



**General Certificate of Secondary Education**

**Additional Science 4463 /**

**Biology 4411**

**BLY2H Unit Biology 2**

**Mark Scheme**

*2009 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. Boldening

- 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 boldened. 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.

**COMPONENT NUMBER: BLY2H****COMPONENT NAME: Additional Science / Biology****STATUS: Final****DATE: January 2009**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
1(a)	the sun / light / sunshine / solar	allow radiation <u>from the sun</u> ignore photosynthesis / respiration apply list principle do <b>not</b> allow water / minerals / heat	1
1(b)	2.5 (:1)	correct answer with or without working ignore rounding with correct working do <b>not</b> allow other equivalent ratios for both marks evidence of selection of 10(insects) <b>and</b> 4(frogs) <b>or</b> 50 <b>and</b> 20 <b>or</b> 1 <b>and</b> 0.4 for <b>1</b> mark if no other working allow <b>1</b> mark for 0.4:(1) on answer line	2
1(c)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• some parts indigestible / faeces</li> <li>• waste / examples of waste eg urea / nitrogenous compounds / urine / excretion</li> <li>• movement / eg of movement</li> <li>• heat</li> <li>• not all eaten / eg of not all eaten</li> <li>• respiration</li> </ul>	allow for insects <b>or</b> frogs allow energy for biomass  allow keeping warm  do not accept energy for respiration	2

**Question 1 continued on next page...**

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question	answers	extra information	mark
1(d)	any <b>four</b> from: <ul style="list-style-type: none"> <li>• (bodies) consumed by animals / named / scavengers / detritus feeders</li> <li>• microorganisms / bacteria / fungi / decomposers</li> <li>• reference to enzymes</li> <li>• decay / <u>breakdown</u> / decompose / rot</li> <li>• respiration</li> <li>• carbon dioxide produced</li> <li>• photosynthesis</li> <li>• sugar / glucose produced</li> <li>• fossilisation / fossil fuels / named</li> <li>• combustion / burning</li> <li>• (burning) produces carbon dioxide</li> </ul>	ignore digest(ion)  accept other organic molecules  must be linked with fossilisation / fossil fuels  allow carbon dioxide produced once only	4
<b>Total</b>			<b>9</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
2(a)(i)	pancreas	allow phonetic spelling	1
2(a)(ii)	glucose into cells / liver / muscles	allow any named organ / cell allow turned into / stored as glycogen <b>but</b> do <b>not</b> allow hybrid spellings for glycogen allow increases respiration allow stored as / turned into fat	1
2(b)(i)	reference to “98.6% of all people who used Diacure reported an improvement in their condition.”	allow claim <b>1 / 1</b> / the first one	1
2(b)(ii)	(only) 30 patients <b>or</b> not enough / not many patients	allow only one trial <b>or</b> only done once <b>or</b> not repeated ignore bias	1
2(b)(iii)	little effect / difference  suggest drug is not effective (in long term)	allow no effect allow only drops by 4 ( $\pm 1$ )  allow wouldn't persuade people to take it	1  1
2(b)(iv)	avoid bias / owtte	eg company could change / ignore results / might lie ignore fair / accurate / reliable / valid	1
<b>Total</b>			<b>7</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
3(a)	opaque / less transparent / blue	allow mixture becomes dark / black ignore thicker	1
3(b)(i)	7 (minutes) <b>or</b> in range 6.7 to 7	award <b>2</b> marks for correct answer  if answer is incorrect evidence of selection of 40(% light intensity) either in working <b>or</b> in graph <b>2</b> for <b>1</b> mark	2
3(b)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• slower / takes longer at lower temperatures</li> <li>• (40°C is) optimum / best temperature</li> <li>• enzyme denatured / destroyed / damaged at higher temperatures</li> </ul>	allow near to 37°C / body temperature where enzymes work best  allow description of denaturation	2
3(c)(i)	isomerase	allow phonetic spelling	1
3(c)(ii)	fructose is sweeter than glucose  needed in smaller quantities <b>or</b> less is needed		1  1
<b>Total</b>			<b>8</b>



