2014 Biology

Advanced Higher (Revised)

Finalised Marking Instructions

Part One: General Marking Principles for: Biology Advanced Higher (Revised)
This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

(a) Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.

(b) Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

GENERAL MARKING ADVICE: Biology Advanced Higher (Revised)

The marking schemes are written to assist in determining the "minimal acceptable answer" rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates' evidence, and apply to marking both end of unit assessments and course assessments.

1. There are no **half marks**. Where three answers are needed for two marks, normally one or two correct answers gain one mark.

2. In the mark scheme, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.

3. In the mark scheme, words separated by/are **alternatives**.

4. If two answers are given which contradict one another the first answer should be taken. However, there are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here, and professional judgement must be applied. Good marking schemes should cover these eventualities.

5. Where questions in data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then the mark can often be given. The general rule is that candidates should not be penalised repeatedly.

6. If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.

7. Clear indication of understanding is what is required, so:

- if a description or explanation is asked for, a one word answer is not acceptable
- if the question asks for **letters** and the candidate gives words and they are correct, then give the mark
- if the question asks for a word to be **underlined** and the candidate circles the word, then give the mark
- if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
- **chemical formulae** are acceptable eg CO_2, H_2O
- contractions used in the Arrangements document eg DNA, ATP are acceptable
- words not required in the syllabus can still be given credit if used appropriately eg metaphase of meiosis

8. Incorrect **spelling** is given. Sound out the word(s),

- if the correct item is recognisable then give the mark
- if the word can easily be confused with another biological term then **do not** give the mark eg ureter and urethra
- if the word is a mixture of other biological words then **do not** give the mark, eg mellum, melebrum, amniosynthesis

9. **Presentation of data:**

- if a candidate provides two graphs or bar charts (eg one in the question and another at the end of the booklet), mark both and give the higher score
- if the question asks for a line graph and a histogram or bar chart is given, then do not give the mark(s). Credit can be given for labelling the axes correctly, plotting the points, joining the points either with straight lines or curves (best fit rarely used)
- if the *x* and *y* data are transposed, then do not give the mark
- if the graph used less than 50% of the axes, then do not give the mark
- if 0 is plotted when no data is given, then do not give the mark (ie candidates should only plot the data given)
- no distinction is made between bar charts and histograms for marking purposes. (For information: bar charts should be used to show discontinuous features, have descriptions on the *x*-axis and have separate columns; histograms should be used to show continuous features; have ranges of numbers on the *x*-axis and have contiguous columns)
- where data is read off a graph it is often good practice to allow for acceptable minor errors. An answer may be given $7{\cdot}3 \pm 0{\cdot}1$

10. **Extended response questions:** if candidates give two answers where this is a choice, mark both and give the higher score.

11. **Annotating scripts:**

- put a 0 in the box if no marks awarded – a mark is required in each box
- indicate on the scripts why marks were given for part of a question worth 3 or 2 marks. A ✓ or **x** near answers will do

12. **Totalling scripts:** errors in totalling can be more significant than errors in marking:

- enter a correct and carefully checked total for each candidate
- do not use running totals as these have repeatedly been shown to lead to more errors

Part Two: Marking Instructions for each Question

Section A

Question			Expected Answer(s)	Max Mark	Additional Guidance
1.			B		
2.			D		
3.			C		
4.			B		
5.			A		
6.			D		
7.			B		
8.			C		
9.			A		
10.			B		
11.			A		
12.			C		
13.			D		
14.			A		
15.			C		
16.			C		

Question			Expected Answer(s)	Max Mark	Additional Guidance
17.			B		
18.			A		
19.			A		
20.			C		
21.			D		
22.			C		
23.			B		
24.			D		
25.			D		

