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Mark Scheme (Results)

Summer 2017

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.
- 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 (a) (i)	(filter) funnel (1)	Allow phonetic spelling	1
1 (a) (ii)	to {collect/catch/contain} the {filtrate/liquid/fluid/filtered solution} (1)		1
1 (b)	Any two from volume of sodium hydroxide solution/alkali (1) concentration of sodium hydroxide/alkali (1) concentration of salt solution (1) volume of salt solution (1)	allow amount of sodium hydroxide/alkali allow amount of salt solution allow temperature/time for reaction	2
1 (c)	wear safety glasses/goggles/wear gloves (1)	allow lab coat/protective clothing	1
Total mark			5

Item	Expected answers	Additional guidance	Marks
2(a)	<p>line between 2.0M and 0.5M (1)</p> <p>drawn line levels off at 125cm³ (1)</p>	<p>ignore if no curve before levelling off</p>	2
2(b)	<p>Any 4 from</p> <p>measure known volumes of hydrochloric acid (1)</p> <p>measure known volume of sodium thiosulfate (1)</p> <p>measure known volume of (hydrochloric) acid (1) add the solutions together (1)</p> <p>measure temperature/record temperature of solution(s) (1)</p> <p>heat (both) using a Bunsen burner/water bath (1)</p> <p>start the stop clock when you add the acid (1)</p> <p>stop the clock when the cross disappears (from view). (1)</p> <p>repeat for three or more different temperatures (1)</p> <p>And any 2 from:</p> <p>same concentration of sodium thiosulfate (1)</p> <p>same concentration of (hydrochloric) acid (1)</p> <p>same volume of sodium thiosulfate (1)</p> <p>same volume of (hydrochloric) acid (1)</p> <p>same size of flask (1)</p> <p>same cross (1)</p> <p>view cross from the same position (1)</p>	<p>ignore place the flask onto a sheet with an x on it</p> <p>allow amount sodium thiosulfate</p> <p>allow amount (hydrochloric) acid</p> <p>allow heat only acid or thiosulfate</p> <p>do not allow 'record the time it takes for the cross to disappear'</p> <p>ignore record the time it takes for the cross to disappear</p> <p>allow amount</p> <p>allow amount</p> <p>allow same paper with a cross</p>	6

Total mark	8
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Item	Expected answers		
3 (a)	<p>add a {label/title/nerve fibre diameter} to the first column (1)</p> <p>place the data in (either ascending or descending) order (1)</p>	<p>allow written in table</p> <p>do not allow change the title / give the table a {label/title}</p>	2
3 (b)(i)	<p>3.5 (2)</p> <p>OR</p> <p>$\frac{3.6+3.7+3.5+3.2}{4}$ (2)</p> <p>OR</p> <p>$\frac{14}{4}$ (2)</p> <p>OR</p> <p>3.6+3.7+3.5+3.2 (1)</p> <p>OR</p> <p>A number divided by 4 (1)</p>	14	2
3 (b)(ii)	<p>take another/repeat measurement (1)</p> <p>{ignore/exclude} anomalous measurement (1)</p>		2
Total mark			6

Item	Expected answers	Additional guidance	Marks
4 (a)	<p>Axes (1) X-axis: mass (lifted) g and Y-axis: input energy (to the motor) J (1)</p> <p>Scaling (2) scale appropriate (1)</p> <p>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>graph needs to cover at least half the graph paper</p> <p>scale must be linear on both axes</p> <p>if numbers on the x 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</p> <p>+/- one small square</p> <p>the line of best fit must be a smooth curve, not dot to dot</p> <p>if bar chart drawn 2 marks max for axes labelled (1) and scale appropriate (1)</p>	6

