



**General Certificate of Secondary Education**

**Additional Science 4463 /  
Biology 4411**

**BLY2H**

**Unit Biology 2**

**Mark Scheme**

*2011 examination – June 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.

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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
<p><b>1(a)</b> <b>E</b></p>	<p>because water enters (the cell / it / named cell)</p>	<p>do <b>not</b> accept salt / sugar / solution entering</p>	<p>1</p>
	<p>by osmosis / diffusion</p>	<p>if osmosis / diffusion not given accept concentration inside cell greater than outside cell</p> <p>assume concentration refers to solute concentration unless answer indicates otherwise</p> <p>allow water goes <u>up</u> the concentration gradient</p> <p>allow water goes <u>down its</u> concentration gradient</p> <p>do <b>not</b> accept if diffusion of salt / sugar</p>	<p>1</p>
	<p>through a partially permeable membrane</p>	<p>allow semi / selectively permeable membrane <b>or</b> description</p>	<p>1</p>
<p><b>1(b)</b> <b>E</b></p>	<p>(plant cells) have (cell) <u>wall</u></p>	<p>accept animal cells have no (cell) <u>wall</u></p> <p>ignore reference to cell membrane</p> <p>do <b>not</b> accept reference to other organelles <b>or</b> any implication that animal cells have a cell wall eg plant cells have a thicker cell wall</p>	<p>1</p>
<p><b>Total</b></p>			<p><b>4</b></p>

**BLY2H****Question 2**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>2</b>	<p>any <b>three</b> from:</p> <p>advantages: (max 2)</p> <ul style="list-style-type: none"> <li>• less transport / example of transport <b>or</b> less fuel used</li> <li>• less pollution / example</li> <li>• support of local / UK economy / farmers</li> </ul> <p>disadvantages: (max 2)</p> <ul style="list-style-type: none"> <li>• not available all year</li> <li>• may require use of heat / light</li> <li>• (production of) heat / light causes pollution</li> </ul>	<p>maximum <b>2</b> marks if only advantages <b>or</b> only disadvantages given</p> <p>ignore references to cost unqualified</p> <p>ignore reference to fresher</p> <p>accept implication eg less food miles</p> <p>allow no transport / fuel costs</p> <p>accept eg less carbon dioxide / smaller carbon footprint</p> <p>allow no pollution / example</p>	<b>3</b>
<b>Total</b>			<b>3</b>

## BLY2H

## Question 3

question	answers	extra information	mark
3(a)	any <b>one</b> from: <ul style="list-style-type: none"> <li>(same) volume / amount / <math>1\text{ cm}^3</math> lipase</li> <li>(same) volume / amount / <math>5\text{ cm}^3</math> lipid</li> <li>mixed after 3 minutes / same time before mixing</li> </ul>	ignore reference to recording results every 5 minutes <b>or</b> concentrations of lipid / lipase  allow amount of solution  allow keep same volumes in the test tubes  do <b>not</b> accept temperature	1
3(b)	so that the lipase and the lipid reached the right temperature		1
3(c)	any <b>two</b> from <ul style="list-style-type: none"> <li>decrease in time <b>or</b> faster (breakdown)</li> <li>then increase in time <b>or</b> <u>then</u> slower (breakdown)</li> <li>fastest / least time / optimum at <math>35^\circ\text{C}</math></li> </ul>	ignore explanations	2
3(d)	any <b>two</b> from: <ul style="list-style-type: none"> <li>test more regularly eg test every minute</li> <li>test at smaller temperature intervals</li> <li>test between <math>50\text{ }^\circ\text{C}</math> and <math>95\text{ }^\circ\text{C}</math></li> <li>repeat at same temperatures <b>or</b> repeat the investigation <b>or</b> compare results with others</li> </ul>	ignore 'test at more temperatures' unqualified  any interval < 5min  any value < $15^\circ\text{C}$ allow test more temperatures in the range  any value in range, eg test at 70  allow do <b>it</b> again	2

Question 3 continues on the next page

**Question 3 continued**

question	answers	extra information	mark
3(e)(i)	(lipase / it) denatured / destroyed / changed shape	allow damaged / deformed do <b>not</b> accept killed ignore broken (down)	1
3(e)(ii)	fatty acids and glycerol		1
<b>Total</b>			<b>8</b>

