



GCSE

Biology

BL3HP
Final Mark Scheme

4401
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Version/Stage: v1.0

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 Assessment Objectives and specification content that each question is intended to cover.

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 and underlining

- 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.
- 2.4** Any wording that is underlined is essential for the marking point to be awarded.

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	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, 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 is 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 'ecf' 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 Accept / allow

Accept is used to indicate an equivalent answer to that given on the left-hand side of the mark scheme. Allow is used to denote lower-level responses that just gain credit.

3.9 Ignore / Insufficient / Do not allow

Ignore or insufficient are 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.

4. Quality of Written Communication and levels marking

In Question 3 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)	less CO ₂ absorbed / taken in (by trees from the atmosphere)	allow release / increase of CO ₂ from burning / use of (heavy) machinery ignore less photosynthesis unqualified	1	AO1 3.4.2a
1(b)(i)	0.8		1	AO2 3.4.2
1(b)(ii)	anywhere in range: 3(.0) – 3.4		1	AO2 3.4.2
1(c)	microorganisms respire and release CO ₂	allow bacteria / fungi / decomposers allow anaerobic decay / respiration releases methane	1 1	AO1 3.4.2a
Total			5	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
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2(a)(i)	<u>left</u> ventricle		1	AO1 3.2.1c
2(a)(ii)	aorta	ignore artery allow aortic (artery)	1	AO1 3.2.1d
2(a)(iii)	(to keep) blood flowing in the right / one direction or prevent backflow (of blood)	ignore ref to veins	1	AO1 3.2.1e

<p>2(b)</p>	<p>Reasons for:</p> <ul style="list-style-type: none"> • less likely to die (44% cf. 59%) • lower risk of death from having a second operation • lower risk of heart infections • less chance of the valve stopping working • longer lasting • doesn't cause rejection • avoids religious issues of using organs from a pig or no ethical issue from using part of a living organism <p>Reasons against:</p> <ul style="list-style-type: none"> • chance of death by bleeding is increased • offers no advantage against clots or equal risk of blood clots • have to take anti-clotting drugs for life • can be noisy 	<p>max 3 marks if only reasons for or reasons against given</p> <p>allow converse for each point if clearly referring to the pig tissue valve</p> <p>ignore cost</p> <p>allow doesn't stop working</p> <p>allow been used for a longer period of time</p> <p>ignore religion or ethical unqualified</p>	<p>4</p>	<p>AO3 3.2</p>
<p>2(c)</p>	<p>(inserted to) keep the (coronary) artery / arteries open</p> <p>allows more blood to flow (to the heart muscle) or return blood flow to normal</p>	<p>do not allow veins</p> <p>allow (more) glucose / oxygen to reach the heart (muscle)</p>	<p>1</p> <p>1</p>	<p>AO1 3.2.1f</p>
<p>Total</p>			<p>9</p>	

Question	Answers	Extra information	Mark	AO / Spec.	
3			6	AO1	
<p>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.</p>				3.3.1a/c 3.1.2b	
0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)		
No relevant content	The name (N) of a waste product is given or a process (P) that makes a waste product or an organ (O) involved	The name of a waste product is given which is linked to either the process that it is made in or the organ involved	The names of waste products are given of which at least one is correctly linked to the process it is made in and the organ(s) involved		
<p>examples of the points made in the response</p> <ul style="list-style-type: none"> • (N) urea • (P) from the breakdown of amino acids • (O) (amino acids broken down) in the liver • (O) removed by kidneys • (O) bladder removes <u>urine</u> (from the body) • (N) CO₂ • (P) from respiration • (O) in a named organ or in cells • (O) breathed out from lungs • (N) water • (P) from respiration • (O) in a named organ or in cells • (O) breathed out from lungs • (O) through skin (by sweating) • (O) by kidneys • (O) bladder removes <u>urine</u> (from the body) 		<p>extra information ignore faeces</p> <p>'Give credit for any extra correct knowledge – eg toxins are broken down in the liver and the products removed in kidneys/urine.'</p> <ul style="list-style-type: none"> • (N) ions • (P) from eating and drinking • (O) skin (through sweating) • (O) by kidneys • (O) bladder removes <u>urine</u> (from the body) 			
Total			6		

