A-LEVEL
Biology
BIO3X
Mark scheme

2410
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Version: 1: Final Mark Scheme

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
1(a)	1. Cell wall; 2. (Cell surface) membrane; 3. Cytoplasm; 4. Vacuole membrane/tonoplast;	2 max	All four correctly labelled for 2 marks Three correctly labelled for 1 mark 2. Accept 'membrane' but reject incorrectly named membrane eg nuclear membrane. 4. Reference to membrane/tonoplast required. Allow any method of labelling, eg label lines or writing on/in the figure
1(b)	1. An effect on membrane(s) eg broken/damaged/destroyed/more permeable; 2. (Due to) proteins denaturing/(phospho-)lipids melting; 3. (Pigment) can <u>diffuse</u> out; 4. Cell wall (freely) permeable;	3 max	1. Ignore references to cell wall. 2. Accept other ways of expressing 'melting' eg become more fluid. 4. Reject cell wall permeable as a result of heat damage.
2	Add acid/example of acid, eg lemon juice, vinegar, pickling;	1	Accept idea in any context, not just boiled cabbage.
3	1. Reduce (pigment) break down/damage; 2. To reduce microbial growth;	1 max	'So it keeps' is not sufficient 1. Must refer to a negative effect. 1. 'To reduce enzyme activity' alone is insufficient. 2. Accept 'to reduce microbial respiration'.

Question	Marking Guidance	Mark	Comments
4	1. Add pH indicator to solutions of known pH; 2. (Then) take colorimeter reading; 3. Draw a graph (known pH against colorimeter reading); 4. Add <u>same volume</u> of pH indicator and unknown; 5. Take colorimeter reading for unknown and read off graph for pH;	3 max	MP2 and MP5 allow recording absorbance or transmission without the mention of the colorimeter 3. Accept 'draw calibration curve'. 4. Do not accept 'same amount'
Total		**10**	

BIO3X: Task 2

Marks for questions 5 and 6 can be awarded whatever the 'quality' of data shown. Where data are shown in rows instead of columns, the same principles apply.

Question	Marking Guidance	Mark	Comments
5	1. Data presented clearly with full description of independent variable, gastric juice, **and** dependent variable, pH; 2. Gastric juice in first column;	2	1. Do not accept 'test tube/solution' 1. Ignore 'pH' if written in result boxes. 1. Reject if units given (use of pH as a unit ok). 2. Accept 'test tube/solution' for this mark point. 2. Ignore additional information that is neutral, eg 'tubing number', even if this is given as the first column.
6	1. Graph has independent variable on x-axis and dependent variable on y-axis; 2. Both axes labelled correctly; 3. Appropriate scales selected for x and y axes; 4. Bars drawn correct height and not touching. Accept a single line for a 'bar';	4	1. This mark is for the correct orientation of the graph. Reject mp2 if no reference to gastric juice anywhere. Same mark points apply if test tubes 1-6 also plotted (x axis must be appropriately labelled). 3. Bars must be equal width to award this mark. 4. Can only be awarded for 2 correct bars or for 8 correct bars.
Total		**6**	

BIO3X: Written Test

Section A

Question	Marking Guidance	Mark	Comments
7	1. (Move the plunger) to get all the acid/solution out of the syringe / to get all acid into tube; 2. (Shake tube) to thoroughly mix / so even concentration;	2	
8	1 cm^3 syringe (no mark) 1. More accurate / more precise; 2. Graduations further apart; 3. Small error;	2 max	No marks for use of any other size syringe. MP1 and MP2 require a comparative statement. 2. Accept any idea that the marks /measurements on the syringe are further apart or that there are smaller divisions in the measurements marked on the syringe.
9	$(1 \times)10^{-3}$;	1	Accept answers with or without the '1 ×'.
10	1. Same volume in all tubes; 2. So same intensity of colour/same concentration of pH indicator in each tube;	2	1. Do not accept 'amount' for volume. 2. Accept other ways of expressing 'intensity' eg 'concentration of colour', just 'so the colours can be compared' is insufficient.
11	1. Some pHs in reference set have similar colours; 2. Gastric juice colour not exactly the same as any of the reference colours; 3. Subjective judgement of the colour match; 4. Can only give us whole number for pH (at best);	2 max	'Qualitative results' does not fulfil any mp.

