General Certificate of Education (A-level)
June 2012

Biology BIO3X

(Specification 2410)

Unit 3X: 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.

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.

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

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, ManchesterM15 6EX.

BIO3X 2012: TASK 1

Question	Marking guidance	Mark	Comments
Table	1. Mean number of beats per trial calculated correctly; 2. Standard deviation calculated correctly; 3. Mean pulse rate in beats per minute;	3	Accept either σ_n or $\sigma_{(n-1)}$ Use candidate's value for mean number of beats per trial
1	1. (Sit down for) longer period /keep taking the pulse within/after 5 minutes; 2. Pulse rate should be the same / consistent/similar;	2	1. Must relate to resting pulse
2	1. Shows how spread out the measurements are; 2. Around the mean / involves all the measurements; 3. Gives an idea of how reliable measurements are/the mean is / overlapping SD results due to chance;	2 max	"Shows how spread out all the measurements are" gains 2 marks
3(a)	1. Idea of not measuring complete beats/cycles; 2. Small difference in measurements can produce large difference in pulse rate/when multiplied;	2	
3(b)	1. Pulse rate changes after exercise / returns to resting rate; 2. More likely to change in longer time; 3. Could lose count/difficult to concentrate for longer period of time; 4. Results may not be so accurate;	2 max	
	Total	**11**	

BIO3X 2012: TASK 2

Question	Marking guidance	Mark	Comments
4 – Candidate's own table of raw data	1. Candidate's own data presented clearly with time and pulse/number of beats per 20 seconds/number of beats per minute clearly indicated; 2. Independent variable (time) in first column; 3. Units of time clearly stated and given only in column headings;	3	1. Accept any heading that provides more detail "Time", and "pulse/number of beats per 20 seconds" are the minimum requirements for the column headings 2. Time should be expressed in minutes or seconds 3. Although AQA uses the convention of separating units by a solidus (/) credit may be given for any method of expressing units
5 - Quality of data	Values more or less identical when at rest and decrease after activity;	1	This mark can only be awarded if the candidate has collected the data
6 - Graph	1. Pulse (rate) on *y* axis and time on *x* axis; 2. Both axes labelled to indicate units; 3. Appropriate scales selected for both *x* and *y* axes; 4. All points plotted accurately. If ICT has been used, it should be possible to read the points with appropriate precision; 5. Data presented as a line graph(s)with appropriate key/titles; Alternatively accept two sets of points, appropriately keyed or labelled, before and after exercise.	5	2. Number of beats/pulse rate per 20 seconds Time in minutes/seconds Although AQA uses the convention of separating units by a solidus (/) credit may be given for any method of expressing units
	Total	**9**	

BIO3X 2012: WRITTEN TEST

Section A

Question	Marking guidance	Mark	Comments
7	1. Total time/duration; 2. Number of repeats/rate of repeating; 3. Action taken to standardise exercise;	2 max	3. E.g. Squatting completely each time
8	Gives a better idea of change/recovery/shows change/recovery in more detail;	1	Accept more reliable if qualified
9	When you cannot predict /are uncertain about intermediate values;	1	
10	(Yes) 1. Allows results (from different students) to be compared; 2. Resting pulse may be different; (No) 3. Exercise not standardised; 4. So cannot compare results;	2	
11	Two marks for correct answer in the range 57-60 beats per minute;; One mark for incorrect answer where a curve is shown as intersecting *y* axis between 19 and 20 / where candidate has found a mean value for the five resting readings;	2	Ignore figures after decimal point if in range
12	1. Supplies more oxygen / glucose / removes more carbon dioxide / removes lactate; 2. Respiration / energy released / ATP produced / CO_2/lactate increasing acidity / decreasing pH;	2	1. Needs to be an idea of relative increase other than for lactate 2. Do not credit references to making energy
	Total	**10**	

BIO3X 2012: WRITTEN TEST

Section B

Question	Marking guidance	Mark	Comments
13	Records every heart beat / does not miss heart beats / gives more precise/accurate measurements;	1	Qualified reference to human error e.g. in counting
14(a)	1. 67 / 69.2 / the same; 2. There is one surge in pressure / pulse each time the heart contracts / beats;	2	1. All that is required here is a connection to be established between heart rate and pulse rate
14(b)	Two marks for correct answer in range 90.0 – 113.0;; One mark for incorrect answer in which duration of one heart beat is clearly identified as between 0.53 and 0.66 seconds;	2	
15	Allow two marks for quantitative statement: e.g. filling time decreases from 0.55 ± 0.1 to 0.30 ± 0.1 s;; Allow one mark for qualitative statement: e.g. Filling time decreases;	2	Accept other quantitative statements such as those based on proportion of cardiac cycle
16	One mark for more general answer, e.g. increase exercise; Two marks for detailed answer, e.g. increase frequency/duration of exercise;;	2	This is the general principle. Detail may vary if centre uses different exercise Reject comments not related to method used

17	1. Percentage of patients surviving is lower/ percentage of patients dying is higher with higher heart rate; 2. Data corrected for other risk factors; 3. Large number of patients (so data likely to be reliable); 4. But difference small for 5 years (and below)/difference only large/significant for 10 years and above / no data between 62 and 83 (beats per minute); 5. Cause of death may not be CHD;	3 max	No mark for yes/no Please write point number by tick to indicate where marking points have been awarded
18(a)	Identifies anomalies/minimises effect of anomalies / unusual results / results more likely to be representative / more reliable mean;	1	Accept likely to see side effects
18(b)	Minimises / avoids regional bias/effects;	1	This is the basic principle. Accept examples that make this basic point, e.g. There may be factors that affect people living in different areas
19	1. Treated the same as those on ivabradine / experimental group; 2. Given dummy pill/placebo;	2	Do not accept: given no pill
20(a)	Increases filling time;	1	
20(b)	1. Maximum / large amount of blood leaves heart / ventricles / increases stroke volume/cardiac output; 2. More blood / more oxygen to heart muscle/heart tissue; 3. Via coronary arteries;	3 max	1. Must be in context of blood leaving the heart 2. Accept wall of heart
	Total	**20**	