



General Certificate of Education (A-level)
June 2013

Human Biology

HBI3X

(Specification 2405)

**Unit 3X: Externally Marked Practical
Assignment**

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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HBI3X: Task Sheet 1

Question	Marking Guidelines	Mark	Comments
1	<ol style="list-style-type: none"> 1. So that the endpoint could be clearly seen; 2. To see colour changes; 	1 max	
2	<ol style="list-style-type: none"> 1. So that only vitamin C from inside the syringe goes into the DCPIP; 2. Anything outside syringe would not be measured; 	1 max	
3	<ol style="list-style-type: none"> 1. (Distilled) water in place of vitamin C solution; 2. Use an equal volume of (distilled) water/1cm³ of distilled water; 	2	
4	<ol style="list-style-type: none"> 1. No need to keep the temperature the same/not temperature dependent; 2. No enzymes involved; 	1 max	
5	Correct answer based on mean, need to see evidence of working out;	2	<p>Correct idea of working out mean but incorrect answer = 1 mark</p> <p>Evidence could be in table</p>
6	<ol style="list-style-type: none"> 1. Concentration of vitamin C on x axis and volume needed to decolourise DCPIP on y axis/line graph; 2. Line of best fit; 3. Find the volume of fruit juice needed to decolourise DCPIP; 4. Draw a line along and down to find concentration of vitamin C in fruit juice/read off concentration of vitamin C which corresponds with this volume on y axis; 5. Calculation of mean volume; 	3 max	
Total		10	

HBI3X: Task 2

Question	Marking Guidelines	Mark	Comments
7	<ol style="list-style-type: none"> 1. Data presented clearly with full descriptions of both the independent (type of fruit juice) and dependent (volume of juice) variable; 2. Type of fruit juice in first column; 3. Juice volume units given eg cm^3; 	3	
8	All four vitamin C concentrations calculated accurately;	1	1/Juice volume x Task 1 mg to decolourise DCPIP or <u>mg from Task 1</u> juice volume
9	<ol style="list-style-type: none"> 1. Independent variable (type of fruit juice) on x axis and dependent variable (vitamin C concentration) on y axis; 2. Appropriate scales selected for the x and y axes. Scales should allow for both accurate plotting and reading of the graph; 3. Both axes correctly labelled with appropriate units, ((type of) juice) on x axis and (vitamin C concentration/ mg cm^{-3}) on y axis; 4. Accurate plots; 5. Data presented as bars; 6. Bars of equal width and do not touch; 	6	<ol style="list-style-type: none"> 1. Accept raw data if calculation has not been done <ul style="list-style-type: none"> • must plot processed data if processing done 3. Accept units relating to raw data if calculation has not been done 4. Award MP4 if volume plotted correctly even if processing done
Total		10	

HBI3X: Written Test Section A

Question	Marking Guidelines	Mark	Comments
10	<ol style="list-style-type: none"> Any purple/red/blue fruit juice; Difficult to see blue colour disappearing/colour changes; 	2	Accept named red/blue/purple juice
11 (a)	<ol style="list-style-type: none"> Volumes (very) small so (strongly) affected by errors; Hard to determine endpoint/endpoint difficult to standardise/end point subjective; 	2	<ol style="list-style-type: none"> Concept of variation in volume and of variation in end point Accept idea of variation in colour vision/perception of students
11 (b)	Use a burette/instrument to measure endpoint/colorimeter;	1	Accept any valid suggestions eg use larger volumes
12 (a)	226/227%;;	2	<p>If answer incorrect allow 1 mark for $\frac{0.98 - 0.3}{0.3}$</p> <p>Allow mark for concept of % difference but wrong round $\frac{0.98 - 0.3}{0.98} \rightarrow 69\%$</p>
12 (b)	(Comparisons can be made because) data shown as mg cm^{-3} ;	1	
12 (c)(i)	A buffer;	1	
12 (c)(ii)	<ol style="list-style-type: none"> Reference to how rapidly blood glucose levels rise after eating carbohydrates/named carbohydrate; Speed of digestion of carbohydrate; Speed of absorption of carbohydrate; 	2 max	If no mark awarded allow 1 mark for reference to carbohydrate/named carbohydrate
12 (d)(i)	Contains more vitamin C;	1	

12 (d)(ii)	<ol style="list-style-type: none"> 1. Only one study; 2. Only one make/brand/type of juice tested; 3. Do not know how the juice was prepared; 4. Vitamin C may have been added/removed during processing; 5. Higher sugar content/named sugar; 	2 max	<p>Accept any valid suggestion</p> <p>eg orange juice might lack a nutrient found in pineapple juice/pineapple juice contains protein digesting enzyme/orange juice contains more citric acid etc</p>
Section A Total		14	

HBI3X: Written Test Section B

Question	Marking Guidelines	Mark	Comments
13	<ol style="list-style-type: none"> 1. Age; 2. Vitamin C intake/factors reflecting uptake; 3. How long the smokers had been smoking; 4. Number of cigarettes smoked; 5. Type of cigarette; 	2 max	
14 (a)	(Vitamin C) deficiency (disease);	1	
14 (b)	<ol style="list-style-type: none"> 1. Smokers might eat fewer foods that contain vitamin C; 2. Smokers might not absorb vitamin C as efficiently; 3. Smokers might excrete more vitamin C; 	1 max	
15	<p>Yes (no mark). Standard deviations do not overlap;</p> <p>Do not know, need to do statistical test;</p>	1 max	
16 (a)	<ol style="list-style-type: none"> 1. To check that vitamin C is causing any effect/to compare; 2. To show that just taking a tablet does not cause the effect/not just psychological; 	1 max	
16 (b)	<ol style="list-style-type: none"> 1. Same size; 2. Same colour; 3. Same mass/weight; 4. Same shape; 5. Same taste; 6. Other ingredients. Do not accept nicotine/tobacco; 	2 max	Allow 'look the same' in place of MP 1,2,4 if they are not awarded

17	<ol style="list-style-type: none"> 1. So that the scientists could not choose volunteers who might fit the results they want; 2. So no-one knows who is having which treatment; 	1 max	Remembers bias/removes expectations (of outcome)
18	<ol style="list-style-type: none"> 1. Vitamin C group start higher and finish lower/finish similar to placebo; 2. Placebo group change very little; 3. Vitamin C group fall (sharply) then rise; 	2 max	Allow one for correct use of figures
19	<ol style="list-style-type: none"> 1. Vitamin C reduces (DNA) damage; 2. Vitamin C does not prevent DNA damage/DNA still damaged even with vitamin C; 3. When it does reduce it may only be in the short term/ valid reference to reduction only for 3 marks; 4. Only looked at one tissue/at cells lining the mouth; 5. Smoking associated with lower vitamin C content; 6. Cancer associated with DNA damage; 	5 max	
Section B Total		16	