



General Certificate of Secondary Education

Biology 4411

BLY3H

Unit Biology 3

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.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2011 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

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.

BLY3H

Question 1

question	answers	extra information	mark
1(a)(i)	brain		1
1(a)(ii)	skin		1
1(a)(iii)	1/25 or 4% or 0.04 or 1 in 25 or 1:25 or 1 out of 25	allow $\frac{1000}{25000}$	1
1(b)	any two from: <ul style="list-style-type: none"> increased / high heart rate / pulse rate dilation / widening of <u>arteries</u> / <u>arterioles</u> (to skeletal muscles) or less blood flow to other organs increased stroke volume / described 	do not allow pumps more blood unqualified accept vasodilation unqualified do not accept reference to veins / capillaries	2
1(c)	<u>more</u> respiration / description or <u>more</u> energy required or to provide <u>more</u> energy respiration / process described → CO ₂ CO ₂ <u>diffuses</u> into blood	ignore references to breathing do not accept anaerobic respiration	1 1 1
Total			8

BLY3H

Question 2

question	answers	extra information	mark
2(a)	to kill (other) (micro) organisms (in the milk) / to sterilise	allow germs ignore viruses allow destroy ignore pasteurise	1
2(b)(i)	0.015	award 2 marks for correct answer irrespective of working allow answer or use of 1.5 for 1 mark allow 1 mark for $\frac{(y_1 - y_2)}{100}$ but incorrect answer y-values may be incorrect or use of 6.0 and 4.5 but incorrect answer	2
2(b)(ii)	running out of substrate / sugar / food or (acid / low pH) denatures enzymes / proteins / kills bacteria	accept stops / slows enzymes / metabolism allow (acid / low pH) stops / slows bacteria working / growing	1
2(c)	lactic acid	if incorrect acid allow 1 mark	1 1
2(d)(i)	25		1
2(d)(ii)	pathogens / harmful bacteria (might) grow (at 35 °C)	do not accept viruses	1
Total			8

BLY3H**Question 3**

question	answers	extra information	mark
3(a)	<u>large</u> surface / <u>large</u> area		1
	thin / short distance (from air to blood) / one cell thick / two cells thick		1
	<u>good</u> blood supply / <u>many</u> capillaries / capillary <u>network</u> / <u>many</u> blood vessels	ignore moist surface	1
3(b)(i)	diffusion	ignore gaseous exchange	1
3(b)(ii)	brings (more) oxygen / air into the <u>lungs</u> / <u>alveoli</u>		1
	keeps O ₂ level high in alveoli or maintains concentration difference (between alveoli and blood) / keeps O ₂ concentration in alveoli > O ₂ concentration in blood gains 2 marks		1
Total			6

BLY3H**Question 4**

question	answers	extra information	mark
4(a)(i)	carbohydrase	allow correct named example eg amylase / maltase	1
4(a)(ii)	fermentation / <u>anaerobic</u> respiration	accept alcoholic fermentation	1
4(b)	any three from: <ul style="list-style-type: none"> • ethanol renewable / can be re-made or petrol non-renewable / can't be re-made • maize / plants / photosynthesis takes in <u>CO₂</u> • (ethanol) causes less increase / no increase in CO₂ concentration in the atmosphere or (ethanol) is carbon neutral • (ethanol) has less effect / no effect on climate / on global warming 	accept converse for petrol ignore ethanol gives off less CO ₂ accept converse for petrol accept correct reference to named pollutant / effect from petrol	3
Total			5

BLY3H

Question 5

question	answers	extra information	mark
5	<p>active transport needs energy or diffusion is <u>not</u> energy-dependent</p> <p>any three from:</p> <ul style="list-style-type: none"> • (energy from) <u>aerobic respiration</u> • <u>more</u> respiration with <u>O₂</u> or <u>more</u> energy release with <u>O₂</u> • (aerobic) respiration / energy release occurs in mitochondria • xylose / other sugars absorbed by diffusion / not by active transport 	<p>do not allow anaerobic</p> <p>allow active transport is selective / specific or active transport can distinguish glucose and xylose</p>	<p>1</p> <p>3</p>
Total			4

BLY3H

Question 6

question	answers	extra information	mark
6(a)	maintain / constant / suitable / optimum temperature or to prevent <u>overheating</u>	ignore to cool (= question)	1
	high temperature denatures enzymes / proteins / high temperature kills microorganisms / fungus	do not allow death of enzymes / denatures microorganisms	1
	microorganisms / fungus / respiration release energy	allow release heat	1
6(b)	<p>any four from:</p> <ul style="list-style-type: none"> • very little / no measurable fungus / biomass <u>before 20h</u> • need fungus present to <u>make</u> protease enzyme or protease is a <u>product</u> from the fungus or protease not made until the fungus is made • protease not made until glucose is used • glucose needed for energy / respiration or glucose as material for growth / to make more fungus • equipment not sensitive enough to measure low concentrations 	<p>allow spores take about 20 h to start growth</p> <p>allow protease increases as glucose decreases</p>	4

Question 6 continues on the next page

BLY3H**Question 6 continued**

question	answers	extra information	mark
6(c)	40 (no mark) any two from: <ul style="list-style-type: none"> • (40) gives the highest yield / activity of enzyme per g glucose • (40) gives highest yield / activity of enzyme per g fungus produced. • (40) is more economic / saves money 	if neither point made allow 1 mark for (40) gives the highest yield / activity of enzyme	2
Total			9

BLY3H**Question 7**

question	answers	extra information	mark
7(a)(i)	A		1
7(a)(ii)	(protein molecule is) too large to pass through the filter / cannot pass through the filter		1
7(b)	RBC is too big to / cannot pass through filter		1
	haemoglobin released when RBC bursts or haemoglobin inside RBC in a healthy person		1
	haemoglobin is small enough to / can pass through filter or haemoglobin diameter < pore diameter or haemoglobin <u>only</u> 5.5 nanometres		1
Total			5