Question	Marking Guidance	Mark	Comments
12	1. Kills bacteria; 2. Denatures proteins; 3. Optimum pH for (carnivore stomach) enzymes; 4. Softens bones/tendons/ligaments;	2 max	2. Accept 'hydrolyses proteins', 'digest proteins' is insufficient. 4. Accept other effect (including digestion in this case) on named tissue.
Total		**11**	

Question	Marking Guidance	Mark	Comments
13	1. (Wide) range of racial group/lifestyle/genetics/employment types/bacterial strain;	1 max	Need idea of (great) variety/(wide) range of one named variable in the patients for credit
14	1. Number each patient; 2. Pull numbers out of hat/use random number generator;	2	Accept put each patient's name into a hat (mp1) and draw out (mp2) for 2 marks
15	1. (Yes), to reduce bias; 2. (No), result was not subjective;	1 max	Accept either a yes or no approach with explanation for the mark 1. Ignore reference to 'placebo effect'. 2. Accept description of 'result' eg whether patient had ulcer/whether patient had *H. pylori* 2. Accept other ways of expressing 'not subjective' eg did not involve the patient/doctor judgement
16(a)	84;;	2	Award 1 mark for (100%-30%) x 120 incorrectly calculated
16(b)	1. *H. pylori* antibiotic resistant; 2. Due to mutation in genetic material/due to an (antibiotic resistance) gene;	2	1. Reject 'immune'. Accept patients did not take all their antibiotic (for MP1) so antibiotic never reached high enough concentration to kill all bacteria (for MP2)

Question	Marking Guidance	Mark	Comments
17	1. 30% of patients still had bacteria / 70% of patients had no bacteria (after taking antibiotic); 2. If no bacteria, not all are cured of ulcer / if no bacteria, most are cured of ulcer; 3. 5% of people with no bacteria (still) had stomach ulcers; 4. (Of the people who took antibiotic/group 1) 26 people/22% had a stomach ulcer after one year;	3 max	Accept any of these mark points in context of either yes or no answers. 1. Accept 36 people had bacteria/84 people did not have bacteria. 2. Mark point for general statement 3. Accept 4 people 3. This statement alone can be awarded mark points 2 and 3 3. Accept converse ie 95% of people with no bacteria were cured of stomach ulcer
18	1. Large/dense/heavy cells; 2. Form pellet/move to bottom of tube (when centrifuged); 3. Liquid/supernatant can be removed;	3	1. Must refer to whole cells.
19	Break down cells/cell parts/toxins;	1	Idea of 'break down/digestion' needed, not just damage
20	1. To stop/reduce them being damaged/destroyed/killed; 2. By stomach acid;	2	1. Reject (to stop) bacteria being denatured. 2. Must be in context of stomach;

Question	Marking Guidance	Mark	Comments
21	1. More cell damage when both present/ A; 2. Some cell damage when either there on their own/some cell damage in B and C; 3. Standard deviation does not overlap for A with B and C so difference is real; 4. Standard deviations do overlap between B and C so no real difference;	3 max	MP1 and MP2 – figures given from the graph are insufficient. MP3 and MP4 **both** aspects needed to gain mark. MP3 and MP4 accept reference to significance/chance for 'real difference'
22	1. Enzyme (a protein) is broken down (so no enzyme activity); 2. No toxin (as a result of protein-digesting enzyme activity); 3. (So) toxin is protein;	3	1. Accept hydrolyse/digested for 'broken down'. 2. Must be in the correct context. 3. This must be stated, not inferred from use of 'protein-digesting enzyme'.
Total		**23**	