



**General Certificate of Education (A-level)
June 2012**

Human Biology

HBI6X

(Specification 2405)

**Unit 6X: Externally Marked Practical
Assignment**

Final

Mark Scheme

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HBI6X: Task 1

Question	Marking Guidance	Mark	Comments
1	No – (starch) only used as an indicator / volume (of starch) has no effect/does not matter;	1	
2	1. (Colour change at start because) iodine reacts with starch; 2. (Then) iodine leaves starch to react with vitamin C / vitamin C (molecules) still present / more vitamin C (molecules) than iodine/starch (molecules);	2	Need context of colour disappearing not what is required for it to remain. 2. Idea of more vitamin C than either iodine or starch
3	Only volume of iodine important to get end point / rate of reaching end point not important;	1	Also allow either of: 1. not an enzyme-controlled reaction / no enzyme (present); OR 2. reaction is quick/not affected by (room) temperature change;
4	1.17/1.18;;	2	2 marks for correct answer 1 mark for division by 8.5
5 (a)	(Student) has indicator/DCPIP in syringe not flask / does not use iodine/starch / (starts with) vitamin C in flask not syringe;	1	
5 (b)	(DCPIP) remains blue;	1	
5 (c)	1. <u>Volume</u> of DCPIP; 2. (Volume of) DCPIP can be used to calculate mass of vitamin C present / is the (dependent) variable / a known volume of vitamin C used;	2	1. Accept where units show volume is required. 2. Accept concentration of vitamin C Reject 'amount' as too vague for both points since volume and mass are required
Total		10	

HBI6X: Task 2

Question	Marking Guidance	Mark	Comments
6	<ol style="list-style-type: none"> 1. Data presented clearly with full descriptions of both the independent (Treatment of food) and dependent variable (Volume of iodine solution); 2. Independent variable (Treatment of food) in first column; 3. Units clearly stated for DV (cm³) and <i>only</i> in the heading for DV <u>and</u> with no units for IV; 4. Data show mass of vitamin C is less in treated food; 	4	<p>This may be recorded either by a full title or by complete headings at the top of the table.</p> <p>2. Accept other appropriate descriptions of IV</p> <p>4. Do not give this mark if 10 results not shown or no column with calculated mass of vitamin C included</p>
7 (a)	Null hypothesis clearly stated;	1	E.g. cooking/heat (treatment) has no effect on vitamin C content of potatoes
7 (b)	Choice of statistical test as standard error (and 95% confidence limits) or <i>t</i> -test;	1	Accept either test
7 (c)	Valid explanation for choice of statistical test;	1	E.g. used to compare two means/samples etc.
7 (d)	Test statistic calculated accurately;	1	<p>Calculation should be based on mass but allow calculation based on volume of iodine used as this will be proportional (to mass of vitamin C) and allow same interpretation.</p> <p>Allow correct calculation even if choice of test is incorrect</p>
7 (e)	<ol style="list-style-type: none"> 1. Correct interpretation of calculated test statistic in terms of acceptance or rejection of null hypothesis; 2. Interpretation involves correct reference to probability of / difference in results being due to chance/probability value of P = 0.05; 	2	1. Allow correct interpretation of calculated test statistic even if calculation or choice of test are incorrect
Total		10	

HBI6X: Written Test Section A

Question	Marking Guidance	Mark	Comments
8 (a)	<ol style="list-style-type: none"> 1. Peel may contain more/less/different amount of vitamin C (compared to rest of tissue); 2. Removes/controls a variable / so samples from same (type of) potato tissue; 3. Makes potato (tissue) easier to blend/homogenise; 	1 max	Accept other appropriate potential variables
8 (b)	(So, at start) no differences in vitamin C content due to source of sample/age/variety;	1	Need stated or implied idea of no differences at the start. Accept cooking or not is the only variable.
8 (c)	(To) break cell <u>walls</u> / release vitamin C from cells;	1	
9	<ol style="list-style-type: none"> 1. Mass of potato; 2. Volume of water (added); 3. Time length for blending; 	2 max	In this case, accept 'amount' where it is clear that this refers to either the potato or volume of water. Reject variables controlled <u>after</u> solutions made
10	Colourless;	1	Reject 'clear colour'
11	<ol style="list-style-type: none"> 1. Bar chart; 2. 'Potato solutions' are categoric/discrete/not numeric; 	2	<ol style="list-style-type: none"> 1. Accept bar graph 2. Allow other appropriate wording eg IV not continuous