**BLY2H****Question 4**

question	answers	extra information	mark
4(a)(i)	release energy	allow provide / supply / give energy  do <b>not</b> accept produce / create / generate / make energy  do <b>not</b> allow release energy for respiration	1
4(a)(ii)	contain half the (number of) chromosomes <b>or</b> contains one set of chromosomes <b>or</b> contains 23 chromosomes	allow genetic information / DNA / genes / alleles instead of chromosomes  accept haploid	1
4(b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• (stem cells) are unspecialised / undifferentiated</li> <li>• are able to become differentiated <b>or</b> can form other types of cell / tissue / organ</li> <li>• stem cells can / able to divide / multiply</li> </ul>	allow description eg 'no particular job'	2
<b>Total</b>			<b>4</b>



**BLY2H****Question 5**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>5(a)(i)</b>	increase (and then level off) <b>and</b> max / up to at 0.15(%) (carbon dioxide)	ignore references to oxygen concentration only  ignore mention of 23	1
<b>5(a)(ii)</b>	<u>CO<sub>2</sub></u> is limiting at low CO <sub>2</sub> / at first  light is limiting at high CO <sub>2</sub> / at end	ignore specific numbers	1  1
<b>5(b)</b>	effect: (oxygen) falls  explanation: (oxygen) used for respiration	<b>mark both parts together</b>  <b>if no other marks</b> awarded allow (effect) no change <b>and</b> (explanation) no photosynthesis for <b>1</b> mark	1  1
<b>5(c)</b>	more chlorophyll / chloroplasts  allows more photosynthesis / description	for both marks must refer to more at least once	1  1
<b>Total</b>			<b>7</b>

**BLY2H****Question 6**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>6(a)</b>	Aa	allow dominant <b>and</b> recessive allow heterozygous	1
<b>6(b)(i)</b>	gametes A, a <b>and</b> A, a	max <b>1</b> if gametes are incorrect (eg in punnet square)	1
	correctly derived offspring from cross	allow ecf from their gametes	1
	identification of round <b>and</b> wrinkled offspring	for this mark the phenotype of each different offspring genotype must be indicated	1
<b>6(b)(ii)</b>	(due to) chance <b>or</b> expected ratio is only a probability	accept the idea of small numbers not representative  ignore anomaly / random / coincidence  do <b>not</b> accept error	1
<b>6(c)</b>	any <b>one</b> idea from: <ul style="list-style-type: none"> <li>genes / chromosomes / alleles / DNA not discovered / known about</li> <li>published in obscure journal / few scientists read his work</li> </ul>	do <b>not</b> accept religious theme (ie confusion with Darwin's difficulties with the church)	1
<b>Total</b>			<b>6</b>

**BLY2H****Question 7**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>7(a)(i)</b>	thermoregulatory centre	allow thermoregulation centre allow hypothalamus	1
<b>7(a)(ii)</b>	it has receptors	ignore receptors in skin	1
	reference to temperature of <u>blood</u>	allow plasma for blood	1
<b>7(b)</b>	muscles <u>contract</u>	ignore relax / expand	1
	increased respiration <b>or</b> more heat released	allow more heat produced if more not given allow respiration releases / produces heat	1
<b>7(c)(i)</b>	(blood vessels / arteries / arterioles) dilate / widen	do <b>not</b> accept capillaries dilate ignore blood vessels get bigger / expand  do <b>not</b> accept idea of blood vessels moving	1
<b>7(c)(ii)</b>	more blood close to / near surface	allow blood is closer to the surface  do <b>not</b> accept idea of blood vessels moving	1
	more heat lost <b>or</b> heat lost faster <b>or</b> cools faster	do <b>not</b> allow for idea of evaporation	1
<b>Total</b>			<b>8</b>

**BLY2H****Question 8**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>8(a)</b>	16	accept correct answer for <b>2</b> marks, irrespective of working  if no answer <b>or</b> answer incorrect accept $0.64 \times 100 / 4$ (.0) <b>or</b> 0.16 for <b>1</b> mark	<b>2</b>
<b>8(b)</b>	insect cold-blooded / not warm blooded <b>or</b> does not control body temperature	accept mammal warm-blooded / constant (high) body temperature / controls body temperature	<b>1</b>
	reference to insect 0.96 (kJ) <b>and</b> mammal 12.25 (kJ) transferred by respiration <b>or</b> relevant calculation of this transfer	ignore references to other data	<b>1</b>
	(less respiration) so more energy / biomass / food available (for growth of insect)	(more respiration) so less energy / biomass / food available (for growth of mammal)	<b>1</b>
<b>Total</b>			<b>5</b>

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