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General Certificate of Secondary Education

Science A 4405 / Biology 4401

BL1HP Unit Biology

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 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.

Quality of Written Communication and levels marking

In Question 1(b) student are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: Basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: Clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: Detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

BL1HP

Question 1

question	answers	extra information	mark
1(a)(i)	fusion / joining / combining of gametes / egg **and** sperm / sex cells	accept fertilisation allow fusion / joining / combining DNA from two parents ignore meeting / coming together / mixing of gametes etc	1
1(a)(ii)	(mixture of) genes / DNA / genetic information / chromosomes from both parents / horse **and** zebra	ignore nucleus / inherited information but allow second mark if given dependent on sensible attempt at 1st mark	1 1

Question 1 continues on the next page . . .

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Question 1 continued

1(b)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.		
0 marks	**Level 1 (1–2 marks)**	**Level 2 (3–4 marks)**	**Level 3 (5–6 marks)**
No relevant content	There is simple description of the early stages of adult cell cloning. However there is little other detail and the description may be confused or inaccurate.	There is an almost complete description of the early stages of the process and description of some aspects of the later stages. The description may show some confusion or inaccuracies.	There is a clear, detailed and accurate description of all the major points of how adult cell cloning is carried out.

Examples of Biology points made in the response could include:	6
• skin cell from zorse • (unfertilised) egg cell from horse • remove nucleus from egg cell • take nucleus from skin cell • put into (empty) egg cell • (then give) electric shock • (causes) egg cell divides / embryo formed • (then) place (embryo) in womb / uterus	

Total			**9**

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Question 2

question	answers	extra information	mark
2(a)	both lead to reduction / fall (in measles cases)	can be implied	1
	measles vaccine caused a big drop **or** correct use of figures		1
	MMR wipes out measles **or** drops to (almost) zero **or** doesn't fall as much as measles vaccine **or** correct use of figures.		1
2(b)	mump(s)	either order	1
	rubella / german measles	allow phonetic spelling	1
2(c)	white blood cells	allow lymphocytes / leucocytes ignore memory cells	1
	(wbc) produce antibodies	ignore antitoxins / antigens / antibiotics / engulfing	1
	in future / if re-infected antibody production rapid / fast(er) / quick(er)	allow ecf from antitoxins / antigens / antibiotics ignore engulfing ignore reference to specificity	1
Total			**8**

COMPONENT NUMBER: BL1HP

Question 3

question	answers	extra information	mark
3(a)(i)	triangular pyramid with 3 layers	may be as blocks or as triangle ignore food chains and arrows	1
	layers appropriately labelled: bean / plant aphid, ladybird	labelled in food chain order must **not** contradict correct pyramid allow correctly labelled inverted pyramid for **2** marks	1
3(a)(ii)	any **two** from: (for aphid / ladybird) • not all digested / faeces • loss in urine • loss of CO_2 • not all eaten	ignore energy ignore loss of CO_2 from bean plant if none of first 3 points given then allow waste (materials) / excretion for **1** mark	2
3(b)	microorganisms / microbes / bacteria / fungi / decomposers / detritivores / named	do **not** accept germs allow mould ignore aphids	1
	decay / breakdown / digest / decompose / rot (bean plant)	ignore eat	1
	respiration (of microorganisms etc / aphids)	allow burning / combustion	1
	carbon dioxide released (from respiration of microorganisms etc / aphids)	allow carbon dioxide released / produced (from burning / combustion) ignore other parts of the carbon cycle ignore formation of fossil fuels	1
Total			**8**

COMPONENT NUMBER: BL1HP

Question 4

question	answers	extra information	mark
4(a)(i)	any **one** from: • chemical messenger / message • chemical / substance produced by a gland • chemical / substance transported to / acting on a target organ • chemical / substance that controls body functions	allow substance / material which is a messenger allow material produced by a gland	1
4(a)(ii)	gland / named endocrine gland	brain alone is insufficient allow phonetic spelling	1
4(a)(iii)	in blood / plasma **or** circulatory system **or** bloodstream	accept blood vessels / named do **not** accept blood cells / named	1
4(b)	FSH stimulates oestrogen (production) / egg maturation / egg ripening oestrogen inhibits FSH LH stimulates egg / ovum release / ovulation	each hormone must be linked to correct action apply list principle ignore the gland producing hormone ignore production / development of egg allow oestrogen stimulates LH / build up of uterine lining accept LH inhibits oestrogen accept LH controls / stimulates growth of corpus luteum ignore production of egg	1 1 1
Total			**6**

