Mark Scheme (Results)

February 2020

Pearson BTEC Level 1/Level 2 Firsts in Application of Science

Unit 8: Scientific Skills (20474E)

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General Marking Guidance

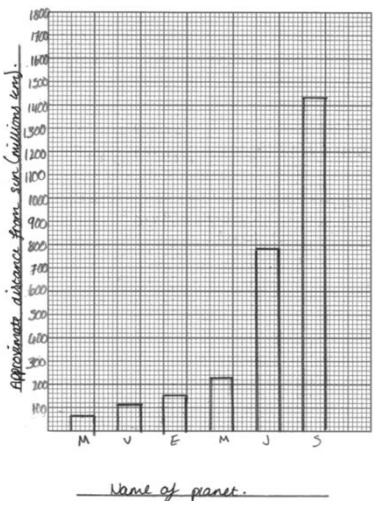
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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.
- Phonetic spelling should be accepted.

Item	Expected answers	Additional guidance	Marks
1 (a)	D - Petri dish		1 auto
1 (b)(i)	(skin) burns/scalding/blistering	ignore damage alone ignore reddening	1
1 (b)(ii)	Any two from (face) mask (1) (safety) goggles/spectacles/glasses (1) gloves (1) lab coat (1)	allow eye protection ignore hand protection allow apron ignore protective suit/clothing	2
1 (c)(i)	to kill any bacteria (on the loop)/sterilise the loop (1) (so as) to stop contamination (1)	allow kill germs/pathogens allow to get rid of bacteria/germs	2
1 (c)(ii)	Any two from time (in incubation) (1) number of bacteria (1) type of bacteria (1) type of agar (1) content/nutrients in agar (1) volume of agar (1) size of petri dish / agar plate (1) Any other valid response	ignore temperature allow amount of bacteria allow same agar ignore same plate unqualified allow the agar plate must be level allow light intensity / amount of light	2
		Total	**8 marks**

Item	Expected answers	Additional guidance	Marks
2	Any four points from the same method: **Method 1** measure a known {mass/weight/volume} of hydrogel (1) add the gel to a known {volume/mass} of water (an excess) (1) wait a specific amount of time (e.g. 10 mins) (1) separate the gel from the excess water (1) find the {volume/mass} of excess water (1) subtract this from initial {volume/mass} of water to find the volume/mass absorbed (1) repeat with different {masses/weights} of hydrogel (1) **AND** two points from controls **Control Variables** same type of hydrogel (1) same time to wait to soak up water each time (1) **OR** **Method 2** measure the {mass/weight} of hydrogel (1) add a specified {volume/mass} of water (1) add water drop by drop (1) stop when the water is no longer absorbed (1) measure the {mass/weight} after the water has been added (1) subtract the initial {mass/weight} of hydrogel from the final {mass/weight} (1) repeat with different {masses/weights} of hydrogel (1) **AND** Any two points from controls	allow amount for {mass/weight/volume} for both methods allow urine for water throughout ignore environmental conditions, i.e. room temp etc same type/brand/size of nappy (1)	6

	Control Variables same type of hydrogel (1) same size of drop (1) same time to wait to soak up water each time (1)	ignore environmental conditions, i.e. room temp etc same type/brand of nappy (1)	
		Total	**6 marks**

Item	Expected answers	Additional guidance	Marks
3 (a)	column labelled with (name of) Planet and column labelled (average surface) temperature (1) places the numbers and names in the corresponding column correctly (1) results placed in correctly ascending / descending order of temperature / alphabetically / in order of the planets from the Sun (1)	ignore units i.e. Kelvin allow Temp	3
3 (b)	smooth continuous curve passing through points	allow points missed if within one small square of line each side.	1

3 (c)	 **Axes (2)** correct y-axis/distance direction label including unit '(approximate) distance from the Sun (millions km)' (1) P x-axis/planet scale correctly labelled 'Planet' (1) P **Scaling (2)** linear scale on y-axis/distance direction (1) P scale appropriate (1) D **Plotting (2)** all 6 bars drawn correctly (2) M OR 4 or 5 bars drawn correctly (1) M	allow horizontal bars, i.e. axes reversed the unit must be present for the y axis/distance direction mark allow names of planets labelled data range needs to cover at least half the graph paper in the y axis direction/distance direction if numbers on the y-axis/distance are taken directly from the table in the order of the table then allow a maximum of 2 marks for correct axes allow bars/columns drawn touching allow +/- one small square max 5 for plotting a scatter/line graph	6

