

Mark Scheme

June 2015 (1506)

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 8: Scientific Skills (20474E)

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Item	Expected answers	Additional guidance	Marks
1 (a)	Protractor (1)	ignore Angle measurer	1
1 (b)	Any two from: (Same) width of light ray (1) Mirror remains vertical/angle of mirror (the same)/ (same) position of mirror (1) Position of protractor (1)	allow ray slit/divider (1) ignore same mirror/ same distance from raybox/same protractor/same brightness	2
1 (c) (i)	Cuts (1)	allow (temporary) blinding	1
1 (c) (ii)	Any one from check for {chips / broken edges}/protect sharp edges / keep mirror in a frame/stable (1) don't shine in eyes/don't look directly at reflected light (1)	allow use a plastic mirror ignore wear gloves	1

Item	Expected answers	Additional guidance	Marks
1 (d)	Any six from shine a ray/light to hit the mirror (1) to same place (each time) on the mirror (1) mark the path of the light/ray (1) measure/record angle of incidence (1) measure/record the angle of reflection (1) give three or more angles of <u>mirror</u> (1) repeat the test for the whole range (1)	to the normal (of the mirror) If not specifying either angle then allow one mark for measure/record the angle(s) (1) Do not allow 'change the position of the ray box'	6
Total mark			11

Item	Expected answers	Additional guidance	Marks
2 (a)	Column labelled 'mass' and Column labelled 'height'(1) Correctly places the numbers in the corresponding column(1) Results placed in ascending/ descending order (1)	do not accept 'weight' for 'mass' ignore units if decimal points are omitted maximum 2 marks	3
2 (b)	(BMI) increases (upto 55-64) (1) after 64/ 55-64/ 65-74 (BMI) decreases (1)		2
2 (c)	25.4 (2) or <u>101.6</u> 4 (2) or <u>101.6</u> 2 ² (1)		2
Total mark			7

Item	Expected answers	Additional guidance	Marks
3 (a) (i)	2.5 circled in the fourth row (1)	allow 7.5 circled	1
3 (a) (ii)	Repeat result (1)	allow plot graph without result (1)	1
3 (b)	<p>Axes (1) X axis: mass (of sherbet) g and Y axis: temperature change °C (1)</p> <p>Scaling (2) Scale appropriate (1) Correct numbers on both axes (1)</p> <p>Plotting (2) All 6 points plotted correctly (2) OR 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 axes are directly taken from the table in the order of the table then allow a maximum of 2 marks correct axes (1)</p> <p>Line of best fit (1)</p> <p>ECF on plotting points from scaling/numbering errors</p> <p>+/- one small square</p> <p>Line of best fit must be a smooth curve not dot to dot.</p> <p>If bar chart drawn 2 marks max.</p> <p>axes label (1) correct scale on y axis (1)</p>	6

3 (c)	<p>the answer has too many decimal places/more than one decimal place/(should be) rounded to 1dp(1)</p> <p>this gives an accuracy greater than is measured/The answer should have the same number of decimal places as the data (1)</p>	<p>allow the results are only measured to 1 decimal place</p> <p>ignore references to significant figures</p>	2
Total mark			10
Item	Expected answers	Additional guidance	Marks
4 (a) (i)	(bottle number) 2/second bottle (1)	<p>allow circled bottle 2 on diagram</p> <p>allow 1.2/circled 1.2 on diagram</p>	1
4 (a) (ii)	<p>1.1 (2)</p> <p>OR</p> $\frac{1.1+1.2+1.0+1.1}{4} \quad (2)$ <p>OR</p> <p>1.1 + 1.2 + 1.0 + 1.1 (1)</p> <p>OR</p> <p>A number divided by 4 (1)</p>	<p>$\frac{4.4}{4}$</p> <p>4.4</p>	2
4 (b) (i)	750 (ml) (1)	any value between 740 and 760	1
4 (b) (ii)	<p>For every 100ml of juice there is 8g more of sugar (2)</p> <p>or</p> <p>positive correlation (1)</p> <p>As the volume increases the mass increases ORA (1)</p>	<p>allow variables are directly proportional (2)</p> <p>allow it (the line) goes up</p>	2
Total mark			6

