the question, but the link will not always be clear.	
Distinction	5-6	A range of points described, <b>or</b> a few key points explained in depth. All sides of the case are considered, and the answer is well-balanced, giving weight to all viewpoints. The majority of points made will be relevant and there will be a clear link to the situation in the question.	
		<b>Total marks: 6</b>	

Ofqual



Llywodraeth Cymru  
Welsh Assembly Government



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