



**General Certificate of Secondary Education**

**Additional Science 4463 /**

**Biology 4411**

**BLY2F      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.

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
1(a)(i)	A cytoplasm	accept clear indications	1
	B nucleus		1
1(a)(ii)	any <b>two</b> from: <ul style="list-style-type: none"><li>• P</li><li>• R</li><li>• T</li></ul>	<b>two</b> required for <b>1</b> mark accept lower case letters	1
1(b)	sperm cells need a lot of energy to swim		1
<b>Total</b>			<b>4</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
2(a)	microorganisms		1
2(b)(i)	proteases	clear indications of correct answer	1
2(b)(ii)	amino acids (both words)	clear indications of correct answer	1
2(c)(i)	14		1
2(c)(ii)	enzyme Z  takes least time (to pre-digest protein) / works fastest	mark independently clear indication of correct answer  allow <u>only</u> 7 minutes / less time / faster  do <b>not</b> allow works best	1  1
2(c)(iii)	temperature  pH		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>
3(a)	2 and 3		1
3(b)	cell <b>P</b> has an X chromosome; cell <b>R</b> has a Y chromosome		1
3(c)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• (formed from) different egg / 2 eggs</li> <li>• (formed from) different sperm / 2 sperm</li> <li>• have different genes / alleles / chromosomes / DNA</li> </ul>	allow genetics	2
3(d)(i)	stem cells		1
3(d)(ii)	the cells divide		1
	the cells differentiate		1
3(d)(iii)	(medical) research / named eg growing organs <b>or</b> medical / patient treatment	allow (embryo) cloning do <b>not</b> allow designer babies / more babies	1

**Question 3 continued on next page...**

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
3(d)(iv)	any <b>one</b> from: <ul style="list-style-type: none"><li>• ethical / moral / religious objections</li><li>• potential harm to embryo</li></ul>	ignore cruel / not natural / playing God allow deformed ignore harm to mother	1
<b>Total</b>			<b>9</b>



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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
4(a)	respiration	clear indication eg tick, underlining, others crossed out	1
4(b)	lungs		1
4(c)	liver		1
4(d)	amino acids		1
<b>Total</b>			<b>4</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>5(a)</b>	any <b>one</b> from: <ul style="list-style-type: none"> <li>• (type of / amount of) soil / minerals / nutrients / pH</li> <li>• amount of water / time of watering</li> <li>• space between plants / plants and wall</li> <li>• time for growth</li> </ul>	list principle ignore carbon dioxide / same number of plants / food do <b>not</b> allow temperature / light / exposure to wind	1
<b>5(b)(i)</b>	North wall		1
<b>5(b)(ii)</b>	nugget	list principle	1
<b>5(c)</b>	has not tested all varieties / nugget / champion against all walls	do <b>not</b> allow repeat experiment	1
<b>Total</b>			<b>4</b>

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<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
6(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
6(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
6(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 6 continued on next page...**

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question	answers	extra information	mark
6(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>
7(a)(i)	pancreas	allow phonetic spelling	1
7(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
7(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
7(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
7(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
7(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>