



## **General Certificate of Education**

# **Biology 1411**

## **BIO3X      Externally Marked Practical Assignment**

# **Mark Scheme**

*2009 examination - June series*

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 meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting 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 the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' 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.

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**Task Sheet 1 (8 marks)**

Question	Part	Sub Part	Marking Guidance	Mark	Comments
1			To get concordant readings / to minimise effects of variation in data / to identify anomalies / to reduce effect of anomalies;  Makes mean more reliable;	2 max	<i>Reject</i> mean more accurate
2			Two suitable precautions, e.g.,  Use clamp stand to ensure the syringe is vertical / at same angle;  Place paper behind syringe so level can be seen;  Read meniscus at eye level;  Drain syringe completely each time / same end point;	2 max	Accept any precautions that should have been taken in this investigation and that are not given in the instructions, e.g., wash <u>and dry</u> syringe
3	(a)		Mean;	1	Check candidate's calculations from data in table, including correct rounding up or down of decimal Do not penalise excessive number of decimal places in answer
3	(b)		Flow rate:	1	Check candidate's calculations from the answer in 3(a)
4	(a)		(May be more accurate) because time taken to drain is longer / less effect from stopping / starting timer / smaller percentage error;	1	
4	(b)		(No/little difference) because effect of stopping / starting timer still has big effect;  Judging when all solution has drained is subjective / not as accurate as the timer;	1 max	If value on script has not been changed, <i>accept</i> answer of "makes no difference because that is what I used".



**Written Paper (30 marks)****Section A (14 marks)**

Question	Part	Sub Part	Marking Guidance	Mark	Comments
8			Reaction occurs at its fastest / close to optimum temperature / fast enough for the reaction to occur in time available / not too hot to denature enzyme;	1	<i>Accept</i> enzyme will work well at this temperature
9			Add water instead of enzyme / add boiled enzyme / add 0% pectinase;  To ensure change (in viscosity) due to enzyme;	2	
10	(a)		Box around any COOH group;	1	
10	(b)		By condensation / water removed;  Between / from two OH (groups);	2	<i>Ignore</i> references to bond formation
11			1. The greater the concentration of pectinase / enzyme, the greater the number of active sites; 2. So more enzyme-substrate complexes formed; 3. By collisions (between enzyme and substrate); 4. More pectin / substrate broken down / broken down faster; 5. Producing thinner/ less viscous mixture;	4 max	
12	(a)		pH 5 – 5.5;  Optimum pH for <u>pectinase</u> / pH when rate was fastest;	2	
12	(b)		No intermediate values;  Cannot predict rate between plotted values;	2	

**Section B (16 marks)**

Question	Part	Sub Part	Marking Guidance	Mark	Comments
13			Gene (for making pectinase) has been removed / altered / different sequence of amino acids produced;	1	
14			To enable (valid) comparison; Bigger/smaller tomatoes could compress more easily;	2	
15			SD bars do not overlap ; Difference (in ripeness) is real; More variation in normal tomatoes (than in GM tomatoes);	2 max	
16			<u>Two principle marks</u> , candidate links: Increase in pectinase activity on graph with time of softening; Softening with ripening; Relationship / correlation does not show cause; Softening could be due to another factor / variable;	3 max	
17			No effect on dry mass / <u>small</u> increase in dry mass; Decrease in fresh mass;	2	<i>Ignore</i> reference to figures.

Question	Part	Sub Part	Marking Guidance	Mark	Comments
18			Water potential inside tomato plant becomes higher / less negative;  Water drawn out of tomato plants / more difficult for tomato plants to take up water;  By osmosis;  Most of the fresh mass is (mass of) water;	3 max	
19			For: Figures indicate mean taste score increases with sodium chloride;  Against: Small sample size/only 14 people;  Measurement of taste very subjective;	3	