4 (b)	<p>2.3 (3)</p> <p>OR</p> <p>2.29 (2)</p> <p>OR</p> <p>$\frac{8.6}{3.75}$ (2)</p> <p>OR</p> <p>$8.6 = 3.75 \times \text{distance}$ (1)</p> <p>OR</p> <p>distance = work done/ force (1)</p>	allow 2.29333 (2)	3
Total mark			9
Item	Expected answers	Additional guidance	Marks
5(a)	2 (days)	<p>two</p> <p>allow working on the graph</p>	1
5(b)	<p>Any 4 from:</p> <p>(as the amount of each/both of) element X {falls/decreases} and element Y {rises/increases} (1)</p> <p>element X decreases at the same rate as element Y increases (1)</p> <p>{the rate of decay of element X/production of element Y} is {greater at first/slower towards the end} (1)</p> <p>after 2 days they were both at 50% (1)</p> <p>after 10 days nearly all of element X is converted to element Y (1)</p>	<p>allow element x has a negative correlation and element y has a positive correlation</p> <p>allow after 2 days the amount of both elements is the same</p>	4
Total mark			5

Item	Expected answers	Additional guidance	Marks
6 (a)	single straight line of best fit through the points (1)	reject dot to dot	1
6 (b)	<p>Any two of the following pairs</p> <p>there was a draught (1) which {moved the flame/cooled down the beaker} (1)</p> <p>the time was less than one minute after the previous time (1) so the temperature had not the time to rise as much (1)</p> <p>the thermometer was taken out of the water to read the temperature (1) so the thermometer recorded a lower temperature (1)</p>	allow thermometer was moved (1) so thermometer recorded a lower temperature (1)	4
Total Mark			5

Item	Expected answers	Additional guidance	Marks
7(a)	<p>Any two from:</p> <p>the more portions of fruit eaten the less likely you will get heart disease (1)</p> <p>eating 6-7 portions decreases the risk {more than eating 5/by another 2%} (1)</p> <p>eating 7+ portions decreases the risk {even more than eating 5/by an extra 13%/even more than eating 6-7/by an extra 11%} (1)</p>	<p>allow the more portions of fruit eaten the more healthy you are</p>	2
7(b)	<p>Any 2 linked statements</p> <p>increase the number in the sample (1)</p> <p>increase the reliability of data (1)</p> <p>include people of different ages (1)</p> <p>so data represents the whole school (1)</p> <p>include males in the sample (1)</p> <p>so the data represents all the students (1)</p> <p>include more schools (1)</p> <p>so data represents all students (1)</p> <p>find out the mass/amount (of fruit and vegetables) eaten in g (1)</p> <p>so numerical comparisons can be made (1)</p> <p>ask about amount of fruit and vegetables eaten per day (1)</p> <p>has only asked per week (1)</p> <p>ask about varieties (of fruit and vegetables) eaten per day (1)</p> <p>because they have to have five different varieties a day (1)</p>		4

Item	Indicative Content		Marks
7(c)	<ul style="list-style-type: none"> • total energy expended each day for males is greater than females • the first conclusion is correct but this does not mean that all females expend less energy as some may be more active than males as this is an average • there is no data for females beyond age 70/70 so a comparison with men cannot be made • there is no data for ages less than 20 • Some older males (74-80) use less energy per day than some females less than 50 • the data may not be reliable as there is no indication of the fitness/medical condition of the males and females in general • There is no data point for 60 year old women therefore it is not known what happens between the age 50 and 70 • energy used each day for men increases and decreases • energy used each day by females falls • for females energy expenditure falls from age 20/20 to age 70 • for males there is a rise in the total energy used in the 20's, 30's and 60's but is not rising in the 70's. • the second conclusion is correct for women but not for men 		6
Level	0	No rewardable material.	
Pass	1-2	Discusses an appropriate point for either conclusion. E.g. total energy expended each day for males is greater than females as the line for males is higher than for females.	
Merit	3-4	Discusses appropriate points for both conclusions or discusses in detail points from one conclusion. E.g. total energy expended each day for males is greater than females as the line for males is higher than for females and the second conclusion is only correct for women and not men, as for men the graph line rises in the 30s and 60s.	

Distinction	5-6	<p>Discusses appropriate points for both conclusions with at least one in detail.</p> <p>E.g. total energy expended each day for males is greater than females as the line for males is higher than for females and the second conclusion is only correct for women and not men, as for men the graph line rises in the 30s and 60s. The data is not totally conclusive as the data for females ends at 70 so no comparison is made and also some females may have more active lives than males so it may not be true for all.</p>
		Total Mark 12

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