



**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.

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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.

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

## BLY3H

## Question 2

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

**BLY3H****Question 3**

| <b>question</b> | <b>answers</b>  | <b>extra information</b> | <b>mark</b> |
|-----------------|---|--------------------------|-------------|
| <b>3(a)</b>     | <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           |
| <b>3(b)(i)</b>  | diffusion   | ignore gaseous exchange  | 1           |
| <b>3(b)(ii)</b> | brings (more) oxygen / air into the <u>lungs</u> / <u>alveoli</u>   |                          | 1           |
|                 | keeps O <sub>2</sub> level high in alveoli<br><b>or</b><br>maintains concentration difference (between alveoli and blood) / keeps O <sub>2</sub> concentration in alveoli > O <sub>2</sub> concentration in blood<br>gains <b>2</b> marks |                          | 1           |
| <b>Total</b>    |   |                          | <b>6</b>    |

**BLY3H****Question 4**

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



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## Question 5

| question     | answers  | extra information  | mark              |
|--------------|--|--|-------------------|
| 5            | <p>active transport needs energy <b>or</b> diffusion is <u>not</u> energy-dependent</p> <p>any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• (energy from) <u>aerobic respiration</u></li> <li>• <u>more</u> respiration with <u>O<sub>2</sub></u> <b>or</b> <u>more</u> energy release with <u>O<sub>2</sub></u></li> <li>• (aerobic) respiration / energy release occurs in mitochondria</li> <li>• xylose / other sugars absorbed by diffusion / not by active transport</li> </ul> | <p>do <b>not</b> allow anaerobic</p> <p>allow active transport is selective / specific<br/><b>or</b> active transport can distinguish glucose and xylose</p> | <p>1</p> <p>3</p> |
| <b>Total</b> |  |  | <b>4</b>          |

## BLY3H

## Question 6

| question | answers  | extra information  | mark |
|----------|--|--|------|
| 6(a)     | maintain / constant / suitable / optimum temperature <b>or</b> to prevent <u>overheating</u>   | ignore to cool (= question)  | 1    |
|          | high temperature denatures enzymes / proteins / high temperature kills microorganisms / fungus   | do <b>not</b> allow death of enzymes / denatures microorganisms  | 1    |
|          | microorganisms / fungus / respiration release energy   | allow release heat   | 1    |
| 6(b)     | <p>any <b>four</b> from:</p> <ul style="list-style-type: none"> <li>• very little / no measurable fungus / biomass <u>before 20h</u></li> <li>• need fungus present to <u>make</u> protease enzyme <b>or</b> protease is a <u>product</u> from the fungus <b>or</b> protease not made until the fungus is made</li> <li>• protease not made until glucose is used</li> <li>• glucose needed for energy / respiration <b>or</b> glucose as material for growth / to make more fungus</li> <li>• equipment not sensitive enough to measure low concentrations</li> </ul> | <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     |
|--------------|---|---|----------|
| <b>6(c)</b>  | 40 (no mark)<br><br>any <b>two</b> from: <ul style="list-style-type: none"> <li>• (40) gives the highest yield / activity of enzyme per g glucose</li> <li>• (40) gives highest yield / activity of enzyme per g fungus produced.</li> <li>• (40) is more economic / saves money</li> </ul> | if neither point made allow <b>1</b> mark for (40) gives the highest yield / activity of enzyme | <b>2</b> |
| <b>Total</b> |   |   | <b>9</b> |

**BLY3H****Question 7**

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