



General Certificate of Secondary Education

**Additional Science 4463 /
Biology 4411**

BLY2H

Unit Biology 2

Mark Scheme

2011 examination – January 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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MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following lines is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

BLY2H**Question 1**

question	answers	extra information	mark
1(a)(i)	colour of light / bulb / lamp	allow wavelength for colour allow bulb alone do not accept light / colour unqualified	1
1(a)(ii)	any one from eg <ul style="list-style-type: none"> • temperature • light intensity or distance between lamp and plant / tube • carbon dioxide • other light in room • mass / size / amount / age / type of pondweed • volume / amount of water 	allow heat allow amount / brightness of light ignore light unqualified allow symbols allow use a dark room allow same piece of pondweed ignore pondweed unqualified ignore reference to time	1
1(a)(iii)	improved reliability or can spot anomalies / changes	allow for reliability or less likely to lose count allow reference to calculating a mean / average ignore reference to accuracy / precision / fair	1
1(b)(i)	green		1

Question 1 continues on the next page

BLY2H**Question 1 continued**

question	answers	extra information	mark
1(b)(ii)	any two from: <ul style="list-style-type: none"> • least / less bubbles / gas / oxygen / mean • least / less photosynthesis • least / less glucose / sugar / carbohydrate / food made 	ignore references to colour reference to least / less needed only once, in context, for 2 marks only penalise no once, ie no bubbles = 0 mark no bubbles so no photosynthesis = 1 mark allow most / more green light reflected (by chloroplasts)	2
Total			6

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Question 2

question	answers	extra information	mark
2(a)(i)	6000	award 2 marks for correct answer irrespective of working allow 1 mark for 20 x 300 with incorrect or no answer allow answer in table if answer line blank	2
2(a)(ii)	bar width 6000 or to match answer to (a)(i)	anywhere on scale ignore depth / height of bar	1
	drawn below slugs	label not required	1
2(b)	any three from: <ul style="list-style-type: none"> • respiration (by hedgehog) • (results in) loss of CO₂ • faeces (of hedgehog) or not digested • excreted / urine / urea (by hedgehog) • not all slug(s) are eaten (by hedgehogs) or some slugs eaten by other things 	ignore reference to size / mass / number of organisms assume reference is to / of hedgehog unless stated otherwise do not accept idea that respiration uses / produces energy accept waste for 1 mark if neither faeces nor excretion point made ignore sweat alone ignore some slugs die ignore reference to movement / heat / growth allow references to energy losses by these methods, rather than biomass losses	3
Total			7

BLY2H**Question 3**

question	answers	extra information	mark
3(a)	pancreas	allow phonetic spelling	1
3(b)	4(.0) to 7.2 or 7.2 to 4(.0)		1
3(c)	13 – 7 = 6	working shows 6 = 1 mark	1
	6/2 = 3 <u>units</u>	accept the correct answer to the calculation, 3 <u>units</u> , for 2 marks, irrespective of working	1
	increase (dose)	accept indication of increase, eg extra / more / + could be in working lines	1
Total			5

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Question 4

question	answers	extra information	mark
4(a)	half / 50% sperm have X (chromosome)	penalise incorrect use of gene / allele once only	1
	or half / 50% sperm have Y (chromosome) all eggs have X (chromosome)	annotated genetic diagram could gain 2 marks	1
4(b)	screening	ignore selection	1
4(c)	any three from: advantages:(max 2)	max 2 if only advantages or only disadvantages discussed	3
	<ul style="list-style-type: none"> • (girl / children / women) don't / less likely to get / inherit (breast) cancer / this / the disease • future generations get less cancer or less likely to have the allele • less expensive (for NHS) than treating cancer 	do not accept reference to allele alone for this point	
	disadvantages:(max 2)	ignore wrong / immoral / religious argument unqualified	1
	<ul style="list-style-type: none"> • (wrong / immoral to) reject / kill embryos • possible harm to embryo (that is implanted) / miscarriage • possible harm to mother (due to operational procedure) 	ignore reference to termination	
	argued conclusion	allow reference to needing hormone treatment	
		must refer to both advantages and disadvantages and must be at end of answer	
Total			7

BLY2H**Question 5**

question	answers	extra information	mark
5(a)	shape changed / destroyed (above 45 °C)	accept denatured accept active site changed do not accept enzyme killed	1
	(shape) doesn't fit (other molecules / stain)		1
5(b)(i)	any two from: <ul style="list-style-type: none"> • can wash the clothes at higher temperature • so wash / enzyme action will be quicker • enzyme not destroyed at high temperature / 80 °C 	do not accept idea of bacteria working faster accept denaturation or description	2
5(b)(ii)	high(er) temperature / 80 °C uses more energy / fuel		1
	more pollution / named (eg carbon dioxide / global warming) (from electricity production) or increased release of hot water (into the environment)		1
Total			6

BLY2H**Question 6**

question	answers	extra information	mark
6(a)	cystic fibrosis (allele / gene) recessive	allow an annotated genetic diagram	1
	carrier has <u>only</u> one cystic fibrosis allele / gene	accept carrier is heterozygous accept any symbol with key or accept conventional use of symbols penalise use of chromosome once only	1
6(b)	any one from: <ul style="list-style-type: none"> Huntington's (allele / gene) dominant (to have Huntington's) need only one Huntington's allele / gene 		1
Total			3

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Question 7

question	answers	extra information	mark
7(a)	<p>any two from:</p> <ul style="list-style-type: none"> • smaller vacuole • smaller / less cytoplasm • cell membrane / cytoplasm not (fully) against cell wall <p>or</p> <p>cell membrane / cytoplasm (partly) pulled away from cell wall</p> <p>or</p> <p>space / liquid / sugar solution between cell membrane / cytoplasm and cell wall</p>	<p>correct names of cell components are required it = cell in sugar solution</p> <p>accept reverse only if clearly stated answer refers to cell in distilled water</p> <p>allow protoplasm for cytoplasm</p> <p>accept plasmolysed / flaccid / less turgid</p> <p>ignore reference to nucleus / water</p> <p>ignore explanations</p>	2
7(b)	<p>water passed / moved out (of cell) by osmosis / diffusion</p> <p>more concentrated (solution) outside</p> <p>or</p> <p>less concentrated (solution) inside</p> <p>or</p> <p>lower <u>water</u> concentration outside</p> <p>or</p> <p>higher <u>water</u> concentration inside</p>	<p>accept reverse answer if clearly refers to cell in distilled water</p> <p>assume reference to concentration refers to solute concentration unless answer refers to water concentration</p> <p>accept references to hypertonic / hypotonic solutions or water potential</p>	1 1
Total			4

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Question 8

question	answers	extra information	mark
8(a)	any two from <ul style="list-style-type: none"> • reference to role of thermoregulatory centre detecting rise in temperature (of blood or skin) or / causing increase in sweating • more evaporation • more cooling / heat loss 	need to refer to more at least once to gain both marks without reference to more only award max 1 mark if both ideas given, eg cooling alone gets no marks	2
8(b)	blood vessels supplying (skin) capillaries or arteries or arterioles dilate / widen	do not accept capillaries / veins allow vasodilation do not accept idea of blood vessels moving note: marks are awarded independently accept shunt vessels close for 2 marks	1 1
8(c)(i)	muscle contraction	ignore relaxing do not allow vasoconstriction	1
8(c)(ii)	respiration (respiration) releases / produces heat	reference to respiration is required for this mark	1 1
Total			7