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# GCSE

# Science A / Biology

BL1FP

Mark scheme

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4405 / 4401

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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](http://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	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 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 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 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.

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## Quality of Written Communication and levels marking

In Question 9(b) 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)	stimulus		1	AO1 1.2.1b
1(a)(ii)	cytoplasm		1	AO1 1.2.1c
1(b)(i)	ear(s) eye(s) skin	in this order only  accept retina  ignore extra detail	1 1 1	AO2 1.2.1b
1(b)(ii)	A muscle		1	AO2 1.2.1e
<b>Total</b>			<b>6</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	64		1	AO2 1.1
2(a)(ii)	36	allow e.c.f from (a)(i) i.e. 100 – answer given in (a)(i)	1	AO2 1.1
2(a)(iii)	any <b>one</b> from: <ul style="list-style-type: none"> <li>only considers 16-year-olds</li> <li>only about some / 5 countries</li> </ul>	ignore lack of evidence allow does not refer to all ages allow does not refer to all countries	1	AO3 1.1
2(b)	the more exercise done the healthier a person is	allow the more exercise done the higher the health rating allow the less exercise done the lower the health rating	1	AO3 1.1.1e
2(c)	having a high cholesterol level		1	AO1 1.1.1d
2(d)(i)	antibodies		1	AO1 1.1.2c/d/e
2(d)(ii)	antibiotics		1	AO1 1.1.2i
<b>Total</b>			<b>7</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
<b>3(a)</b>	A (inoculating / wire) loop		1	AO1
	B Petri dish	allow (agar) plate ignore ref to culture medium	1	1.1.2m
<b>3(b)(i)</b>	to kill (unwanted) bacteria / microorganisms / microbes	allow fungi ignore viruses / germs	1	AO1 1.1.2m
<b>3(b)(ii)</b>	Using a flame		1	AO1 1.1.2m
<b>3(b)(iii)</b>	any <b>one</b> from:	ignore reference to gases ignore viruses / germs	1	AO1 1.1.2m
	<ul style="list-style-type: none"> <li>so bacteria / microorganisms / microbes / pathogens / fungi (growing in dish) do not get out</li> <li>so bacteria / microorganisms / microbes / pathogens / fungi (from the air) do not get in</li> </ul>	ignore viruses / germs		
<b>3(c)</b>	25 °C		1	AO1 1.1.2 n
<b>Total</b>			<b>6</b>	



Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	Taking cuttings from plants		1	AO1 1.7.2a/b
4(b)(i)	Adult cell cloning		1	AO2 1.7.2c
4(b)(ii)	an egg cell		1	AO2 1.7.2c
4(b)(iii)	nucleus		1	AO1 1.7.2c
4(b)(iv)	an electric shock		1	AO1 1.7.2c
4(b)(v)	uterus / womb	accept phonetic spelling	1	AO1 1.7.2c
4(c)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• unethical / immoral</li> <li>• cloned child would have to give up a kidney</li> <li>• possible operation complications</li> </ul>	allow 'rights' of the cloned child allow against religious teachings  allow illegal allow parents may not want another child allow a long time to wait (for the kidney)	2	AO3 1.7
<b>Total</b>			<b>8</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
<b>5(a)</b>	any <b>two</b> from: <ul style="list-style-type: none"> <li>amount of waste on each heap</li> <li>(type of) materials on each heap</li> <li>put heaps in same (environmental) conditions</li> </ul>	allow size of heap  if neither marking points one or two awarded, allow <b>1</b> mark for same waste  eg keep at same (outside) temperature allow put in same place	2	AO3 1.6.1
<b>5(b)</b>	microorganisms / microbes / bacteria / fungi / decomposers	ignore detritivores / examples (such as worms, maggots, insects)  ignore pathogens / germs  do <b>not</b> allow viruses	1	AO1 1.6.1b
<b>5(c)(i)</b>	oxygen / air added (when turning over)	allow idea that decay will be aerobic  allow bacteria / microorganisms need oxygen / air  allow (microorganisms) respire faster	1	AO2 1.6.1b
<b>5(c)(ii)</b>	any <b>two</b> from: <ul style="list-style-type: none"> <li>dead leaves / fruit / plants (fall off / onto the ground)</li> <li>(fallen dead leaves / fruit / plants) decay</li> <li>minerals / ions / nutrients are recycled / released</li> </ul>	ignore references to carbon dioxide  allow animal waste <b>or</b> dead animals	2	AO2 / AO3 1.6.1d
<b>Total</b>			<b>6</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	an extremophile species		1	AO1 1.4.1e
6(b)(i)	smaller ice area	allow smaller amount of ice	1	AO2 1.4.2a/b
	(so) less habitat	allow less ice allow fewer places to live / nest	1	
6(b)(ii)	<p><b>either</b> increase</p> <p>as more sea to live in</p> <p><b>or</b></p> <p>as less competition for food</p> <p><b>or</b> decrease</p> <p>as less space (ice) to lay eggs</p> <p><b>or</b></p> <p>predators more likely to eat them</p>	<p>there is no mark for increase / decrease alone. The mark is for an appropriate reason linked to increase / decrease</p> <p>if increase / decrease not ringed the mark may be awarded if it is clear in the explanation which is intended</p>	1	AO3 1.4.2a/b
6(c)	Living organisms show long-term changes.		1	AO3 1.4.2d
<b>Total</b>			<b>5</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	selection		1	AO1 1.8.1a
7(b)(i)	4		1	AO2 1.8
7(b)(ii)	ground finch / lives on the ground (only) eats seeds	allow eg eats seeds on / from the ground for 2 marks	1 1	AO2 1.8
7(c)	Lamarck		1	AO1 1.8.1c
<b>Total</b>			<b>5</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	leprosy	allow bone / blood cancer ignore cancer	1	AO1 1.3.1d
8(b)(i)	6 / six		1	AO2 1.3.1a
8(b)(ii)	from 1120 to 5600	allow from 5600 to 1120 allow 4480 (alone)	1	AO2 1.3.1a
8(c)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• (test for) toxicity</li> <li>• (test for) dosage</li> <li>• (test for) efficacy</li> </ul>	ignore side effects, eg allergies ignore safety / harm unqualified  allow poisonous  allow idea of amount  allow to see if it works  allow to check for interaction with other drugs	1	AO1 1.3.1b
8(d)(i)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• more people take / use legal / non-prescribed drugs</li> <li>• legal / non-prescribed drugs are (more) readily available</li> <li>• alcohol causes liver/brain damage</li> </ul> <b>or</b> tobacco causes cancer	ignore reference to cost / addiction      allow harmful effects of other named legal non-prescribed drugs	2	AO1 / AO3 1.3.1g
8(d)(ii)	addiction / dependency	allow withdrawal or examples of symptoms of withdrawal (if attempting to stop)	1	AO1 1.3.1h
<b>Total</b>			<b>7</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)(i)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• (same) (type of) weed killer</li> <li>• (same) volume / 5dm<sup>3</sup> of solution used (on each area)</li> <li>• effect on daisies (not other weeds / plants)</li> <li>• (same) area / 10m<sup>2</sup></li> <li>• (same) time <b>or</b> (effect after) two weeks</li> </ul>	ignore references to same lawn / weather / soil, which are not given in the question.  allow amount of solution used  do <b>not</b> allow amount / volume / concentration of weed killer do <b>not</b> allow number of daisy plants	1	AO2 1.2.3d
9(a)(ii)	more (daisies) growing after use of weed killer <b>or</b> after two weeks	allow it does not fit pattern (of other results)	1	AO3 1.2.3d
9(a)(iii)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• as a control</li> <li>• to compare (to the other areas)</li> <li>• to check other factor(s) are not affecting the results / daisies</li> </ul>	ignore to see if it / water has an effect  do <b>not</b> allow as a control variable	1	AO2 1.2.3d
9(a)(iv)	80 (arbitrary units of weed killer) also killed all the daisies	allow ref to possible experimental design flaws such as 'only tested once' or 'not repeated' or 'different number of daisies in each area at first'  allow idea that other weed species may not respond in the same way as daisies  allow idea that 100 (units) may also kill wanted species / grass	1	AO3 1.2.3d

Question	Answers	Extra information	Mark	AO / Spec. Ref
9(b)			6	AO1 1.2.3a/b/c
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.				
<b>0 marks</b>	<b>Level 1 (1–2 marks)</b>	<b>Level 2 (3–4 marks)</b>	<b>Level 3 (5–6 marks)</b>	
No relevant content.	Reference to at least one environmental factor plants respond to <b>or</b> at least one response <b>or</b> a named hormone	Reference to at least one environmental factor plants respond to <b>and</b> at least one associated response <b>or</b> reference to a named hormone <b>and</b> at least one associated response	Reference to at least one environmental factor plants respond to <b>and</b> at least one associated response <b>and</b> reference to a named hormone	
<b>examples of biology points made in the response:</b> <i>environmental factors</i> <ul style="list-style-type: none"> <li>light</li> <li>(direction of the force of) gravity</li> <li>moisture / water</li> </ul> <i>effects on direction of growth</i> <ul style="list-style-type: none"> <li>shoots grow upwards</li> <li>shoots grow towards light</li> <li>shoots grow against (the force of) gravity</li> <li>roots grow downwards</li> <li>roots grow towards moisture</li> <li>roots grow towards (the force of) gravity</li> </ul> <i>hormone</i> <ul style="list-style-type: none"> <li>reference to auxin</li> <li>unequal distribution of hormone causes unequal growth (rates)</li> </ul>		<b>extra information</b>  allow phototropism allow gravi/geotropism allow hydrotropism  allow reference to 'positive' and 'negative' in terms of tropisms as indicating direction of growth  allow other named hormone(s) allow higher concentration of hormone causes faster growth in shoots allow higher concentration of hormone causes slower growth in roots		
<b>Total</b>			<b>10</b>	