



**General Certificate of Secondary Education
June 2013**

Additional Science / Biology

BL2FP

(Specification 4408 / 4401)

Unit 2: Biology 2

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.

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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. Boldening

- 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 boldened. 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 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	green, 5	0
2	red*, 5	1
3	red*, 8	0

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

Candidate	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, 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, 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 9(b) candidates 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.

Question 1

question	answers	extra information	mark
1(a)(i)	A = cytoplasm B = (cell) membrane		1 1
1(a)(ii)	nucleus	accept chromosome / DNA / genes accept phonetic.	1
1(b)	<p>Control what substances enter the cell</p> <p>Photosynthesis</p> <p>Protein synthesis</p> <p>Respiration</p>	extra lines cancel	3
Total			6

Question 2

question	answers	extra information	mark
2(a)(i)	(remains of) an organism / a bone / a shell / hard part of an organism / part of organism that does not decay / impression of an organism / footprint / burrow / rootlet trace		1
	further detail – eg in rock / ice/ amber / mineralisation or from a long time ago / many years ago	if number, > 1000 years ignore hundreds	1
2(a)(ii)	older fossils are simple(r) or fossils show change / adaptation with time	must make ref to change and time allow deeper fossils are simple(r)	1
2(b)(i)	18 to 30	allow 30 to 18 allow 12 ignore units	1
2(b)(ii)	small sample	allow <u>only</u> 49 shells / not representative / not enough evidence allow not all fossils found	1
2(c)	example of a physical factor such as flooding, volcanic activity (allow volcanoes) asteroid collisions, drought, ice age / temperature change or example of a biological factor such as predators / disease / competition / lack of food or mates / cyclical nature of speciation / isolation / lack of habitat or habitat change	allow natural disaster / climate change / weather change / catastrophic event / environmental change ignore human factors eg hunting / pollution	1
Total			6

Question 3

question	answers	extra information	mark												
3(a)(i)	<table border="1" data-bbox="347 349 1098 651"> <thead> <tr> <th data-bbox="347 349 858 465">Feature</th> <th data-bbox="858 349 978 465">Mitosis only</th> <th data-bbox="978 349 1098 465">Meiosis only</th> </tr> </thead> <tbody> <tr> <td data-bbox="347 465 858 524">Produces new cells during growth and repair</td> <td data-bbox="858 465 978 524">✓</td> <td data-bbox="978 465 1098 524"></td> </tr> <tr> <td data-bbox="347 524 858 582">Produces gametes (sex cells)</td> <td data-bbox="858 524 978 582"></td> <td data-bbox="978 524 1098 582">✓</td> </tr> <tr> <td data-bbox="347 582 858 651">Produces genetically identical cells</td> <td data-bbox="858 582 978 651">✓</td> <td data-bbox="978 582 1098 651"></td> </tr> </tbody> </table> <p data-bbox="336 685 655 801">All 3 correct = 2 marks 2 correct = 1 mark 0 or 1 correct = 0 marks</p>	Feature	Mitosis only	Meiosis only	Produces new cells during growth and repair	✓		Produces gametes (sex cells)		✓	Produces genetically identical cells	✓			2
Feature	Mitosis only	Meiosis only													
Produces new cells during growth and repair	✓														
Produces gametes (sex cells)		✓													
Produces genetically identical cells	✓														
3(a)(ii)	(a man) testis / testes (a woman) ovary / ovaries	accept testicle(s) do not accept 'ova' / ovule	1 1												
3(b)(i)	XY / YX or X and Y		1												
3(b)(ii)	XX or X and X or 2 X's	accept X	1												
3(c)	$\frac{1}{2}$ / 0.5 / 50% / 1:1 / 1 in 2	do not accept 1:2 / 50/50 allow 50:50 allow 2 in 4	1												
Total			7												

Question 4

question	answers	extra information	mark
4(a)	protein		1
4(b)(i)	(more) magnesium gives more growth / more leaves / more duckweed	if converse must be clear that less magnesium gives less growth	1
4(b)(ii)	A gave highest number of leaves / plants or more than others or A gave most growth / most duckweed or more than others	it equals 'A' use of numbers must compare A with at least one other allow faster / fastest / better / best growth allow more growth with nitrate / less growth without nitrate do not allow 'no' growth without nitrate	1
4(c)(i)	mark (c) as a whole sensible method: e.g. mass / weighing	ignore dry or fresh allow other sensible method involving measuring eg length of roots – ignore 'size' of roots or measure roots unqualified	1
4(c)(ii)	corresponding explanation: e.g. includes roots / includes <u>whole</u> plant or leaves vary in size or (length / mass / surface area given in c(i)) is a continuous variable	ignore accuracy	1
Total			5

