



Mark Scheme

November 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	Additional Guidance	Reject	Mark						
1	<table border="1"> <tr> <td></td> <td>Letter of apparatus</td> </tr> <tr> <td>To measure body mass</td> <td>E (1)</td> </tr> <tr> <td>To measure how quickly an athlete runs 100m</td> <td>A (1)</td> </tr> </table>		Letter of apparatus	To measure body mass	E (1)	To measure how quickly an athlete runs 100m	A (1)	<p>Accept lower case letter e Accept named apparatus e.g. (bathroom / weighing) scales / balance (1)</p> <p>Accept lower case letter a. Accept timer/clock / stop clock / watch (1)</p>		2
	Letter of apparatus									
To measure body mass	E (1)									
To measure how quickly an athlete runs 100m	A (1)									
			<b>Total mark</b>	<b>2</b>						

Question Number	Correct Answer	Additional Guidance	Reject	Mark
2 (a)	(Glass / large) beaker (1)			1
2 (b)	(The water is) not hot enough/ does not exceed 40 degrees (1)  Will not burn/scald/damage skin (1)	Allow it is too cold / close to body temperature (1)		2
2 (c)	Volume of water (1)          (Thermochromic) Strip (1)	<p>Amount of water</p> <p>{volume/ size/ type/ material} of beaker (1)</p> <p>Same position of strip</p> <p>Same person (observing colour change) (1)</p>		2
			<b>Total mark</b>	<b>5</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark
	<b>Indicative content</b>			
3	<p>Six Marks from either:</p> <p><b>Method 1:</b> using a beaker of water</p> <p>Use water at 37°C (1)</p> <p>Place the strip into the water/ onto the beaker (1)</p> <p>Wait for colour (on strip) to stabilise OWTTE (1)</p> <p>Note the colour (on the strip) (1)</p> <p>Do the same for other/different strips (1)</p> <p>Repeat whole experiment to {ensure reliability/check for anomalies/ get the same results} (1)</p> <p><b>OR</b></p> <p><b>Method 2:</b> Testing on forehead</p> <p>Confirm person's temperature is 37°C OWTTE (1)</p> <p>Place a strip onto forehead/ under armpit (1)</p> <p>Wait for colour (on strip) to stabilise OWTTE (1)</p> <p>Note the colour (on the strip) (1)</p> <p>Do the same for other/different strips (1)</p> <p>Repeat whole experiment to {ensure reliability/check for anomalies/ get the same results } (1)</p>	Allow in mouth		6
			<b>Total mark</b>	<b>6</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark
4	<p>Column labelled Cans of drink and Column labelled Mass of sugar (1)</p> <p>Correctly places the drinks and corresponding numbers in the correct columns(1)</p> <p>Results placed in ascending/ descending order of mass of sugar (1)</p>	<p>These are independently marked points</p> <p>Allow drink/ type of drink/ can/ liquid</p> <p>Allow sugar Allow mass</p> <p>Mass and drink can be in either column</p> <p>Ignore units</p> <p>Shortened versions of drinks e.g. soda and ginger/ beer.</p>		3
			<b>Total mark</b>	<b>3</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark
5 (a)	Bubble wrap (1)	Allow bubble		1
5 (b)	Any <b>one</b> from: (bubble wrap/it) had the smallest temperature/heat loss (1)  (At the end of the experiment) it had the highest temperature (1)  It was always the highest temperature (1)  Keeps the water hotter for longer (1)	Allow: The temperature didn't fall as much as the others. (1)  (bubble wrap/it) has <u>only</u> lost 6°C (1)    Kept the most heat (energy) in (1)		1
5 (c) (i)	Result circled in the table – result for 6 minutes cotton wool. 25 (1)			1
5 (c) (ii)	Does not fit in the pattern  It's lower than the results either before/after it	Allow: The results go down and then up again  The result drops from 79 to 25 then back to 74°C  Recorded 25 when the result should be higher/between 79 and 74°C  (The result) is too low		1
5 (d) (i)	Walls	Allow Wall		1
5 (d) (ii)	$\frac{1}{4}$ /quarter/ $\frac{250}{1000}$	Allow: $\frac{25}{100}$ or 0.25		1
			<b>Total marks</b>	<b>6</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark												
6 (a)	Cotton wool	If no answer on answer line, allow identification on table		1												
6 (b)	<p><b>Axes (2)</b> Correct y-axis labelled, units (1)</p> <p>Bars correctly labelled (1)</p> <p><b>Scaling (2)</b> Correct numbers on y-axis (1) Scale appropriate (1)</p> <p><b>Plotting (2)</b> All 5 bars drawn correctly (2) or 3 or 4 bars drawn correctly (1).</p> <table border="1" data-bbox="248 1675 703 1921"> <thead> <tr> <th>Material used as soundproofing</th> <th>Sound level (decibels)</th> </tr> </thead> <tbody> <tr> <td>No material</td> <td>94</td> </tr> <tr> <td>Paper towel</td> <td>90</td> </tr> <tr> <td>Cotton wool</td> <td>80</td> </tr> <tr> <td>Newspaper</td> <td>88</td> </tr> <tr> <td>Fabric</td> <td>86</td> </tr> </tbody> </table>	Material used as soundproofing	Sound level (decibels)	No material	94	Paper towel	90	Cotton wool	80	Newspaper	88	Fabric	86	<p>Allow horizontal bars i.e. axes reversed</p> <p>Labels may be shortened e.g. paper, cotton.</p> <p>Data spread (between 80 and 94) needs to cover at least half the graph paper.</p> <p>If numbers on Y axis are directly taken from the table and evenly spaced e.g. 94, 90, 80, 88, 86 then:</p> <p><b>Allow a max of up to 2 marks, for axes.</b></p> <p><b>Maximum for scatter graph: 4</b> Correct y axes label (1) Correct numbers on y axis (1) Appropriate scale of y axis (1) Labelling points (1)</p> <p>Allow no gaps between bars/columns drawn.</p> <p>Allow +/- one small square</p>		6
Material used as soundproofing	Sound level (decibels)															
No material	94															
Paper towel	90															
Cotton wool	80															
Newspaper	88															
Fabric	86															
Total marks				7												