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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
4(a)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• increase / give light</li> <li>• increase temperature / make warmer</li> <li>• increase / give CO<sub>2</sub></li> <li>• add fertiliser / nutrients / minerals / named</li> </ul>	award marks if the method by which these could be done is given eg leave lights on all night <b>or</b> use a heater  allow nitrogen ignore 'food'	1
4(b)(i)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• cheaper</li> <li>• better quality / flavour</li> <li>• available all year</li> </ul>	accept converse if clear that answer refers to use of British tomatoes  allow grow faster / more grown ignore size  allow 'Fair Trade'	2
4(b)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• greater distance <b>or</b> more food miles <b>or</b> more transport</li> <li>• transport needs (more) energy / fuel</li> <li>• reference to eg greenhouse effect / global warming / pollution / CO<sub>2</sub> release / carbon footprint</li> </ul>	idea of more needed only once  ignore ozone	2
<b>Total</b>			<b>5</b>

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question	answers	extra information	mark
5(a)	respiration	allow muscle contraction <b>or</b> muscle movement <b>or</b> exercise of muscles allow metabolism / chemical reactions	1
5(b)(i)	any <b>two</b> from: <ul style="list-style-type: none"> <li>less / no water (available) for sweat</li> <li>less / no heat lost / less / no cooling</li> <li>less / no evaporation (of sweat)</li> </ul>	allow dehydrated so less sweat allow converse if evident that response refers to athletes who have drunk liquid  only need to refer to less / no once	2
5(b)(ii)	<b>either</b> blood vessels supplying the skin <b>or</b> blood vessels in skin  dilate / widen / muscles relax	do <b>not</b> allow first mark if implied that skin capillaries dilate  ignore enlarge / open vasodilation in skin = <b>2</b> marks  allow hairs lie flat for <b>1</b> mark allow less insulation for <b>1</b> mark if linked to hairs  allow more blood in skin for <b>1</b> mark if no other marks awarded	1  1
5(c)(i)	cold / 15°C cools the body / blood (more)	<b>or</b> reverse argument  ignore reference to values for body temperature derived from graph	1

**Question 5 continued on the next page...**

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>5(c)(ii)</b>	any <b>two</b> from: <ul style="list-style-type: none"><li>• cools slower at 15°C cold / 15°C</li><li>• cold / 15°C causes reduced blood flow to surface / skin</li><li>• blood not cooled as much / as quickly</li><li>• cold / 15°C causes shivering</li><li>• muscles contract / more respiration / heat made</li></ul>	allow converse arguments ignore reference to capillaries	<b>2</b>
<b>Total</b>			<b>8</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
6(a)	1 in 4 / $\frac{1}{4}$ / 1:3 / 25% / 0.25	do <b>not</b> accept 3:1 / 1:4 / 2:6	1
6(b)	<p><b>either</b> from <b>C and D</b></p> <p>any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• <b>C and D</b> have disorder</li> <li>• I/J don't have disorder</li> <li>• <b>C and D</b> have dominant <b>and</b> recessive alleles</li> <li>• recessive alleles from <b>C and D</b> passed to I/J <b>or</b> I/J have two recessive alleles</li> </ul> <p><b>or</b> from <b>A and B</b></p> <ul style="list-style-type: none"> <li>• A is homozygous recessive / rr, <b>and</b> B is heterozygous / Rr can be shown in words or symbols</li> <li>• offspring can be rr <b>or</b> Rr described</li> </ul>	<p>accept synonyms for dominant / recessive eg. Normal / faulty</p> <p>accept genetic diagram if clearly referring to correct individuals or genotypes on family tree</p> <p>allow 'gene' for 'allele'</p> <p>ignore 'C &amp; D are carriers'</p> <p>NB if allele was recessive then all offspring of <b>C and D</b> would have the disorder = <b>3</b> marks</p> <p>assume response refers to A+B unless contradicted</p> <p>allow any symbol</p> <p>allow without key</p>	3
6(c)(i)	(embryos) checked for inherited / genetic disorders / conditions	accept diseases for disorders	1

**Question 6 continued on next page...**

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question	answers	extra information	mark
6(c)(ii)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• C/D have disorder / have dominant allele</li> <li>• chance of embryo / foetus / child having disorder <b>or</b> may pass on alleles for disorder to their offspring</li> <li>• C/D might want to decide on termination <b>or</b> prepare for child with disorder</li> <li>• G <b>and</b> H don't have disorder / both homozygous recessive / have no dominant alleles (for this disorder)</li> <li>• so offspring (of G <b>and</b> H) cannot / don't have disorder</li> </ul>	accept disease / condition accept 'gene' for 'allele' ignore reference to 'carriers'	3
<b>Total</b>			<b>8</b>