Question 5

question	answers	extra information	mark
5(a)(i)	1		1
5(a)(ii)	fertilisation / fusion	allow <u>sexual</u> reproduction allow fertilise / fuse ignore joining	1
5(b)(i)	Dd		1
5(b)(ii)	dd		1
5(c)(i)	1 in 2		1
5(c)(ii)	0		1
Total			6

Question 6

question	answers	extra information	mark
6(a)	LHS – glucose		1
	RHS – water	allow H ₂ O / H2O	1
6(b)	so the earthworms' body temperature would change to 20°C		1
6(c)(i)	56 or 55 or 54	if incorrect answer given accept 60 - 5 for 1 mark or 60 – 6 for 1 mark or 60 – 4 for 1 mark	2
6(c)(ii)	one-tenth of answer to (c)(i) eg 5.5		1
6(c)(iii)	(at 10 °C / lower temperature): lower rate of respiration	allow chemical reactions slower or enzymes less active ignore breathing do not allow anaerobic	1
	worms less active / worms release less energy / worms use less energy		1
6(d)(i)	anomalous result / not in line with other data / does not fit the pattern		1
6(d)(ii)	more representative / more reliable / can check 'repeatability' / see if get similar values / identify anomalies	ignore valid / more fair ignore reproducible ignore 'to remove' anomalies do not accept more accurate or more precise	1
Total			10

Question 7

question	answers	extra information	mark
7(a)	xylem and phloem	either order allow words ringed in box allow mis-spelling if unambiguous	1
7(b)(i)	movement / spreading out of particles / molecules / ions / atoms	ignore names of substances / 'gases'	1
	from high to low concentration	accept down concentration gradient ignore 'along' / 'across' gradient ignore 'with' gradient	1
7(b)(ii)	oxygen / water (vapour)	allow O ₂ /O ₂ ignore O ² /O allow H ₂ O/H ₂ O ignore H ² O	1
Total			4

Question 8

question	answers	extra information	mark
8(a)	chose places <u>randomly</u> method of obtaining randomness, e.g. (grid and) random numbers	allow thrown qualified e.g. over shoulder, eyes shut allow max 1 for mention of a transect with sampling at regular or random intervals	1 1
8(b)(i)	7 or 8	allow fractions / decimals between 7 and 8	1
8(b)(ii)	count number of whole squares and add estimate of area covered by part squares	allow reference to counting squares with $\frac{1}{2}$ cover or more allow clear working on diagram and / or (b)(i)	1
8(b)(iii)	28 – 32 (in range)	allow ecf if answer incorrect allow 1 mark for reasonable reference to divided by 25 or multiplied by 4	2
8(c)	nutrients / minerals / ions / fertiliser / water	allow light / pH / trampling / soil texture / grazing / mowing / weed killer / where seeds originally fell ignore pollution / soil / competition if unqualified ignore temperature / wind	1
Total			7

Question 9

question	answers	extra information	mark
9(a)(i)	8.6	accept value in range 8.5 to 8.7	1
9(a)(ii)	hydrochloric acid / HCl	accept HCL accept hydrogen chloride ignore hcl / etc.	1
9(a)(iii)	X		1

Question 9 continues on the next page . . .

Question 9 continued . . .

9(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 5.			6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)	
No relevant content.	There is a simple description of part of a process or a reference to at least one of: mechanical digestion, lipase, product of enzyme action, bile, site of production or site of digestion	There is a description of at least one process <u>linking</u> ideas.	There is a clear description of the process including reference to the majority of: mechanical digestion, lipase, bile, where they are produced, products, function of bile and site of digestion / absorption	
<p>examples of biological points made in the response:</p> <ul style="list-style-type: none"> • mechanical breakdown in mouth / stomach • fats →fatty acids and / or glycerol • by lipase • (produced by) pancreas • and small intestine • fat digestion occurs in small intestine • bile • produced by liver • neutralises acid from stomach • produces alkaline conditions in intestine • refs. to increased surface area related to emulsification or chewing • products are small molecules / water-soluble • products absorbed by small intestine 				
Total				9

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