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General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2010 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. 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)	three layer triangular pyramid soya / beans / food – trout / fish – people / human (in sequence)	either way up (as blocks or triangle) ignore reference to producers / herbivores / consumers award **1** mark only for a correct food chain with 2 correct arrows showing energy flow	1 1
1(b)	The trout release energy when they respire Some energy will be lost in waste from the trout		1 1
1(c)	any **one** from eg • easy / easier to catch / more caught • easy / easier to feed • no / less predation • less energy loss • less movement	 allow easy / easier to monitor allow control food allow less fishing / poaching allow grow faster ignore less space to move do **not** allow easier to farm	1
1(d)	any **two** from: • microorganisms / bacteria / decomposers / microbes / fungi / detritus feeders • decay / rot / decompose / digest / break down • (microorganisms) respire • turned into fossil fuels / named fossil fuels • carbon dioxide / CO_2 released	 ignore biodegrade do **not** award this mark if response implies the trout respire	2
Total			**7**

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Question 2

question	answers	extra information	mark
2(a)	5		1
2(b)	any **one** from: • more light • warm(er) / hot • more water / lot of rain	allow in either section allow more sun / sunnier	1
	increased / more photosynthesis	allow in either section allow more biomass / carbohydrate / named (made) do **not** allow food allow enzymes / metabolism faster **NB** for **2** marks this must be linked to heat to gain **2** marks more / increased must be mentioned at least once	1
2(c)	less pollution / named pollutant eg carbon dioxide / 'fumes' / emissions	allow examples of effect of less pollution eg less global warming / less acid rain allow any relevant environmental effect eg imported diseases	1
	less fuel used / less transport / named transport	ignore 'less distance' / importing allow 'less distance <u>travelled</u>' /' less travel' allow smaller carbon footprint once only for <u>either</u> mark	1
Total			**5**

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Question 3

question	answers	extra information	mark
3(a)(i)	pancreas	allow phonetic spelling	1
3(a)(ii)	(increases movement of) glucose into cells / organs / named	allow (glucose*)* converted to glycogen / fat allow (glucose*)* used in (increased) respiration do **not** allow hybrid spellings of glycogen	1
3(b)	**Type of diabetes** / **Treatment** Type 1 → Careful attention to diet only Type 1 → Careful attention to diet **and** injection of insulin Type 2 → Careful attention to diet **and** injection of insulin Type 2 → Injection of insulin only	**1** mark per correct line extra line from a type of diabetes cancels the mark	2
3(c)(i)	protein		1
3(c)(ii)	gene / allele		1

Question 3 continues on the next page

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Question 3 continued

question	answers	extra information	mark
3(c)(iii)	any **three** from: • (amino acids) broken down / converted • (amino acids) form / into urea • (break down / convert / urea formed) in liver • (urea / broken down amino acids) removed / filtered by kidney • (urea / broken down amino acids) in urine • (urine / urea / broken down amino acids) stored / held in bladder	max **2** if any one process goes on in the wrong organ	3
Total			**9**

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Question 4

question	answers	extra information	mark
4(a)(i)	oxygen produced		1
4(a)(ii)	any **one** from: • average / mean / median • some may be anomalous	ignore reliable / precise / accurate allow some may not float	1
4(b)(i)	any **two** from: • low intensity / below 12.5 / 2.5 – 12.5 *(*units of light*)* flat wrack / it, rate of photosynthesis faster **or** saw wrack rate of photosynthesis slower • high intensity / above 12.5 / 12.5 – 15 (units of light) flat wrack / it, rate of photosynthesis slower **or** saw wrack rate of photosynthesis faster • same (rate) at 12.5 units	do **not** allow answers in terms of time only if candidate answers in terms of comparing rate of change then the rate of change of photosynthesis must be in the correct direction for **1** mark allow any value in range allow any value in range	2

Question 4 continues on the next page

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Question 4 continued

question	answers	extra information	mark
4(b)(ii)	any **two** from: • saw wrack receives less light • less photosynthesis **or** less carbohydrate / sugar / starch production • when tide is in **or** at high tide **or** any tide above low tide	 accept converse if clear reference to bladder wrack if first and second responses, 'less' needed only once accept saw wrack covered by water / submerged longer / more reference to position on shore is insufficient	2
Total			**6**

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Question 5

question	answers	extra information	mark
5(a)	both parents **Aa**	accept other upper and lower case letters without key **or** symbols with a key allow shown as gametes in punnet square	1
	aa in offspring correctly derived from parents / **aa** correctly derived from the parents given	ignore other offspring / gametes for this mark parents do not have to be correct	1
	offspring **aa** identified as having cystic fibrosis	may be the only offspring shown **or** circled / highlighted / described	1
5(b)(i)	any **one** from: • sure / greater chance of healthy / non-cystic fibrosis egg / embryo / child • greater chance of fertilisation	accept converse if clear eg if you (only) took one it might have cystic fibrosis / might not be fertilised accept some may have the allele reference to suitable embryo is insufficient	1

Question 5 continues on the next page

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Question 5 continued

question	answers	extra information	mark
5(b)(ii)	**advantages** any **two** from • greater / certain chance of having child / embryo without cystic fibrosis / healthy • child with cystic fibrosis difficult / expensive to bring up • cystic fibrosis (gene / allele) not passed on through generations **disadvantages** any **two** from: • operation dangers eg infection • ethical or religious issues linked to killing embryos • (high) cost • possible damage to embryo (during testing for cystic fibrosis / during operation) **plus** **conclusion** a statement that implies a valued, qualified judgement eg it is right because the risk of infection is small **or** eg it is wrong because embryos are killed	**to gain 3 marks both advantages and disadvantages must be given** ignore references to abortion unless qualified by later screening ignore risk unqualified accept wrong / cruel to kill embryos accept right to life **Note:** the conclusion mark cannot be given unless a reasonable attempt to give both an advantage and a disadvantage has (already) been made do **not** award the mark if the conclusion only states that advantages outweigh disadvantages	max 3 1
Total			**8**

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Question 6

question	answers	extra information	mark
6(a)	pancreas small intestine	either order	1 1
6(b)	any **two** from: • to give them time to come to temperature of the water-bath • at / near body temperature / best / optimum temperature • otherwise reaction would take place at a series of different temperatures **or** sensible statement about control / fair test	accept so (they / both) are at the same temperature	2
6(c)(i)	0.42	allow in range 0.42 to 0.425	1
6(c)(ii)	0.021	correct answer with or without working allow ecf from 6(c)(i) ie 6(c)(i) ÷ 20 correctly calculated for **2** marks if answer incorrect 0.42 ÷ 20 **or** (c)(i) ÷ 20 gains **1** mark	2
6(c)(iii)	(all) starch digested / gone / used up / turned to sugar	allow the amount of sugar stays the same / maximum	1
6(c)(iv)	any **two** from • enzyme destroyed / denatured / damaged / shape changed • unable to fit (starch molecule) • starch can't be digested	allow reference to active site once only as alternative to first or second bullet point do **not** accept killed enzymes don't work is insufficient	2
Total			**10**