

GCSE ADDITIONAL SCIENCE / BIOLOGY

BL2FP
Mark scheme

4405 / 4401
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Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer 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 associates 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 associate understands and applies it in the same correct way. As preparation for standardisation each associate 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, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

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.

Further copies of this Mark Scheme are available from aqa.org.uk

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 8 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.

Question	Answers	Extra information	Mark	AO / spec ref.
1(a)(i)	A = (cell) membrane B = cytoplasm	do not accept cytoplasm	1 1	AO1 2.1.1a
1(a)(ii)	To control the activities of the cell		1	AO1 2.1.1a
1(b)	<pre> graph LR A[Layer of cells lining the stomach] --- B[An organ] A --- C[A tissue] D[Stomach] --- E[An organ] F[Mouth, stomach, intestines, liver and pancreas] --- G[An organ system] </pre>	<p style="text-align: right;">extra lines cancel</p>	3	AO1 2.2.1b, c,d
Total			6	

Question	Answers	Extra information	Mark	AO / spec ref.
2(a)	any three from: <ul style="list-style-type: none"> • place 30-m tape measure across field / from one wood to the other • place quadrat(s) next to the tape • count / record the number / amount of dandelions / plants in the quadrat • repeat every 2 metres 	ignore 'record the results' ignore measures / estimates dandelions allow every metre / at regular intervals	3	AO2 2.4.1b
2(b)(i)	low light / it is shady or not enough water / ions / nutrients or wrong pH of soil	allow no light ignore sun / rays accept correct named ion ignore no water / ions / nutrients accept competition with trees for light / water / ions ignore competition for space and competition unqualified accept soil too acidic / too alkaline ignore temperature	1	AO2 2.4.1a
2(b)(ii)	sensible suggestion for a small area, eg chance variation / anomaly / poisoned by animal waste / wrong pH of soil / eaten (by animals) / cut down / footpath		1	AO3 2.4.1a
2(c)	repeat (transect) / compare with the results of other groups at different / random location(s) / elsewhere (across the field)	allow 'do it in two different locations' for 2 marks do not allow 'in other fields'	1 1	AO3 2.4, 2.4.1b
Total			7	

Question	Answers	Extra information	Mark	AO / spec ref.
3(a)(i)	a catalyst		1	AO1 2.5.1b
3(a)(ii)	lower temperatures		1	AO1 2.5.2j
3(a)(iii)	sugar		1	AO1 2.5.2i
3(b)	The enzyme can easily be used again The fructose does not have any enzyme in it		1 1	AO2 2.5.2i
Total			5	

Question	Answers	Extra information	Mark	AO / spec ref.
4(a)	fossils show change over time.		1	AO1 2.8
4(b)	covered in sediment / mud or sinks into the mud soft parts decay / are eaten or bones / hard parts / shell do not decay minerals enter bones / parts are replaced by minerals / mineralisation	accept turns to rock allow 'is an impression' / 'imprint' / 'cast'	1 1 1	AO1 / AO2 2.8.1a, b
4(c)	skin is soft / skin not preserved / not fossilised / skin decays	accept not enough / no evidence / no-one has seen one allow 'this fossil is only bones'	1	AO3 2.8, 2.8.1c
4(d)	any two examples of: physical factors such as volcanic activity (allow volcanoes) / earthquakes / asteroid (collision) / ice age / temperature change and / or biological factors such as predators / disease / named pathogen / competition/ lack of food / mates / cyclical nature of speciation / isolation / lack of habitat or habitat change	accept 2 physical factors or 2 biological factors or one of each for full marks ignore pollution if no other answers given allow natural disaster / climate change / weather change / catastrophic event / environmental change for 1 mark	2	AO1 2.8.1e
Total			7	

Question	Answers	Extra information	Mark	AO / spec ref.
5(a)(i)	fertilisation		1	AO1 2.7.1i
5(a)(ii)	in sequence: 1 gene 2 chromosome 3 nucleus	accept 1 next to gene, 2 next to chromosome and 3 next to nucleus in box allow 1 mark for smallest or largest in correct position	2	AO2 2.1.1a, 2.7.1b,e, 2.7.2f,g
5(a)(iii)	DNA		1	AO1 2.7.2f
5(b)(i)	On diagram: tick drawn next to X and / or Y from Parent 1	tick(s) must be totally outside grid squares allow ticks around “parent 1” extra ticks elsewhere cancel	1	AO1 2.7, 2.7.2a,b
5(b)(ii)	0.5 / ½ / 50% / 1:1 / 50:50 / 1 in 2 2 (out of 4) boxes are XX or half of the sperm contain an X -chromosome	allow 2/4 / 2 in 4 / 2 out of 4 / ‘even(s)’ / ‘fifty – fifty’ do not allow 1:2 or ‘50 / 50’ or ‘50 – 50’	1	AO2 2.7, 2.7.2a,b
		allow XY is male and 2 (out of 4) boxes are XY	1	
Total			7	

