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General Certificate of Secondary Education

Biology 4411

BLY3H Unit Biology 3

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.

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. 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.

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Question 1

question	answers	extra information	mark
1(a)(i)	any **two** from: • sterilise flask before use **or** method described • sterilise water / solution (before yeast added) • work near a flame • modification to air lock eg disinfectant / cotton wool filter	accept boil accept heat to kill organisms ignore heating unqualified sterilise unqualified = **1** mark	2
1(a)(ii)	any **one** from: • so can see the effect of different types of sugar • different concentrations give different rates / affect results • so only one variable / valid • concentration is a control variable	ignore fair test do **not** accept accurate / reliable / precise	1
1(b)(i)	carbon dioxide	accept CO_2 / CO2 ignore CO^2 / Co_2 / Co^2	1
1(b)(ii)	less likely to lose count / get tired **or** experiment lasts a long time **or** less chance of human error	ignore precise / accurate / reliable / valid	1
1(c)(i)	**A** – more gas / CO_2 produced	if **B** – no marks	1
1(c)(ii)	gas production <u>stopped</u> **or** <u>zero</u> rate **or** no more gas / bubbles produced	do **not** accept levelled off / constant	1
Total			**7**

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Question 2

question	answers	extra information	mark
2(a)	(protein molecules too) big **or** larger than pore size	allow cannot fit through the pores / hole / gaps	1
2(b)(i)	diffusion		1
2(b)(ii)	high to low concentration **or** high concentration in blood, low concentration in dialysis fluid **or** <u>down</u> concentration gradient **or** correct use of numbers	ignore along gradient / across gradient allow there is none in dialysis fluid	1
2(c)	any value between 3.15 and 3.25 (inclusive)		1
2(d)(i)	any **two** from: • kidney works all the time **or** dialysis works for short time **or** dialysis needs regular trips to hospital / regular treatment / long term treatment • kidney maintains correct concentration all the time **or** no build-up as between dialysis sessions • no need to regulate diet **or** correct example – eg low salt / low protein / low fluid intake as with dialysis • cheaper in the long term	ignore enables an active life accept kidney transplant is one off treatment	2

Question 2 continues on the next page

Question 2 continued

question	answers	extra information	mark
2(d)(ii)	any **two** from: • rejection / described **or** need to use immunosuppressants **or** need to take drugs for life • susceptible to other infections • hazards of operation / anaesthetic • shortage of donors / match • high initial cost	allow may need later replacement	2
Total			**8**

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Question 3

question	answers	extra information	mark
3(a)(i)	methane	accept CH_4 / CH4 ignore CH^4 / Ch_4 / Ch^4	1
3(a)(ii)	70	correct answer with or without working if answer is in incorrect **or** no answer 100 – (27 + 2 + 0.5 + 0.5) gains **1** mark	2
3(b)(i)	allows (better) mixing of <u>microorganisms</u> and organic matter **or** to maintain temperature for enzyme action / chemical reaction / microorganisms	accept allows microorganisms to get at organic matter	1
3(b)(ii)	any **one** from: • need <u>anaerobic</u> conditions / respiration • prevent aerobic respiration • biogas made in <u>absence of O_2 / air</u> • less methane would be made with air • more CO_2 would be made with air	accept biogas made by fermentation	1
3(c)	<u>best</u> / <u>optimum</u> temperature for <u>named process</u> (in microorganisms) eg growth / reproduction / digestion / respiration / chemical / enzyme reactions / decomposition / breakdown of organic matter causes high (rate of) biogas production		1 1
Total			**7**

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Question 4

question	answers	extra information	mark
4(a)	blood has red (blood) cells / haemoglobin		1
	haemoglobin combines with / carries oxygen	ignore 'mix' **NB** Blood can form oxyhaemoglobin = **2** marks	1
4(b)	blood gains oxygen / becomes oxygenated (in the lungs)	idea of acquiring oxygen must be unambiguous	1
	blood loses oxygen to the muscles / cells		1
	because muscles are respiring (aerobically)		1
	to provide energy (for exercise)		1
Total			**6**

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Question 5

question	answers	extra information	mark
5	D – many microvilli (1) Ex – provide large surface area (1) D – many capillaries / good blood supply (1) Ex – maintain concentration / diffusion gradient **or** quickly removes food (1) D – thin wall / one cell thick surface / capillaries near surface (1) Ex – short distance for food to travel (1) D – many mitochondria (1) Ex – provide energy / ATP for active uptake / transport (1)	**five** points made max **3** descriptions max **3** explanations allow villi are thin ignore villi are one cell thick	max 5
Total			**5**

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Question 6

question	answers	extra information	mark
6(a)	any **one** suitable product: eg • penicillin / antibiotic / other named antibiotic • mycoprotein / described / quorn • lactic acid / yoghurt • enzymes • ethanol / alcohol / beer / wine • hormones / insulin / GH / somatotrophin • blood-clotting protein / factor VIII • methane / biogas • vaccines		1
6(b)(i)	otherwise too many colonies <u>to count</u> **or** too many bacteria <u>to count</u> **or** make it easier to count		1
6(b)(ii)	a colony is <u>many</u> bacteria **or** cannot see one bacterium each bacterium produces one colony		1 1

Question 6 continues on the next page

Question 6 continued

question	answers	extra information	mark
6(c)	correct answer: 8 800 000 / 8.8 million / 8.8×10^6	correct answer gains **2** marks with or without 1st two lines if answer incorrect, 1 error in calculation eg 88 000 / 880 000 gains **1** mark **or** allow error carried forward from incorrect 1st line for **1** mark	2
6(d)(i)	on graph: line starts at x and decreases downward sloping s – shaped curve not reaching zero before 30 hours		 1 1
6(d)(ii)	(graph **A**) rises: because glucose <u>is used</u> for reproduction / growth / cell division / multiplication (graph **A**) falls: less / no glucose available **or** glucose is limiting causes some bacteria to die	 allow food for glucose must relate to previous point	 1 1 1
6(d)(iii)	method B counts living and dead bacteria / includes dead bacteria		1
Total			**12**

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