**General Certificate of Secondary Education
January 2013**

Science A / Biology   **BL1HP**

(Specification 4405 / 4401)

Unit: Biology 1

Final

Mark Scheme

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 events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process 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 standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised 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.

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 bullet points 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	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, 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, 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 or by each stage of a longer calculation.

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.

3.8   Ignore / Insufficient / Do not allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 3(a) students 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.

Students 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.

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Question 1

question	answers	extra information	mark
1(a)	any correct named physical environmental condition, e.g. light / water / rain / temperature / minerals / nutrients / space (between plants)	ignore carbon dioxide / climate / weather / sun / pollution	1
	genes / inheritance OR any correct named biotic factor e.g. predation / disease	ignore 'variety'	1
1(b)	mass of crop also depends on number of pods (per plant) / size / mass of each pea	ignore number of plants	1
1(c)	microorganisms / bacteria / fungi / decomposers / detritus feeders / named		1
	decompose / rot / break down / decay / digest	ignore feed / eat	1
	(these organisms) respire	do **not** allow respiration by pea (plants)	1
	(decay / respiration / microorganisms etc) releases carbon dioxide	do **not** allow combustion / fossilisation	1
Total			**7**

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Question 2

question	answers	extra information	mark
2(a)(i)	**A** – pituitary **B** – ovary / ovaries	allow hypothalamus	1 1
2(a)(ii)	in blood (stream)	accept in plasma ignore dissolved	1
2(b)(i)	FSH and Luteinising Hormone (LH)		1
2(b)(ii)	fertilised OR reference to sperm form embryos / ball of cells or cell division (embryo) inserted into mother's womb / uterus	 allow (fertilised egg) is inserted into mother's womb / uterus	1 1 1
2(b)(iii)	any **one** from: • multiple births lead to low birth weight • multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages	 allow premature ignore reference to cost / ethics / population	1
2(c)(i)	any **one** from: • almost identical • both approximately 20%	allow S (slightly) more successful	1
2(c)(ii)	larger numbers (in clinic R) (in 2007) results likely to be more repeatable (in 2008)	allow only 98 (in S) (compared to 1004 (in R)) allow more reliable do **not** accept more reproducible / accurate / precise	1 1
Total			**11**

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Question 3

question	answers	extra information	mark
3(a)	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 5, and apply a 'best-fit' approach to the marking.		6

0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is a brief description of at least one of the stages (pre-inoculation, inoculation, post-inoculation).	There is a simple description of at least two stages and an explanation of at least one of them.	There is a clear description of all three stages and an explanation of at least two of them.

examples of biology points made in the response:

Pre-inoculation

- Petri dish and agar sterilised before use

- to kill unwanted bacteria

- inoculating loop passed through flame / sterile swab

- to sterilise / kill (other) bacteria

Inoculation

- loop/swab used to spread/streak bacterium onto agar

allow other correct methods, eg bacterial lawns

- lid of Petri dish opened as little as possible

- to prevent microbes from air entering

Post-inoculation

- sealed with tape

- to prevent microbes from air entering

- incubate

- to allow growth of bacteria

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Question 3 continued

question	answers	extra information	mark
3(b)(i)	bacteria killed / destroyed	ignore fights / attacks / stops growth / got rid of	1
3(b)(ii)	*Might be correct* largest area / space where no bacteria are growing	allow most bacteria killed	1
	Might not be correct (need more evidence as) D may be harmful to people / animals / surfaces **or** may work differently with different bacteria **or** disinfectants may be different concentrations **or** may not last as long	ignore ref to cost / dangerous or harmful unqualified ignore different amounts of disinfectant unless reference to different drop size ignore take longer to work allow reference to anomalous result or not repeated	1

Total			**9**

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Question 4

question	answers	extra information	mark
4		ignore descriptions of LDL levels	
	<u>A + B</u> most effective (treatment)		1
	D is (the most) effective (treatment)	D is the best single (treatment)	1
	neither A nor B (alone) are effective	allow increase risk of heart disease instead of not effective	1
	can't tell if C is effective		1
	OR		
	<u>A + C</u> is not effective		
Total			**4**

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Question 5

question	answers	extra information	mark
5(a)	extremophile(s)		1
5(b)(i)	common (periwinkle) and flat (periwinkle)	either order, **both** required	1
5(b)(ii)	(common and flat) both live in the same habitat / area / named area	allow habitats overlap the most	1
5(b)(iii)	any **two** from: • would have wrong food • would otherwise be exposed to (specific) predators • cannot tolerate extended exposure to air **or** reduced submersion in seawater • cannot tolerate high salt concentration (in rock pools) • cannot compete with small periwinkle	allow cannot tolerate temperature / dehydration allow low salt concentration (in rock pools)	2
Total			**5**

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Question 6

question	answers	extra information	mark
6(a)(i)	any **one** from: • (produce) toxins / poisons • (cause) damage to cells	 kill / destroy cells allow kills white blood cells	1
6(a)(ii)	produce antitoxins engulf / ingest / digest pathogens / viruses / bacteria / microorganisms	 accept phagocytosis or description ignore eat / consume / absorb for engulf ignore references to memory cells	1 1
6(b)(i)	dead / inactive / weakened (measles) pathogen / virus	accept idea of antigen / protein ignore bacteria	1 1
6(b)(ii)	(after infection) rise begins sooner / less lag time steeper / faster rise (in number) longer lasting **or** doesn't drop so quickly	accept converse if clearly referring to before vaccination idea of staying high for longer ignore reference to higher starting point	 1 1 1
6(b)(iii)	antibodies are specific or needs different antibodies	accept antigens are different **or** white blood cells do not recognise virus	1
6(c)	reduces spread of infection / less likely to get an epidemic	 accept idea of eradicating measles	1
Total			**10**

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Question 7

question	answers	extra information	mark
7(a)		allow described example	
	variation (between organisms within species)	allow mutation – but **not** if caused by change in conditions	1
	those most suited / fittest survive		1
	genes / alleles passed on (to offspring / next generation)	allow mutation passed on	1
7(b)(i)	any **two** from:	allow converse	2
	• increase in latitude reduces number of (living) species	ignore references to severity of conditions	
	• increase in latitude reduces time for evolution (of new species)		
	• the less the time to evolve the fewer the number of (living) species		
7(b)(ii)	any **two** from:	do **not** accept intention or need to evolve	2
	• (increase in latitude reduces number of (living) species because) less food / habitats / more competition <u>at high latitude</u>	allow only extremophiles / well-adapted species can survive	
	• increase in latitude reduces time for evolution (of new species) because) severe conditions act more quickly / to a greater extent on the weakest		
	• (the less the time to evolve the fewer the number of (living) species because) species that evolve slowly don't survive		
Total			**7**

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Question 8

question	answers	extra information	mark
8(a)(i)	5.2	award **2** marks for correct answer, irrespective of working or lack of it award **1** mark for 62.4÷12 only with incorrect or no answer	2
8(a)(ii)	the smaller the (mass of the) bird the more energy is needed (per gram of body mass)	allow converse ignore figures	1
8(a)(iii)	smaller bird has larger surface area : volume / mass ratio so heat / energy lost more quickly	allow converse allow lose more heat / energy if (a)(ii) describes a trend of more energy with increasing body mass allow **one** mark for idea of more energy needed for flight	1 1
8(b)	larger birds spend less time feeding since they need less food per gram of body mass (to satisfy energy needs)	accept converse allow the less energy they need per day the longer they spend feeding	1 1
Total			**7**

UMS Conversion Calculator: www.aqa.org.uk/umsconversion