3 (d)	490 (s) (3) OR 486.99 (s) (2) OR $\frac{1.46 \times 10^8}{299\ 800}$ (2) OR $1.46 \times 10^8 = 299\ 800 \times$ time (1)	sig fig mark independent of other marks, but must be with working $\frac{146\ 000\ 000}{299\ 800}$ OR $\frac{146\ 000}{299.8}$	3
		Total	**13 marks**

Item	**Expected answers**	**Additional guidance**	**Marks**
4 (a)	35 (cm^3)	ignore units	1
4 (b)	{up to 30/at first} there is not much change in pH (1) {between 30 and 40/in the middle} there is a big change in pH (1) {between 40 and 60/at the end} there is not much change in pH again (1)	allow pH is low at low volumes of alkali/pH rises slowly allow rises fast allow high pH at high volumes of alkali if no other marks awarded, allow 1 mark for the general comment the more alkali added the more/higher the pH	3
		Total	**4 marks**

Item	Expected answers	Additional guidance	Marks
5 (a)	49.3 (2) OR $\frac{47.5 + 51.2 + 48.2 + 50.3}{4}$ (2) OR 47.5 + 51.2 + 48.2+ 50.3 (1) OR a number divided by 4 (1)	 $\frac{197.2}{4}$ 197.2	2
5 (b)(i)	Any two from: repeat the reading (1) ignore the result/draw a line of best fit, ignoring the (anomalous) result (1)	 allow repeat test/experiment/trial	2
5 (b)(ii)	Any two linked pairs: stopwatch {started too early/not reset to zero/stopped too late} (1) {before acid added/ time for cross to disappear had passed/longer} (1) OR volume of water added was more/volume of sodium thiosulfate was less (1) so the solution was less concentrated than expected/took longer to react/longer for cross to disappear (1) OR flask was wet/had water from previous trial (1) so concentration of thiosulfate was less/ longer to react/longer for cross to disappear (1) OR volume of acid was less (1) so the reaction took longer/longer for cross to disappear (1)	 allow weaker solution allow reaction slower allow weaker solution allow reaction slower allow reaction slower allow lower concentration of acid used	4
		Total	**8 marks**

Item	Expected answers	Additional guidance	Marks
6 (a)	Any two linked pairs: place the toy car at the same point on the slope each time (1) so that the starting distances are the same (1) OR measure the distance the car moves from the start to the end of the ramp with a ruler (1) so the exact distance moved is known (1) OR use the same person to start/stop the stopwatch (1) so the reaction time is the same (1) OR measure the vertical height (with a ruler) / measure the angle of the slope (with a protractor) (1) so that the height / angle is accurate (1) OR let go of the car without pushing it (1) so that the car is not given additional speed/force/KE to go down the slope (1) OR repeat each height / angle more than once (1) so that the data can be checked for anomalies / consistency or averaging (1)	ignore 'use light gates' without qualification	4
6 (b)	allow any number greater than 10 (cm/s)	ignore units	1
		Total	**5 marks**

Item	Indicative Content	Marks
7	**Conclusion 1** percentage of males smoking has reduced from 50% to (about) 20%. number of females smoking has halved/fallen from 40% to 20%. fall in female percentage is steadier than in males. the rate of fall in smoking was greater in males at the start compared to females. fall in percentage is not steady as it rises and falls for both males and females. some indication in the last few years of a rise in percentage of males smoking. supports first conclusion as there is a reduction, but not a steady/constant fall for males and females. **Conclusion 2** the difference between the percentage of males and females smoking over time has reduced. the numbers of males and females smoking now is about the same, but still the percentage of females smoke slightly less than males. supports the second conclusion as the percentage of females smoking is always lower than males.	6 expert

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. 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, **or** 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	Range of points described, **or** 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.
		Total Mark 6