



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

Biology

BIO6X

(Specification 2410)

**Unit 6X: 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 candidates' 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 candidates' 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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BIO6X 2012: TASK 1

Question	Marking guidance	Mark	Comments
Table	No marks awarded		
1(a)	Allow any method that does not involve any element of conscious choice;	1	E.g. number and select numbers from a 'hat' Do not accept methods such as measure every other seed 'Use random number generator' insufficient must be a table/calculator for example
1(b)	Selector influenced (by some feature)/selector makes conscious choice;	1	No marks awarded for using the words random and bias as these are given in the question
2(a)	Principle that magnification is apparent size divided by real size; 4.0 – 4.2;;	2	E.g. Measured size of scale divided by scale size itself
2(b)	Two marks for correct answer in range 5.7 – 6.5;; One mark for incorrect answer in which incorrect measured length of seed has been divided by magnification / measured length of seed has been compared to given scale;	2	Two marks can be awarded if error in the magnification calculation is carried forward
3(a)	(Involves lengths of) all the seeds/shows spread (of all lengths);	1	Do not accept answers using 'range'
3(b)	1. Large standard deviation means greater variation (in seed length/size); 2. Greater variation in distance (from the parent plant) / more spread out; 3. Description of why seed size/mass affects distance travelled;	3	Allow 'range' as equivalent to variation in this instance 3. suggestion must be reasonable
Total		10	

BIO6X 2012: TASK 2

Question	Marking guidance	Mark	Comments
4(a)	Clear statement of null hypothesis. E.g. height has no effect on distance travelled;	1	
4(b)	Standard error (and 95% confidence limits);	1	
4(c)	Comparing means;	1	
4(d)	Test statistic calculated correctly;	1	Allow wrong stats test calculated correctly
4(e)	<p><i>If Overlap:</i></p> <p>1 Probability greater than 0.05 / 5% that (differences in) results are due to chance;</p> <p>2 Accept null hypothesis;</p> <p><i>OR If no overlap</i></p> <p>1 Probability less than 0.05 / 5% that (differences in) results are due to chance;</p> <p>2 Reject null hypothesis;</p>	2	<p>Use student's value of test statistic even if it has been calculated incorrectly</p> <p>1 Must refer to both probability and chance</p> <p>2. Reject 'hypothesis is true/false'</p>
Total		6	

BIO6X 2012: WRITTEN TEST

Section A

Question	Marking guidance	Mark	Comments
5	<p>2 marks</p> <p>Method fixes height dropped and orientation of seeds, would be repeatable;;</p> <p>1 mark</p> <p>Method fixes either height dropped or orientation and would be repeatable;</p> <p>0 marks</p> <p>Method may fix either height dropped or orientation, but unlikely to be repeatable</p>	2 max	
6	Allows horizontal distance to be measured accurately;	1	
7	<p>(Yes)</p> <ol style="list-style-type: none"> 1. Seeds exposed to wide range of wind speeds; 2. Would cancel out in the average; <p>(No)</p> <ol style="list-style-type: none"> 3. Will affect those dropped from higher more; 4. Longer time for wind to have effect/wind more noticeable higher from floor; 	2 max	Ignore references to anomalies
8(a)	Minimises the effect of factors/named factor other than height;	1	Accept “that’s how they are released naturally by plant” Do not accept ‘quicker’
8(b)	May interfere with each other; Will not all be released in the same position/same orientation;	max 1	

9	1. Stick to/land on tyres/radiator/vehicle; 2. Draft/turbulence;	2	
Total		9	

BIO6X 2012: WRITTEN TEST

Section B

Question	Marking guidance	Mark	Comments
10	<ol style="list-style-type: none"> 1. Quadrats placed at intervals along transect; 2. Number of seeds counted per quadrat to calculate seeds per m²; 	2	
11(a)	<ol style="list-style-type: none"> 1. Wind from North East; 2. Seeds blown further; 	2	1. Accept blowing to South West
11(b)	<ol style="list-style-type: none"> 1. Seeds have different distances to fall / seeds have different times in air; 2. Blown by wind a different amount; 3. (Candidates investigation) shows that seeds travel further when dropped from higher; 	2 max	3. Supported by reference to candidate's investigation
12(a)	<ol style="list-style-type: none"> 1. Produces large number of seeds / produces seeds blown by wind; 2. Greater probability (of colonising); 	2	2. Accept greater chance
12(b)	<ol style="list-style-type: none"> 1. Small size; 2. Too little food in seed to become established; 3. Not enough light for photosynthesis; 	2 max	
13(a)	Each treatment occurs in each row <u>and</u> each column;	1	Ignore references to random

13(b)	<ol style="list-style-type: none"> 1. Different environments or different variables in the field/in different plots; 2. Variables change across rows / down columns / from one side to another; 3. Minimises/removes the effect of variables; 	2 max	
14	<p>Standardising any two relevant factors, for example:</p> <ol style="list-style-type: none"> 1. Water; 2. Fertiliser/manure/ soil nutrient; 3. Weed killer; 4. Soil pH; 	2 max	<p>To gain credit here, factor must be something that the scientists could do and must relate to field conditions</p> <p>Reject answers such as keep light/carbon dioxide/temperature constant</p>
15(a)	<ol style="list-style-type: none"> 1. Survival falls as time increases; 2. Survival falls as sowing density increases; 3. Up to 15/25 seeds per m² all survive/above 250 seeds per m² survival falls rapidly; 	3	
15(b)	<ol style="list-style-type: none"> 1. Intraspecific competition/ competition between bean/soya plants; 2. For water/nutrients/light; 3. Greater as plants grow/increase in size; 	2 max	
16(a)	<ol style="list-style-type: none"> 1. Competition; 2. (From) parent tree; 3. (From) large number of seeds; 4. For light/nutrients/water; 	3 max	
16(b)	<ol style="list-style-type: none"> 1. Few seeds/young plants; 2. Interspecific competition/unsuitable conditions means not all survive; 	2	
Total		25	