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	Causes acid rain		1	AO1 3.4.1b
4(b)(i)	66(%) or 65.7(%)	allow 1 mark for 920 or ecf from first line	2	AO2 3.4.1b
4(b)(ii)	it rises and then falls maximum level in 2005 or maximum reached at 400 (thousand tonnes)		1 1	AO2 3.4.1b
Total			5	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	<u>xylem</u> transports mineral (ions)	allow <u>xylem</u> transports water	1	AO1 3.2.3a
	<u>phloem</u> transports sugars	allow <u>phloem</u> transports sucrose / glucose / carbohydrate ignore minerals / ions transported in phloem if no other marks given allow one mark for xylem and phloem	1	
5(b)(i)	lost the most water or lost water faster than the others	allow mass decreased the most	1	AO3 3.1.3d
	(it) has the greatest number of stomata (per mm ²)		1	
	(and) water is lost through the stomata		1	
5(b)(ii)	(transpiration rate would be) lower	at least one comparative must be given	1	AO2/3 3.1.3d
	(because) slow(er) evaporation / diffusion (into the air) or (because) concentration gradient will be less	allow 'lower rate of evaporation' for these 2 marks	1	
	(due to) high(er) humidity	allow air becomes saturated	1	
Total			8	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	sugar / glucose / carbohydrate	allow correctly named sugars	1	AO1 3.1.1d/e
6(b)(i)	3:1	do not allow 1:3 ignore 112:38 / 56:19 allow 2.95:1 allow 2.9:1	1	AO2 3.1.1e
6(b)(ii)	concentration is (slightly) lower than the blood or concentration is 20 units less (than blood) the ratio of sodium (ions) to potassium (ions) is close to 2:1	 allow has high levels of sugar / substance X to keep blood sugar levels stable or for (more) energy	1 1	AO3 3.1.1e
6(b)(iii)	cells shrivel / shrink (because) cells lose water due to osmosis (of water) or diffusion (of water)	ignore reference to flaccid / plasmolysed allow crenated allow because there is a higher concentration <u>of water</u> in cells (compared to the sports drink)	1 1 1	AO2/3 3.1.1b
Total			7	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	(detected by) <u>thermoregulatory</u> centre	allow thermoregulatory part of brain allow detected by receptors in the brain	1	AO1 3.3.2b
7(b)	muscles <u>contract</u> (rapidly) this requires <u>respiration</u> (which) releases energy	do not allow making energy allow making / releasing 'heat' ignore warms you up	1 1 1	AO1 3.3.2e
7(c)	blood vessels supplying the skin constrict (so) less blood flows to the skin / surface (of skin) (and) less energy is transferred (to the environment)	'skin' must be mentioned once for full marks allow vasoconstriction do not allow capillaries / veins constrict do not allow capillaries moving allow less heat is lost (to the environment) if no other marks awarded allow reduce sweating for 1 mark	1 1 1	AO1 3.3.2e
Total			7	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
<p>8(a)</p>	<p>any two from:</p> <ul style="list-style-type: none"> • (shorter villi gives) a smaller surface area • (thicker cells give) a longer diffusion path • (capillaries are further from the lining) giving a longer diffusion path • fewer capillaries or less blood flow <p>and</p> <p>(therefore) lower rate of diffusion / active transport / absorption</p> <p>(so) less glucose / vitamins / minerals are absorbed</p> <p>(and) fat (stores) are broken down (to release glucose for energy so lose weight)</p>	<p>allow converse if clearly explaining about healthy person</p> <p>if no marks awarded in this section allow one mark for two unqualified features eg there are shorter villi and thicker cells or capillaries are further from the lining</p> <p>'longer diffusion pathway' unqualified only gains 1 mark</p> <p>allow correct named example</p>	<p>2</p> <p>1</p> <p>1</p> <p>1</p>	<p>AO2/3 3.1.1a/h/k/l</p>
<p>8(b)</p>	<p>against the concentration gradient</p> <p>requires energy</p>	<p>allow from a low concentration to a high concentration or up the concentration gradient</p> <p>do not allow along the concentration gradient</p> <p>allow using ATP</p> <p>do not allow making energy</p> <p>allow correct use of terms carrier or transport proteins</p>	<p>1</p> <p>1</p>	<p>AO1 3.1.1g</p>
<p>Total</p>			<p>7</p>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	pancreas releases <u>insulin</u> glucose moves into the cells or pancreas stops releasing glucagon glycogen stops being converted to glucose	do not allow liver releasing / producing insulin allow glucose is converted to glycogen	1 1	AO1 3.3.3a
9(b)	(exercise) uses up <u>glucose</u> idea of no <u>glucose</u> released into the blood(stream) (because) no available glycogen or glycogen cannot be broken down or no glycogen stored (and) <u>blood</u> sugar levels fall too low or (and) blood sugar levels remain low	allow glucagon has no effect (on faulty glycogen) or glucagon doesn't break down glycogen ignore glycogen does not form properly	1 1 1	AO2 3.3.3b
Total		6		