COMPONENT NUMBER: BL1HP

Question 5

question	answers	extra information	mark
5(a)	mutation	correct spelling only ignore other adjectives eg random / spontaneous	1
5(b)		ignore references to X / Y chromosomes	
	idea of mutant gene / new form / this allows hatching (of males)		1
	(individual with advantage) (more) survive / (more) live / (more) don't die	allow immunity rather than resistance throughout	1
	(so survivors) breed / reproduce		1
	mutation / gene passed (from survivors) to offspring / next generation	allow resistance / characteristic for gene 'gene passed on' is insufficient	1
Total			**5**

COMPONENT NUMBER: BL1HP

Question 6

question	answers	extra information	mark
6(a)(i)	any **one** from: • cells • tissues • (live) animals / named	 allow mammals	1
6(a)(ii)	any **three** from: (to test for) • toxicity / check not poisonous / not harmful • interaction with other drugs • efficacy **or** to see if they work **or** check if they treat the disease • dosage **or** how much is needed	 allow side-effect allow converse allow converse	3

Question 6 continues on the next page . . .

Question 6 continued

question	answers	extra information	mark
6(b)	**argued evaluation**	comparison can be written anywhere in evaluation allow use of 'only' for implied comparison for each point eg **only** statins damage muscles / kidneys / organs	
	any **six** from:		6
	• statin can damage / muscles / kidneys / organs but cholesterol blockers don't	ignore liver if neither of the first 2 points are given accept for **1** mark
	• statins can cause death but cholesterol blockers don't	statins are more dangerous than cholesterol blockers **or** statins have more side effects
	• cholesterol blockers can interfere with action of other drugs but statins don't	
	• statins are for a life time but cholesterol blockers are not	
	• statins (might) reduce cholesterol to zero but cholesterol blockers only reduce it **or** statins reduce cholesterol more	allow statins (might) stop membrane / hormone production but cholesterol blockers don't
	• statins better for people with inherited high cholesterol	
	• cholesterol blockers better for people with dietary cholesterol problems	
	• taking/using statins/cholesterol blockers is better than dying from heart attack or build up of fat in blood vessels or reduced blood flow	
Total			**10**

COMPONENT NUMBER: BL1HP

Question 7

question	answers	extra information	mark
7(a)		ignore nerve / neuron(e) throughout	
	A sensory	accept afferent	1
	B motor	accept efferent	1
	C relay	accept intermediate	1
7(b)	stretch	allow pressure / pull / tension (in muscle) allow a hit at (point) **P** ignore pain	1
7(c)	any **three** from: • chemical (release) • diffuses (across the gap / synapse) • transmits impulse / information (across synapse) • between neurones / nerve cells / named	 accept neurotransmitter / acetylcholine allow transmits signal / message if named, must be either sensory / A to relay / C **or** relay / C to motor / B allow 'to the next neurone'	3
Total			**7**

COMPONENT NUMBER: BL1HP

Question 8

question	answers	extra information	mark
8(a)	Scotland any **one** from • Scotland 15 to 20% / about 1/5th to 1/7th but England and Wales / the others are less / lower / reasonable estimated figures • $\frac{13.4}{79}$ is greater than England / $\frac{11.4}{130}$ and Wales / $\frac{2.8}{21}$		1 1
8(b)(i)	broadleaf woodlands have more grey squirrels **or** broadleaf woodlands have less red squirrels	allow converse referring to conifers	1
8(b)(ii)	Wales has more conifers and / but more grey squirrels **or** Wales has less broadleaf and / but more grey squirrels	allow converse for red squirrels	1
8(c)	any **three** from: grey squirrels • have wider range/ more types of food • are resistant to parapox (virus) but reds are not • have more young each year / litter • young more likely to survive (in mixed populations)	answers must be comparative they = grey squirrels allow converse arguments for red squirrels ignore reference to other disease	3
Total			**7**

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