



**General Certificate of Education (A-level)  
June 2011**

**Biology**

**BIO6X**

**(Specification 2410)**

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

**Final**

***Mark Scheme***

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**BIO6X - Task 1**

<b>Question</b>	<b>Marking Guidance</b>	<b>Mark</b>	<b>Comments</b>
1	Maggots may leave smell/substances/trail; Which could affect (the behaviour of) other maggots;	2	
2	Method which would even out light intensity in maze; To produce uniform/constant light intensity	2	E.g. place lamp above maze  May be uniform over time or across maze
3	Take temperature continually/when each maggot is used; Determine if changes have occurred (during the experiment);	2	
4	No (no mark) Low sample size/too few repeats; Statistical test not carried out; Not representative;	2 max	Accept 'not enough data'
5	Same (previous) treatment e.g. environment/feeding; Same size/age; Same species;	2 max	
	<b>Total</b>	<b>10</b>	

**BIO6X - Task 2**

<b>Question</b>	<b>Marking Guidance</b>	<b>Mark</b>	<b>Comments</b>
6(a)	Clear statement of null hypothesis;	1	E.g. there is no difference in the frequency in which maggots make a right or left turn.
6(b)	Chi-squared;	1	
6(c)	Categorical/frequency data/direction of turn/right and left are categories;	1	Allow converse – not taking measurements Accept 'counting'
6(d)	Test statistic calculated correctly;	1	Allow if wrong test calculated correctly.
6(e)	Correct interpretation of statistical test in terms of acceptance and rejection of null hypothesis; Interpretation involves appropriate reference to the probability of the results being due to chance;	2	Use candidate's values even if calculation incorrect. Correct critical value needed for 1 <sup>st</sup> mark
	<b>Total</b>	<b>6</b>	

**BIO6X - EMPA Written Test Section A**

Question	Marking Guidance	Mark	Comments
7	Large enough for statistical test; The larger the sample the more representative of the population it will be; Not so many that insufficient time;	2 max	Do not allow identification of anomalies. Do not credit sample size. Do not allow for calculation of reliable mean
8	No (no mark) Prevents learning/reduces stress on maggots;	1	Yes unacceptable
9	No (no mark) Can be explained by (natural) variation/chance;	1	Accept 'It's what it actually did'.
10(a)	Directional response to stimulus;	1	
10(b)	Method to keep light source non-directional e.g. lamp above/keep in dark; So that it is not possible to show a directional response/reduces light as a variable/keeps light uniform;	2	
11	1 Use T part of maze only/place maggot in stem of T; 2 Put food at one end of T-shape; 3 Analyse data statistically/use large number of maggots; 4 Repeat with food on the other side of T;	3 max	
	<b>Total</b>	<b>10</b>	

**BIO6X EMPA Written Test – Section B**

Question	Marking Guidance	Mark	Comments
12	Decrease (woodlice turning in opposite direction to forced turn with increasing distance between turns) then more rapid decrease; (Rapid decrease) when distance between turns is 9cm/80% woodlice turning in opposite direction;	2	Accept 'after 9cm' or between 9 and 10cm' but not at 10cm
13	No (no mark) Equal numbers/50% turn each way; (Would expect this) by chance/at random;	2	
14	1 Keep distance same; 2 Increase time/delay woodlice/decrease speed of woodlice 3 (Increase time) between forced and second turns;	3	Allow one mark for measure time taken for stated/set distance
15	Short distances result in more (woodlice showing) turn alternation; Keeps woodlice going in one direction/stops them going round in circles;	2	
16	Time to establish humidity to that required/time for substance to absorb water; So that behaviour typical of humidity; Woodlice no longer affected by handling;	2 max	Allow acclimatisation idea
17	Correlation does not show causal link; May be due to other factors/named factor;	2 max	Do not accept casual

18	<p>1 It is a line of best fit;</p> <p>2 Variation in woodlice/a named difference in woodlice;</p> <p>3 Variation in environmental conditions/change in a named environmental condition;</p>	3	<p>E.g. age, species, sex</p> <p>E.g. Temperature/vibration/sound/light</p>
19(a)	<p>11.1;;</p> <p>Allow one mark for calculating loss in mass as 0.02g and calculating a percentage;</p>	2	Accept 11.11/11 but not 11.0
19(b)	<p>1 (More mass loss) linked to losing more water;</p> <p>2 Gills (more) exposed to air/covered (less) by other woodlice;</p> <p>3 Greater surface area (exposed);</p> <p>4 (Not clumped) so lower humidity (around each woodlouse);</p> <p>5 So greater evaporation/diffusion (of water);</p>	3 max	Assume 'They' refers to woodlice in group B
19(c)	Initial masses different;	1	
20	<p>Low humidity results in more woodlice moving;</p> <p>So increased movement increased chance of leaving dry/unfavourable environment;</p> <p>So reduce water loss/reduce evaporation;</p>	2 max	
	<b>Total</b>	<b>24</b>	