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General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Mark Scheme

2012 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 students' 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 students' 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 students' 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 students 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)

Student	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)

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student 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)	the lower the temperature the shorter the time **or** the lower the temperature the more chance of frostbite	a trend is required accept reverse accept the lower the temperature the faster you get frostbite accept positive correlation but **not** directly proportional ignore wind speed	1
1(a)(ii)	any value from 5 to below 10	do **not** accept 10 allow less than 10 **or** < 10	1
1(b)	Muscles 'shiver' Blood vessels supplying the skin capillaries constrict	if more than two boxes ticked deduct **1** mark for each additional tick	1 1
Total			**4**

Question 2

question	answers	extra information	mark
2(a)	any **one** from:	ignore control variables that are not given in the method, such as 'equally crushed' **or** same time do **not** accept volume of apple juice	1
	• 20 g (of apple) **or** (same) mass / amount / weight of apple	ignore volume / size	
	• crushed (apple)		
	• 10 drops (of solution) **or** (same) number / amount / volume of drops	do **no**t accept 10 drops of amylase alone	
	• apple **or** type of fruit	ignore type of apple	
2(b)	(may) have different volume / amount / sizes	ignore reference to human error ignore don't know / can't measure size of drop	1
2(c)	amylase has no / little effect on cell / walls / apple **or** amylase does not breakdown / digest cell / walls / apple	accept ideas that refer to shape of enzyme being 'incorrect' accept amylase <u>only</u> breaks down / digests starch	1
	pectinase breaks down cell / walls / apple	allow digest for breakdown allow shape of pectinase fits cell / walls / apple	1
	boiling breaks down cell / walls / apple		1
2(d)	11.6		1
	enzyme / pectinase destroyed / denatured / damaged / broken down	do **not** allow kill	1
	only effect of boiling (relevant)		1
Total			**8**

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Question 3

question	answers	extra information	mark
3(a)	B		1
	less / no insulin (produced) **or** insulin produced in pancreas	allow pancreas can't monitor (blood) sugar (level) ignore pancreas can't control (blood) sugar (level) allow increased glucagon production allow A as liver stores less glucose / sugar for **2** marks only	1
3(b)(i)	(it / protein / insulin) digested / broken down	if ref to specific enzyme must be correct (protease / pepsin) ignore denatured do **not** accept digested in mouth / other incorrect organs	1
3(b)(ii)	any **two** from: • (attention to) diet • exercise • (pancreas) transplant / stem cells / genetic engineering	ignore injections accept examples, eg eat less sugar(y food) **or** eat small regular meals allow eat less carbohydrate / control diet ignore cholesterol or balanced / healthy diet ignore keep fit / healthy	2
Total			**5**

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Question 4

question	answers	extra information	mark
4(a)	less carbon dioxide used **or** higher carbon dioxide (concentration) in jar because less photosynthesis **or** light was a limiting factor	do **not** allow no carbon dioxide used **or** no change in carbon dioxide do **not** allow no photosynthesis	1 1
4(b)	magnesium / Mg	do **not** allow manganese / Mn allow iron / Fe ignore nitrates	1
Total			**3**

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Question 5

question	answers	extra information	mark
5(a)	0.18	award both marks for correct answer irrespective of working if no answer or incorrect answer allow **1** mark for 45 ×100 / 25000	2
5(b)	heat / thermal	allow heat <u>from</u> respiration	1
5(c)	energy / mass / biomass lost / not passed on **or** energy / mass / biomass is used **or** not enough energy / mass / biomass left	ignore reference to losses via eg respiration / excretion / movement / heat	1
	a sensible / appropriate use of figures including heron	eg <u>only</u> 2 from frog / to heron ignore units	1
5(d)	any **three** from: • (microorganisms) decay / decompose / digest / breakdown / rot • (breakdown) releases minerals / nutrients / ions / salts / named • (microorganisms) respiration • (microorganisms / respiration) release of carbon dioxide	accept marking points if candidate uses other terms for microorganisms ignore eat ignore food ignore other organisms respiring	3
Total			**8**

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Question 6

question	answers	extra information	mark
6(a)	water enters (funnel / sugar solution) **or** water diffuses in (to the funnel)	do **not** accept if diffusion of sugar	1
	membrane partially / selectively / semi permeable **or** by osmosis	allow description	1
	because concentration (of sugar) greater inside funnel than outside / water / in beaker	assume 'concentration' refers to sugar unless candidate indicates otherwise the position of the solutions may be implied	1
6(b)	(level / it) rises more slowly **or** levels out earlier **or** does not rise as much	accept inference of less steep gradient (of graph) allow less / slower osmosis / diffusion / less water passes through or less water enters funnel allow water enters / passes through slower	1
	less difference in concentration (between solution / funnel and water / beaker)	accept due to lower diffusion / concentration gradient / described	1
Total			**5**

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Question 7

question	answers	extra information	mark
7(a)	gene / allele		1
7(b)	(in / on) ribosome(s)		1
7(c)	any **three** from: • amino acids make up a protein • (protein is) particular combination / sequence (of amino acids) • bases form a <u>code</u> • the bases work in threes or description • (code / three bases) for one amino acid	accept bases work in triplet accept eg (bases) WXZ for amino acid J for **2** marks	3
7(d)(i)	different / wrong amino acid (coded for) **or** different / wrong shape	ignore reference to amino acid 'made' ignore change unqualified ignore different protein	1
7(d)(ii)	different / example of different eye colour	allow protein may / would not be made / function (normally)	1
Total			**7**

Question 8

question	answers	extra information	mark
8		Marks should **not** be awarded for simply copying the information provided A mark may be awarded for a comparison between treatments if the answer only involves copied information	
	any **four** from: embryo stem cells – examples of pros • can treat a wide variety / lots of diseases / problems • many available / plentiful • using them better than wasting them • painless cons • (possible) harm / death to embryo • (relatively) untested / unreliable / may not work • embryo can't be 'asked' / 'embryo rights' idea adult bone marrow stem cells – examples of pros • no ethical issues (in collection) **or** permission given • quick recovery • (relatively) safe • well tried / tested / know they work	For all **4** marks to be awarded, there must be at least 1 pro and 1 con allow long term effects not known **or** may be more risky allow does not kill (donor) / low risk	4

	cons • operation hazards eg infection • few types of cell / tissue produced **or** few diseases / problems treated • painful so may deter donors Conclusion to evaluation: A reasoned conclusion from the evidence		1
Total			**5**

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