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General Certificate of Education (A-level)
June 2011

Human Biology HBI6X

(Specification 2405)

Unit 6X: Externally Marked Practical Assignment

Final

Mark Scheme

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HBI6X Task Sheet 1

Question	Marking Guidance	Mark	Comments
1	Soot/carbon on boiling tube / smoke from seed / steam from water / light from flame / conduction to needle;	1	Accept other suitable evidence for detectable energy losses e.g. felt heat given off (from seed) Ignore reference to pieces falling off
2	Take readings, with a thermometer, at intervals;	1	Need both the ideas of regular readings and use of a thermometer Accept use of dataloggers
3	Use a larger seed / use a smaller volume of water;	1	If value for mass of seed given, it should be greater than that used, if volume of water is stated, it should be less than 25cm^3 Accept 'more seeds on needle'
4(a)	Add iodine (solution); Blue black colouration / seed crushed/cut;	2	Accept potassium iodide / 'do iodine test'. Reject 'do starch test'. Accept black / dark blue
4(b)	Correct answer (fraction in simplest form or percentage) from candidate data = 2 marks;; (Did not burn) identified as remaining mass divided by original mass ***OR*** correct calculation of proportion that did burn = 1 mark;	2	Check candidate's data.
5	Time (taken to burn); Change in mass divided by time;	2	Accept mass of seed burnt

6	Allow comparison (of energy content) between food substances / mass of food substances varies;	1	
	Task Sheet 1 Total	**10**	

HBI6X Task Sheet 2

Question	Marking Guidance	Mark	Comments
7	Data presented clearly with full descriptions of both the independent variable (mass/weight of seed) and dependent variable (allow either of change in temperature/temperature rise *or* energy content);	1	This may be recorded either by a full title or by complete headings at the top of the table. E.g. if 'mass' is recorded in the table, the title should give more detail by reference to the seed.
7	Independent variable (Mass/weight of seed) in first column;	1	
7	Unit clearly stated (g and ^{o}C or J) and <u>only</u> in the headings of the appropriate columns;	1	Accept use of solidus or brackets
7	Data shows energy content increases as mass increases in majority of cases;	1	Do not give this mark if 10 results not shown or no column for energy content included
8(a)	Null hypothesis clearly stated*;* e.g. the mass of a seed does not affect its energy content.	1	Allow other ways of expressing e.g. there is no difference in the energy content of seeds of different masses Reference to mass/weight not size required
8(b)	Spearman's rank or correlation coefficient;	1	Accept either test
8(c)	Valid explanation for choice of statistical test;	1	E.g. looking for associations between different measurements
8(d)	Test statistic calculated accurately;	1	Check candidate's working. Accept candidate's correct calculation even if the test is not appropriate.

8(e)	Correct interpretation of statistical test in terms of acceptance or rejection of null hypothesis; Interpretation involves appropriate reference to both probability/p and chance;	2	Use candidate's values from chosen test even if it is incorrect. Do not credit the words, the use of probability and chance must be in the correct context.
	Task Sheet 2 Total	**10**	

HBI6X Written Test - Section A

Question	Marking Guidance	Mark	Comments
9	Improve accuracy / measurement more accurate;	1	Accept reference to more precise
10(a)	Principles: safety and expansion of water/water release from tube (with increase in temperature);	1	Accept e.g. 'so not on me if water spurts out of tube'' Accept 'splash'. Reject 'spill'.
10(b)	Flame in contact with more of glass/boiling tube/water;	1	Accept idea of more heated/larger surface area heated
11(a)	(Transferred into) Air; (Glass of) boiling tube; Glass rod; Thermometer; Mounted needle; Light (energy); Carbon/soot on tube;	2 max	 Ignore 'surroundings' Accept tongs if used instead
11(b)	Reliability because the amount of transfer may not be the same each time/will vary / because results will be different / accuracy (of reading thermometer) will be same each time;	1	
12	5.33 / 5.27 ;; Mean mass 0.27(g) and mean energy content 1.44(J) / division of energy by mass for the 5 seeds = 1 mark;	2	Correct answer is 2 marks

13	Scatter diagram/graph / scattergram; To see the type of correlation;	2	Accept other reasons e.g. data paired / DV may have multiple values for a value of IV / *both* variables quantitative/continuous
14(a)	There is no difference in the <u>mean masses</u> (of runner bean and pea seeds) / differences in <u>mean masses</u> are due to chance/not significant;	1	Reject if there is reference to energy content
14(b)	Probability/p = 0.05/5% <u>and</u> degrees of freedom/df = 8 / critical value is 2.31; Difference significant if *t* value greater than critical value;	2	Accept description of how df derived e.g. $(n_1 + n_2) - 2$ Accept converse or correct reference to null hypothesis (in part (a))
15	1. Digestion/absorption not 100% efficient / some content cannot be digested; 2. Seeds contain cellulose/fibre/roughage; 3. Cellulose/fibre/roughage is indigestible/ no enzyme to digest <u>cellulose</u>;	2 max	Ignore references to 'break down' or 'inedible' Note: "cellulose cannot be digested" would score points 1 and 3 Point 3 identifies what it is that cannot be digested. Accept 'no cellulase'.
	Section A Total	**15**	

Question	Marking Guidance	Mark	Comments
16	Fewer cells/mitochondria; Less respiration/respiring tissue / muscle has high rate of respiration;	2	Note -"Fewer respiring cells" scores both points Reject 'less energy for/used in respiration'
17(a)	(Men) exercise less with age;	1	Reject if expressed as 'need to'
17(b)	(Men) eat less as they get older;	1	Reject if expressed as 'need to'
18	Two suitable suggestions;; with reasons;; E.g. (Difference in) surface area : volume ratio; Higher ratio means more heat loss; Genetic differences; Suitable explanation of difference e.g. different hormone/testosterone levels; (Difference in) fat/muscle content; Muscle more active/respires more / fat less active/respires less; (Differences in) levels of activity/exercise/energy intake; BMR increases with exercise/greater energy intake / more active person has higher BMR;	4 max	Mark in pairs, with no transfer between pairs. Maximum two pairs Accept description e.g.' tall & thin versus short & fat' idea Credit other ways of expressing
19	To allow a comparison / to provide a standard unit; Because) people are different sizes;	2	

20	High - High - Low:	1	
21	*BMR* 1 Body weight affected by BMR; 2 If BMR falls, more difficult to maintain/lose/avoid gain in weight; 3 BMR affected by age/food intake/energy intake/dieting/level of activity/exercise; *Issues with ageing (reducing BMR and so to avoid)* 4 Eat less / have lower energy intake / less active; 5 Loss of muscle (tissue); 6 Gain of fat (replacing muscle); *Control of weight* 7 high energy flux/exercise + high energy intake beneficial for maintaining weight; *Enjoy longer life because* 8 Active/high BMR/not overweight; 9 Reduced risk of obesity/CHD/diabetes/other named disease associated with age; *Definitions* 10 Level of activity / age range / 'suitable level' not defined; *Data* 11 Some only based on hypotheses 12 No data (in resources) on life expectancy/sample size; 13 No data for women;	4 max	Allows different ways of approaching question
	Section B Total	**15**	

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