12	Change in method	Effect of change in method on result	1	Allow either or or approach to answer (because fewer iodine molecules to react with vitamin C)
	Use a more dilute iodine solution	<i>Either</i> Need more (iodine solution) to reach end-point/colour change/go blue-black OR take longer;		
	Increase the number of drops of starch solution used	<i>Either</i> No effect (it is just an indicator) / more intense blue-black colour OR take same length of time;		
	Use 100 cm ³ of water to make the raw potato solution	<i>Either</i> Need more <u>iodine</u> (solution) (to reach end-point) OR take longer;	1	(because potato sample will be a more concentrated vitamin C solution)
13 (a)	Storage time of potatoes has no effect on vitamin C content;		1	Accept other appropriate ways of expressing this idea eg age of potatoes
13 (b)	Correlation coefficient;		1	
13 (c)	(Yes because, in potatoes dug up) 1. Initial vitamin C content might vary/be different / potatoes might be different sizes (at start); (No because) 2. Natural variation between potatoes; 3. Mass (of vitamin C) is related to days <i>after</i> harvesting; 4. ('Seed' potatoes) planted at same time / same time to produce vitamin C; 5. All treated the same/from same field; 6. Same growing conditions/example given;		2 max	Accept answers from either route. Answers should be in the context of reasons for possible differences or similarities in the amount of vitamin C that had been produced in the new potato tubers that had grown. 4. Ignore references to differences in the 'seed potatoes' that were planted.
Total			15	

HBI6X: Written Test Section B

Question	Marking Guidance	Mark	Comments
14	<ol style="list-style-type: none"> (500 mg) wasteful / (one tablet/500 mg) more than meets daily needs / 250 mg is closer to recommended daily intake; Excess not stored/lost in urine; (Excess) might lead to diarrhoea; 	2 max	
15	<ol style="list-style-type: none"> (Vitamin C) has shape similar to histamine; (Vitamin C) can bind to receptor / is complementary to receptor; (Vitamin C) changes shape of receptor (so histamine cannot bind); 	2 max	<p>Allows idea that binding is somewhere on the receptor.</p> <p>Reject idea of same shape as receptor.</p>
16	<ol style="list-style-type: none"> (Females and males) different sizes / males are larger/have greater mass; (Recommended daily) intake based on per unit size; 	2	<ol style="list-style-type: none"> Accept converse Accept other ways of expressing e.g. per kg body mass
17	Recommended dose/3000 mg is beyond safe upper limit (for intake) / excess can cause diarrhoea;	1	Accept 'symptoms/effects of diarrhoea worse than symptoms/effects of hay fever'
18	<ol style="list-style-type: none"> Varies with/depends on intake (of vitamin C); Varies with/depends on use (of vitamin C) by cells/reactions/processes; 	1 max	Could be expressed as different foods contain different amounts (of vitamin C)
19 (a)	It is (some form of) a 'measure'/provides evidence of benefit/ reflects how sufferer perceives effect on symptoms;	1	Idea of does allow sufferer to indicate a change in symptoms
19 (b)	Not quantitative / subjective / judgemental / based on opinion/ only sufferer can describe effect (on symptoms) / (effects on) symptoms are varied/vary from person to person / might be a psychological effect;	1	Idea of difficult to give precise benefits from taking dose

