



A-LEVEL

Biology and Human Biology

BI/HB/6X

Mark scheme

2410/2405

June 2016

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

BI/HBI/6X: Task 1

Question	Marking Guidance	Mark	Comments
1	Might cause conscious control of blinking;	1	Accept references to 'thinking about blinking' Do not accept 'subconscious'
2	<ol style="list-style-type: none"> (After first experiment) person knows what to expect; May make reaction no longer non-conscious/not a reflex action; Less self-conscious; Blink at the true/normal rate; 	2 max	Ignore unqualified references to 'reliability'
3	<ol style="list-style-type: none"> More difficult to see blinking in dimmer light; Changes in light intensity might affect blink rate; 	1	
4	<ol style="list-style-type: none"> Camera will not miss blinks; Can record blinks for longer; Enables graph/data analysis to be drawn on computer (in real time); Psychological effects of not being watched (by a person); 	2 max	1. Accept 'no time delay/no human error in counting'
5	<p>A Vesicle;</p> <p>B Neurotransmitter;</p> <p>C Synaptic cleft;</p>	3	B Accept named neurotransmitter
6	<ol style="list-style-type: none"> Smokers might have sore eyes and <u>so</u> blink at a different rate; Nicotine/chemical in the smoke might affect the <u>synapse</u>; 	1 max	
Total		10	

BI/HBI/6X: Task 2

Question	Marking Guidance	Mark	Comments
7(a)	The time that someone has their eyes closed for has no effect on blink rate after opening them;	1	<p>Allow other ways of expressing the null hypothesis but it must include reference to both the blink rate and the time for which eyes are closed. “No effect on the results” should not be credited</p> <p>Accept other terms for ‘effect’ eg correlation, relationship, link, association</p> <p>Accept ‘the length of time of eyes closed has no effect on the blink rate’</p> <p>Reject ‘ there is no difference between the time of eyes closed and the blink rate’</p>
7(b)	Spearman (rank correlation);	1	
7(c)	Looking for associations between different measurements from the <u>same sample/same person</u> ;	1	Do not credit if wrong test is chosen
7(d)	Test statistic calculated correctly;	1	Working must be shown. Accept student’s correct calculation of the test statistic from their data even if the wrong test has been chosen

Question	Marking Guidance	Mark	Comments
7(e)	<p>1. Correct interpretation of statistical test in terms of acceptance or rejection of null hypothesis;</p> <p>2. Interpretation involves appropriate reference to the <u>probability</u> of the results being due to <u>chance</u>.</p> <p>See comments and guidance below:</p> <p>If r_s is less than critical value then accept null hypothesis;</p> <p>Probability is greater than 0.05/5% that any association is due to chance / Probability is less than 0.95/95% that any association is not due to chance;</p> <p>If r_s is greater than critical value then reject null hypothesis;</p> <p>Probability is less than 0.05/5% that any association is due to chance / Probability is greater than 0.95/95% that any association is not due to chance;</p> <p>If r_s is equal to the critical value then reject the null hypothesis;</p> <p>Probability is 0.05/5% that any association is due to chance / Probability is greater than 0.95/95% that any association is not due to chance;</p>	2	<p>Neither mark can be awarded if a calculation has not been completed.</p> <p>Allow correct interpretation of calculated test statistic even if the calculation or the choice of test is incorrect</p> <p>2. Do not credit suggestion that probability is 0.05% or 5</p>
Total		6	

BI/HBI/6X: Written Test**Section A**

Question	Marking Guidance	Mark	Comments
8	Any two from: <ul style="list-style-type: none"> • light • pressure • touch • temperature • chemicals • (loud) noise • smell; 	1	Two required for 1 mark Do not accept unqualified reference to dust/particles/objects Accept (rapid) movement (of particles/air) towards the eye Accept humidity/moisture/tears
9(a)	1. Standard deviations/standard errors; 2. (So) likely to overlap;	2	
9(b)	1. Would not know the patient's/human's normal blink rate <u>so</u> unable to make a comparison; 2. Blink rate could be affected by stress of seeing a doctor; 3. Many factors could affect blink rate <u>so</u> it would be difficult to tell if blink rate was due to illness;	2 max	
10	1. Not possible to predict intermediate values; 2. Only one result for each time period / not mean values;	2	
11	Collected paired data;	1	
12(a)	1. No/low influx of sodium <u>ions</u> ; 2. So no depolarisation/action potential;	2	2. 'so no impulses' insufficient

Question	Marking Guidance	Mark	Comments
12(b)	<ol style="list-style-type: none"> 1. Allows calcium ions in; 2. At end of presynaptic neurone; 3. Causing release of neurotransmitter; 	3	<ol style="list-style-type: none"> 1. Accept Ca^{2+}/Ca ions but not Ca/Ca^+ 2. The idea of the end of the presynaptic neurone must be given eg presynaptic knob
13	<ol style="list-style-type: none"> 1. Reference to large group size; 2. Reference to matching a specific, named variable; 3. Applying a statistical test to the data; 	3	<ol style="list-style-type: none"> 1. Accept '≥ 20/many/lots' but not 'several/less than 20' 2. Accept any named variable other than age. 3. Accept 'use SE/95% confidence limits'
TOTAL		16	

BI/HBI/6X: Written Test

Section B

Question	Marking Guidance	Mark	Comments
14	<ol style="list-style-type: none"> <u>Complementary</u> to receptor for acetylcholine; Binds to <u>receptor</u>; On postsynaptic (membrane); Prevents acetylcholine from binding; No action potential in postsynaptic neurone; 	3 max	<ol style="list-style-type: none"> Accept description of 'binds' Must be in context of membrane Accept 'depolarisation' but not 'impulse'
15	<ol style="list-style-type: none"> Takes longer to become unconscious than it does to stop blinking; No overlap of standard error; 	2	1. Accept reference to 0.24/0.28 and 0.48/0.44 in place of longer
16	Different body masses but need to have comparable effects;	1	Do not accept 'same' effects or unqualified references to 'bias/comparison/fair test'.
17	<ol style="list-style-type: none"> Stops blinking but no evidence of effect on pain; They don't work for very long; Takes (5 to 10 minutes) time to work; Need the blink reflex to protect the eye; 	2 max	<ol style="list-style-type: none"> Do not accept 'eventually wear off/stop working'. Accept 'only works for..' with use of figures.
18	<ol style="list-style-type: none"> Discomfort/pain/stress likely to be felt by rabbits during the investigation; Likely (long term) effects on rabbits' vision; Food/water/space (per rabbit); 	2 max	<ol style="list-style-type: none"> Do not accept unqualified references to side effects. Do not accept 'thirsty/suitable accommodation'
19	All of the rabbits were blinking again;	1	

20	<ol style="list-style-type: none"> 1. Surgeons can't get to the eye / surgeons can't apply anaesthetic to eye surface; 2. Lens might stick to eye if no blinking for a long time / lens might move during surgery; 	1 max	
21	<ol style="list-style-type: none"> 1. Anaesthetics do affect the blinking / use of data to demonstrate effect of anaesthetic on blinking; 2. Investigations in resources do not refer to surgery; 3. Only three anaesthetics / one type of rabbit were tested / investigations only done once; 4. Ill rabbits might respond differently / no research on rabbits requiring surgery has been carried out; 5. Small sample size; 6. (Many) operations last longer than the times involved (in both resources); 7. (Resource) A is about humans (rather than rabbits); 8. (Resource) B is about local anaesthetics only / not all surgery is done under local anaesthetic; 9. No statistical test carried out in (Resource) B; 	6 max	3. Accept 'only some anaesthetics'
TOTAL		18	