Item	Expected answers	Additional guidance	Marks
5	<p>Any two linked pairs</p> <p>The line goes up between 0 and 40 seconds (1) because the speed is increasing between 0 and 40 seconds (1)</p> <p>The line is steeper between 40 and 50 seconds (1) because the increase in speed is greater between 40 and 50 seconds (1)</p> <p>The line is {flat/horizontal} between 50 and 70 seconds (1) because the speed is steady/not changing between 50 and 70 seconds (1)</p> <p>The line goes down between 70 and 90 seconds (1) because the speed is reducing between 70 and 90 seconds (1)</p> <p>The line is {flat/ at zero} between 90 and 120 seconds (1) because the speed is zero/ train has stopped/ speed is constant after 90 seconds (1)</p>	<p>allow gets faster between 0-40 seconds</p> <p>allow slowing down between 70-90 seconds</p>	4
Total mark			4

Item	Expected answers	Additional guidance	Marks
6	<p>Any one linked pair</p> <p>Choose objects of differing heights /choose more than one object (1)</p> <p>to get a range / to test the hypothesis (1)</p> <p>OR</p> <p>Measure the height of the objects (1)</p> <p>so that height values are collected (1)</p> <p>OR</p> <p>Make sure the light is kept at the same distance from the objects (1)</p> <p>or the shadow will be affected by this (and not the size of object) (1)</p> <p>OR</p> <p>Make sure the light is same height/at same angle/same position (above table)(1)</p> <p>or the shadow will be affected by this (and not the size of object) (1)</p>		2
Total mark			2

Item	Expected answers	Additional guidance	Marks
7 (a)	The blood <u>sugar</u> level increases/rises (1)		1
7 (b)	There is a <u>larger</u> rise in blood sugar for breakfast (compared to lunch) (1)	Needs a comparison Allow the peak was <u>higher</u> after breakfast (than after lunch) Allow use of numbers 180 in the morning but/and 160 in the afternoon.	1
Total mark			2

Item	Indicative content	Marks	
8 (a)	caesium hydroxide (1) hydrogen (1)	Answers can be in either order allow CsOH allow H or H ₂	2

8 (b)	<p>They all react in the same way because:</p> <p>They all react (vigorously) with water They all 'fizz' when added to water They all produce hydrogen with water They all produce a metal hydroxide with water They are dull before being cut They are all shiny when first cut.</p> <p>They become more reactive as the number of electron shells increases because:</p> <p>As the number of electron shells increase, the reactivity with water becomes more vigorous</p> <p>Potassium reacts violently with water and has most shells</p> <p>Lithium only fizzes with water and has least shells</p> <p>Potassium has four electron shells and reacts more vigorously with water than sodium which has three.</p> <p>Sodium has 3 shells and reacts more vigorously with water than lithium that has two.</p> <p>The more vigorous the reaction with water the more reactive the element.</p> <p>Potassium is the most reactive because it explodes whilst sodium rapidly fizzes and lithium just fizzes with water.</p> <p>There is only evidence for the reaction with water.</p> <p>Do not know how reactive they will be with other substances.</p> <p>Only credit information that uses the evidence from Bailey's tables.</p>		6
Level	0	No rewardable material	
Pass	1-2	Identifies appropriate features of the data to support part of the conclusion or explains part of the conclusion simply. One or two simple ideas taken from the tables e.g. all metals fizz and give off hydrogen or all metals react in the same way, as they go shiny when cut.	
Merit	3-4	Identifies features of the data to support some of the conclusion and explains how evidence supports some of the conclusion. e.g. all metals fizz and give off hydrogen, which means that they all react in the same way.	
Distinction	5-6	Identifies features of the data to support the whole conclusion. Gives a coherent explanation of how the evidence supports the conclusion. e.g. all metals fizz and give off hydrogen, which means that they all react in the same way and lithium has 2 electron shells and only fizzes, whereas potassium has 4 electron shells and has very rapid fizzing, which supports the more electron shells, the more reactive the metals.	
		Total mark 8	
		TOTAL FOR THE PAPER 50	

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