

A-LEVEL **BIOLOGY**

BI03X – Investigative and practical skills in AS Biology
Mark scheme

2410
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Version 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer 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 associates 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 associate understands and applies it in the same correct way. As preparation for standardisation each associate 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, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

BIO3X: Task 1

Question	Marking Guidance	Mark	Comments
Labelling Figure 1	Vascular bundle correctly labelled with label line and the letter X ;	1	If no label line the centre of the X must be inside a vascular bundle.
1	1. Cohesion-tension; 2. Root pressure; 3. Transpiration/evaporation;	2 max	
2	To allow light through/to see clearly where the (red) colour is;	1	
3	Xylem/vascular;	1	
4	1. Measure length of line (P-Q); 2. Divide this by 9/actual distance;	2	1. Allow 'measure image' Correct calculation only with no description = 1 mark
5	1. Description of how to measure distance moved; 2. Set time (if measuring distance) / record time (if distance constant); 3. Distance moved divided by time;	3	
6	1. The water/solution continues to move; 2. Capillary action continues;	1 max	
Total		11	

BIO3X: Task 2

Question	Marking Guidance	Mark	Comments
7 – Candidate's own table of raw data	<ol style="list-style-type: none"> 1. Data presented clearly and with full description of independent (concentration of salt (solution)) and dependent (distance solution moved) variables; 2. Concentration (of salt solution) in first column; 3. Units (mol dm^{-3} and mm) and only in heading; 	3	<p>These marks are awarded irrespective of the quality of the data</p> <p>3. Allow M for mol dm^{-3}</p> <p>Where data shows rows rather than columns the same principles apply.</p>
8 - Graph	<ol style="list-style-type: none"> 1. Correct calculation of mean distance moved; 2. Graph has 'concentration of salt' on x-axis and 'mean distance solution moved' on y-axis; 3. Both axes labelled correctly with appropriate units; 4. Appropriate scales selected for x and y axes; 5. All points plotted correctly; 6. Points joined with ruled lines unless the candidate's data are such that it is felt that intermediate points could be predicted reliably, in which case a line of best fit can be given credit; 	6	<p>Allow mean rate of movement, eg cm per minute</p> <p>If a bar chart is drawn mp4 and mp6 cannot be awarded.</p> <p>1. Do not credit if less than 3 readings taken for each concentration.</p> <p>1. Ignore number of decimal places but if rounding up/down then must be correct.</p> <p>Mp 2 and 3. Allow error carried forward from the table.</p> <p>3. Credit may be given for any method of expressing units i.e. with solidus or brackets.</p> <p>6. Reject if line extrapolated beyond plotted points.</p>
Total		9	

**BIO3X: Written Test
Section A**

Question	Marking Guidance	Mark	Comments
9	<ol style="list-style-type: none"> Headings correct – mol dm⁻³ <u>and</u> volume of water / cm³; Concentration correct ie 0.3; 	2	1. Allow M for mol dm ⁻³
10(a)	<ol style="list-style-type: none"> Thin/narrow (tube); Non-living/no energy/no ATP/no respiration; Continuous/hollow (tube); 	2 max	<ol style="list-style-type: none"> Allow 'similar diameter to xylem' Ignore 'dead'
10(b)	<ol style="list-style-type: none"> No roots/no root pressure; No leaves/no <u>transpiration</u>; Only one tube/plant has several xylem vessels; Xylem vessels different diameter; Different adhesion of water to tube; 	2 max	Accept (No pits) so no sideways movement of water Ignore reference to 'cohesion-tension'
11	Movement (of water/solution) had stopped;	1	
12(a)	Cannot predict intermediate values;	1	
12(b)	<ol style="list-style-type: none"> Increase in (salt) concentration had a greater effect in celery; Didn't move as far in capillary tubing compared to celery upto 0.88 (mol dm⁻³)/moved further in capillary tubing than it moved in celery above 0.88 (mol dm⁻³); 	2	2. Allow above 0.86-0.9 / allow 'at 1.0'
13	<ol style="list-style-type: none"> Movement over large distances/around plant or organism; (All) substances move together/<u>bulk</u> movement; All move at the same speed/quicker than diffusion; All move in the same direction; Movement due to pressure (differences); 	2 max	<ol style="list-style-type: none"> Accept 'from roots to leaves' Accept named substance moving in water/in solution Mp 2, 3 and 4 – Do not credit if referring to water only.
Total		12	

BIO3X: Written Test
Section B

Question	Marking Guidance	Mark	Comments
14	Variable that is changed;	1	Reject 'the variable that changes'.
15	1. Idea of a confounding variable; 2. (So) genetically similar; 3. (So) have similar salt tolerance/response to salt water/response to watering treatment; 4. (So) have similar yield/mass of seeds;	2 max	2. Do not accept 'genetically identical/same DNA'. 4. Do not accept 'amount/number of seeds' or 'growth rate'.
16	Mitosis;	1	Ignore cell division
17	1. Irrigation with sea water/ C/D increased yield compared with no irrigation/ A ; 2. Yield was lower when irrigated with sea water/ C/D compared with fresh water/ B ; 3. Yield was lower when watered with sea water throughout growth and seed formation/ C than when watered with sea water just at seed formation/ D ;	2 max	For 'yield' accept 'mass of seed' throughout. Only penalise once for use of 'amount/number of seeds'. Accept use of figures from table. 'It' refers to watering with seawater/mixture.

Question	Marking Guidance	Mark	Comments
18	<ol style="list-style-type: none"> 1. Irrigation with sea water/C/D increases concentration of salt in soil; 2. Lower water potential in the soil linked to reduced uptake of water; 3. Salt concentration in the soil might/might not increase in the future; 4. Might decrease plant growth/yield in the future; 5. Less food/fewer seeds for future planting; 	3 max	<p>Ignore reference to standard deviation/quality of the data.</p> <p>3. Mark point 3 includes the principle for mark point 1 so mp3 gains 2 marks (for mp1 and mp3)</p> <p>Mp 3 and 4. Allow 'further' for the idea of 'in the future'.</p>
19	(Salt) intake can vary greatly from day to day;	1	
20	<p>No (no mark)</p> <ol style="list-style-type: none"> 1. High blood pressure given as percentage (of population); 2. Large numbers used; 	1 max	Answer must be in the context of 'No'
21	<ol style="list-style-type: none"> 1. Shows positive correlation; 2. (But) not necessarily a causal link/may be other factors causing the results; 3. Data is for large populations (not for individuals); 4. Salt in the diet will affect each individual differently; 5. There are populations that don't fit the trend/there are outliers; 	3 max	<ol style="list-style-type: none"> 1. Allow a description of the positive correlation; 2. Do not accept 'casual link' 5. Allow 'there are anomalies'/suitable example
22(a)	Idea of it happened/still part of sample;	1	
22(b)	<ol style="list-style-type: none"> 1. If method flawed; 2. If method different to other studies; 	1 max	<p>1. Accept suitable example of error in method.</p> <p>Ignore reference to 'caused by other factors'</p>

Question	Marking Guidance	Mark	Comments
23	1. High salt linked to high blood pressure linked to heart disease; 2. (Increased risk of) atheroma; 3. (Increased risk of) blockage/clot in the <u>coronary artery</u> ;	2 max	1. Reference to 'strain on the heart' is insufficient. 2. Accept description of atheroma with minimum of 'fatty deposit in the wall of an artery' Ignore reference to aneurysms.
Total		18	