Section B

Question			Expected Answer(s)	Max Mark	Additional Guidance
1.	**(a)**		(in RM) **glucose transport** is high**er** in control/before insulin/after insulin **OR** (in RM) **glucose transport** shows great**er** *increase* **(1)** **One** correct quantification in support, eg 4 – 3 **(1)**	**2**	Note comparatives essential, eg 'In control, transport in red is 4 units whereas in white it is **only** 3 units.' = 2 marks Control = before Insulin = no insulin Before ~ 4·0RM ~3·0WM After ~ 9·0RM ~6·5WM **(+/− 0·2 units)**
1.	**(b)**		Error bars overlap **so** differences (between GLUT levels) are not significant/(GLUT) levels could be the same	**1**	The size of the error bar is not relevant, eg. 'The error bars are the same in both' is a comment about variance but the result is about the GLUT levels.
1.	**(c)**	**(i)**	All in PM/none in IM **in both types**	**1**	
1.	**(c)**	**(ii)**	(GLUT1 stays in PM, so insulin has) **no effect** (on location/distribution/fraction/in either muscle type)	**1**	Accept (slight) decrease in amount **in PM**
1.	**(c)**	**(iii)**	(in both muscle types) insulin increases the amount of GLUT4 in PM **and** decreases it in IM	**1**	Amount of GLUT4 can be descriptions of the blot – lighter, darker, denser, more intense
1.	**(d)**		(after insulin **both** muscle types have) (In Fig 4): **similar** (relative) **increase** in PM and (relative) **decrease** in IM (In Fig 3): (comparing overall blot densities) bigger/darker blots in Red Muscle (1−4) than white (5−8)	**2**	Graph shows percentage changes are matching in both muscle types And blots show magnitude is greater in red eg 2 vs 6
1.	**(e)**		**receptor** loses function/less sensitive recruitment of GLUT4 fails/reduced	**2**	
				(10)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
2.	**(a)**	**(i)**	Hydrogen (bonding between parts of peptide bonds)	**1**	
2.	**(a)**	**(ii)**	Prosthetic (group)	**1**	Correct spelling
2.	**(b)**	**(i)**	(origin) MTOC/centriole/centrosome **and** centromere/kinetochore	**1**	
2.	**(b)**	**(ii)**	to pull chromatids/chromosomes/centromeres apart	**1**	Homologous pairs OK
2.	**(b)**	**(iii)**	cell division in normal cells also inhibited distribution of organelles disrupted **(Any 1)**	**1**	Can refer to meiosis,eg. non-disjunction or gamete production Or can refer to growth and repair in mitosis.
				(5)	
3.	**(a)**		(p21 binding to Cdk) prevents Cdks phosphorylating proteins **(1)** (proteins) that then **stimulate** the cell cycle **(1)** **OR** unphosphorylated protein inhibits cycle/stops cycle at the checkpoint	**2**	Need idea that unphosphorylated protein i**nhibits** the cell cycle Rb = protein
3.	**(b)**		DNA damage **OR** death signals from lymphocytes	**1**	
3.	**(c)**		apoptosis/programmed cell death DNA damage repaired cell continues through cell cycle **(Any 1)**	**1**	
3.	**(d)**		uncontrolled **decrease** in the rate of the cell cycle may lead to **degenerative** disease uncontrolled **increase** in the rate of the cell cycle may lead to **tumour formation**	**2**	
				(6)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
4.	**(a)**		pilot study	**1**	
4.	**(b)**		starch	**1**	
4.	**(c)**	**(i)**	this gives maximum absorbance for the starch reaction **and** lowest for blank **OR** maximum difference between reaction and blank/control	**1**	
4.	**(c)**	**(ii)**	(other than the independent variable) a factor that may affect dependent variable/results	**1**	
4.	**(c)**	**(iii)**	(aim is to monitor rates of reaction and) method can distinguish between starch concentrations	**1**	
				(5)	
5.	**(a)**		genetic drift	**1**	
5.	**(b)**	**(i)**	(link pop size/timescale and genetic variation eg) population 25000 to 50 **and** number of alleles from 5·2 to 3·7 **OR** from 1930s, number of alleles dropped from 5·2 to 3·7	**1**	1.5 difference OK
5.	**(b)**	**(ii)**	to allow comparison with a large population **OR** comparison with grassland that had not suffered a reduction in size	**1**	
5.	**(b)**	**(iii)**	(In Illinois: percentage of) eggs hatched decreases from 93 to 50 between 1930 in 1993	**1**	63 years OK
5.	**(b)**	**(iv)**	introduce birds from neighbouring populations	**1**	
				(5)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
6.	**(a)**		Attracting or mating with a female	**1**	
6.	**(b)**	**(i)**	*Drosophila persimilis* 2 per 100 ms *Drosophila pseudoobscura* 3 per 100 ms **(both required)**	**1**	4 per 200 ms every 50 ms 6 per 200 ms every 30 – 35 ms