Question	Answers	Extra information	Mark	AO / spec ref.
6(a)	chlorophyll is needed for photosynthesis		1	AO3 2.3.1b, e
	light is needed for photosynthesis		1	
6(b)	increases		1	AO2 2.3.1c, d
	levels off / reaches a maximum / remains constant / stays the same / plateaus	do not allow stops / stationary / peaks allow stops increasing	1	
	goes up to / reaches a maximum / levels off at (a rate of) 200 (arbitrary units) or levels off at 225 – 240 (light units)	ignore references to other numerical values	1	
6(c)(i)	higher light intensity does not increase rate of photosynthesis	accept the graph stays level (above this value) allow stops increasing allow the rate of photosynthesis stay the same (above this value)	1	AO3 2.3.1c, d
6(c)(ii)	any two from: <ul style="list-style-type: none"> • carbon dioxide (concentration) • temperature / heat • (amount of) chlorophyll / chloroplasts 	allow water allow ions / nutrients ignore ref to surface area of the leaf	2	AO1 2.3.1c, d
Total			8	

Question	Answers	Extra information	Mark	AO / spec ref.
7(a)(i)	amino acid(s)	accept peptide(s) do not allow polypeptide(s)	1	AO1 2.5.2e
7(a)(ii)	protease		1	AO1 2.5.2e
7(b)(i)	2		1	AO3 2.5.2b, g
7(b)(ii)	repeat using smaller pH intervals between pH1 and pH3	do not allow other enzyme / substrate allow smaller intervals on both sides of / around pH2 allow smaller intervals on both sides of / around answer to (b)(i)	1 1	AO3 2.5.2b
7(b)(iii)	<u>enzyme / pepsin</u> denatured / shape changed <u>enzyme / pepsin</u> no longer fits (substrate)	do not allow enzyme killed allow enzyme 'destroyed' allow enzyme / pepsin does not work	1 1	AO1 / AO2 2.5.2a, b
7(c)	hydrochloric (acid)	allow phonetic spelling accept HCl allow HCL ignore hcl do not allow incorrect formula – e.g. H ₂ Cl / HCl ₂	1	AO1 2.5.2g
Total			8	

Question	Answers	Extra information	Mark	AO / spec ref.
8			6	AO1 2.1.2a,b, c, 2.2.1d, 2.3.1a,b, c,g, 2.6.1
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.				
0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)	
No relevant content.	An example is given of a named substance or a process or there is an idea of why diffusion is important eg definition.	At least one example of a substance is given and correctly linked to a process in either animals or plants.	There is a description of a process occurring in either animals or plants that is correctly linked to a substance and a process occurring in the other type of organism that is correctly linked to a substance.	
<p>examples of points made in the response</p> <p>Importance of diffusion:</p> <ul style="list-style-type: none"> to take in substances for use in cell processes products from cell processes removed <p>Examples of processes and substances:</p> <ul style="list-style-type: none"> for gas exchange / respiration: O₂ in / CO₂ out for gas exchange / photosynthesis: CO₂ in / O₂ out food molecules absorbed: glucose, amino acids, etc water absorption in the large intestine water lost from leaves / transpiration water absorption by roots mineral ions absorbed by roots 		<p>extra information</p> <p>Description of processes might include:</p> <ul style="list-style-type: none"> movement of particles / molecules / ions through a partially permeable membrane (movement of substance) down a concentration gradient <p>osmosis: turgor / support / stomatal movements</p>		
Total			6	

Question	Answers	Extra information	Mark	AO / spec ref.
9(a)	<u>anaerobic respiration</u>	allow phonetic spelling	1	AO1 2.6.2a, b,d
9(b)(i)	4.4	4.2, 4.3, 4.5 or 4.6 with figures in tolerance (6.7 to 6.9 and 2.3 to 2.5) and correct working gains 2 marks 4.2, 4.3, 4.5 or 4.6 with no working shown or correct working with one reading out of tolerance gains 1 mark correct readings from graph in the ranges of 6.7 to 6.9 and 2.3 to 2.5 but no answer / wrong answer gains 1 mark	2	AO2 2.6.2a, b,d
9(b)(ii)	more energy is needed / used / released (at 14 km per hour) not enough oxygen (can be taken in / can be supplied to muscles) so more <u>anaerobic</u> respiration (to supply the extra energy) or more glucose changed to lactic acid	do not allow energy production ignore work allow reference to oxygen debt do not allow less / no oxygen allow not enough aerobic respiration	1 1 1	AO1 / AO2 2.6.2a, b,d
Total			6	