Question Number	Correct Answer	Additional Guidance	Reject	Mark
7 (a)	6.12 (2) Or 6.1 (2) Or $30.6 \div 5$ (2) Or $\frac{6.1 + 6.5 + 5.8 + 6.0 + 6.2}{5}$ (2)	          ECF from their addition divided by 5 (1)		2
7 (b)	0.882 (2) Or $\frac{300}{340}$ (2) 340  Or time = $\frac{\text{distance}}{\text{speed}}$ (1)  Or $340 = \frac{300}{\text{time}}$ (1)	Allow between 0.88 and 0.9 (2)		2
			<b>Total mark</b>	<b>4</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark
8 (a) (i)	The point at 0.6 is circled.			1
8 (a) (ii)	B The thermometer was read incorrectly (1) D The mass of the crisp was less than 0.6g (1)			2
8 (a)(iii)	A straight line through the points (1)	Ignore line before the first point and after the last point Allow +/- one square		1
8 (b)	2.5 (2) Or 5÷2 (2) or 5 degrees (1) or a number ÷2 (1)			2
			<b>Total mark</b>	<b>6</b>

Question Number	Correct Answer	Additional Guidance	Reject	Mark
9 (a)	There is no temperature rise/temperature rise is zero (1)	The result is 0.0 Allow nothing happens		1
9 (b)	An explanation linking <b>four</b> of the following:  Magnesium is the most reactive (1) Magnesium and copper sulfate/Magnesium gives the highest rise in temperature/result (1)  Zinc/copper does not react with/displace magnesium sulfate (1) Magnesium reacts with {zinc sulfate /copper sulfate /other metal sulphates} (1) There is no temperature rise when zinc/copper is added to magnesium sulfate (1)	Allow Magnesium displaces {zinc/copper/other metals} (1)  If no other mark awarded credit for 1 mark: There is not enough evidence because the results have not been repeated		4
			<b>Total mark</b>	<b>5</b>

10	<p>Indicative content:</p> <p><b>Improvements:</b> linked to the fruit juices:</p> <ul style="list-style-type: none"> <li>• specify type/brand,</li> <li>• specify range e.g. 3 fruit juices</li> <li>• use a control eg. Distilled water</li> </ul> <p>pH / indicator paper:</p> <ul style="list-style-type: none"> <li>• dip the indicator paper into the juice/put a drop of juice onto the indicator paper</li> <li>• read the colour from the indicator paper/ use a pH meter/ read the colour from the pH colour chart</li> <li>• use different/ fresh universal indicator each time</li> <li>• Use a fresh beaker each time</li> </ul> <p>Repeat results/experiment</p> <p><b>Explanations:</b></p> <ul style="list-style-type: none"> <li>• so that a comparison of the fruit juices can be made</li> <li>• so that the pH of the juice can be compared</li> <li>• so that the juice/ pH from previous experiments does not contaminate</li> <li>• to identify/ remove anomalies</li> <li>• to get concordant results/to ensure results are valid/comparable/calculate an average</li> <li>• to gain numerical data (from pH meter)</li> <li>• to be able to draw a valid/reliable conclusion.</li> <li>• to get a bigger range of data/ results</li> <li>• so that another person doing the same experiment would gain the same/similar/comparable results.</li> </ul> <p>Ignore references to fair testing and accuracy.</p>	6
Level	0	No rewardable material
Pass	1-2	<p>Identifies one appropriate variable to control/improvement/change. Explains simply or identifies another improvement/change.</p> <p>e.g. Use (at least) three fruit juices so that different juices are tested.</p>
Merit	3-4	<p>Identifies changes to the method/control variable and explains the reason(s) for the changes. Or identifies three appropriate changes and explains one.</p> <p>e.g. Use (at least) three fruit juices so that different juices are tested to give a range of different types of fruit juice. Compare the colour on the universal paper to the colour chart so that the pH number can be identified. Take repeat readings so that the results are considered reliable and so that a mean may be calculated.</p>
Distinction	5-6	<p>Identifies appropriate changes and discusses/explains them in terms of reliability, validity and drawing conclusions. Repeatability is explained in terms of gaining similar/same results. Or Three improvements are explained.</p> <p>e.g. Use (at least) three fruit juices so that different juices are tested to give a range of different types of fruit juice. Compare the colour on the universal paper to the colour chart so that the pH number can be identified. Take repeat readings so that the results are considered reliable and so that a mean may be calculated. This means that a valid conclusion may be draw that is trustworthy. This would also enable anyone repeating the experiment to follow the same method and gain the same results.</p>
		<b>Total mark</b> 6

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