6.	**(b)**	**(ii)**	(Courtship signals may be used by *females*) to discriminate between males of the different species **(1)** **OR** to discriminate between males of the different quality/fitness Female investment (in reproduction) is greater than male's **(1)** More energy dedicated to egg production than sperm production Offspring from poor quality male less well-adapted **OR** (if mating with other species) Hybrids may be sterile/maladaptive	**2**	The Question is not asking about investment in courtship
6.	**(b)**	**(iii)**	Subject to female choice increases chances of mating/breeding with female	**1**	
				(5)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
7.	**(a)**		infects the host with the parasite transfers/transmits/transports parasite (from one host to another host)	**1**	
7.	**(b)**		The mosquito – where the parasite reproduces sexually	**1**	
7.	**(c)**	**(i)**	'Hiding' inside cells (liver cells/red blood cells)	**1**	
7.	**(c)**	**(ii)**	Mimic host antigens/modify host immune response via antigenic variation **(Any 1)**	**1**	
7.	**(d)**	**(i)**	**1.** Antibodies transferred to mosquito when it bites **(1)** **2.** Antibodies prevent escape from stomach/move to salivary gland **(1)**	**2**	
7.	**(d)**	**(ii)**	Does **not** prevent individual being bitten by (possibly) infective mosquito **(1)** **OR** does not affect the parasite in humans (so they can still get malaria) (Does prevent development in biting mosquito so that) further transmission is blocked/population of infective mosquitoes decreases **(1)**	**2**	
7.	**(d)**	**(iii)**	Antibodies bind with **antigens** (sporozoite proteins) to render harmless/stimulate phagocytes etc. T cells (cell-mediated) destroy infected cells (hepatocytes)	**2**	
				(10)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
8.	**(a)**	**(i)**	has both male and female parts/sex organs	**1**	
8.	**(a)**	**(ii)**	clones/offspring are genetically identical to parent **or** already adapted to habitat new plants sustained by runner/parent until established rapid spread/colonisation/rapid population increase **(Any 1)**	**1**	
8.	**(b)**		parthenogenesis	**1**	correct spelling
				(3)	
9.	**(a)**		**Combating** parasite/infection uses energy **(1)** less brain/cognitive development **(1)** **OR** damaged **brain**	**2**	
9.	**(b)**		eg some samples long way from best-fit line eg small/no samples for some infection levels eg some obvious discrepancies/inconsistencies such as at stress 0	**1**	not 'small sample size'
9.	**(c)**		IQ increases as parasitic infection decreases the relationship does not mean that level of parasite stress **causes** IQ **OR** another variable could account for differences in IQ **OR** eg Temperature (parasite abundance higher in tropics) nutrition/literacy/education/GDP or other economic indicator	**2**	
9.	**(d)**		IQ should increase (Flynn effect) (Development) improves prevention/treatment **(Both)**	**1**	
				(6)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
10.	A	(i)	**EITHER** 1. rhodopsin is the light-sensitive protein 2. (rhodopsin is) retinal combined with opsin 3. in membranes of retina/membrane location/photosensor 4. cones cells sense specific wavelengths/colours 5. (because of) different forms of opsin 6. rod cells absorb wider range of wavelengths 7. rods more sensitive in low light intensity 8. greater amplification in rod cells 9. amplification converts stimulation by photon into large effect on ion movement **(Any 6)**	**6**	
10.	A	(ii)	10. photon stimulates change in conformation of rhodopsin 11. G protein/transducing activated 12. enzyme activated/phosphodiesterase 13. sufficient product/cyclic GMP to GMP/closes sodium channels 14. idea of increasing numbers 15. leads to nerve impulse **(Any 4)**	**4**	
				(10)	

Question			Expected Answer(s)	Max Mark	Additional Guidance
			OR		
10.	**B**	**(i)**	1. Ions pumped against concentration gradient OR ions moved by active transport 2. (3) sodium ions (pumped) out of cell and (2) potassium in 3. Pump uses/hydrolyses ATP 4. Phosphate attaches to protein/pump/NaKATPase 5. Phosphorylation alters conformation of protein 6. (Different conformations) have different affinity for sodium and potassium **(Any 4)** 7. Osmotic balance 8. Symports eg. sodium influx + glucose uptake 9. across nerve cell/resting potential 10. Ion gradients in nephrons **(Any 2)**	**6**	
10.	**B**	**(ii)**	11. Resting potential across the plasma membrane 12. Ligand gated channel opens to allow ions in 13. Neurotransmitter is ligand 14. Ions enter and voltage (membrane potential) changes 15. Voltage change opens voltage-gated channels (nearby) 16. Sequence of v – gated channels open/wave of depolarisation **Maximum 10 marks for (i) and (ii)**	**4**	
				(10)	

[END OF MARKING INSTRUCTIONS]