



GCSE

Science A / Biology

BL1FP

Mark scheme

4405 / 4401

June 2015

Version/Stage: 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 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.

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 | 1 | AO2 1.2.1b |
| | | accept retina | 1 | |
| | | ignore extra detail | 1 | |
| 1(b)(ii) | A muscle | | 1 | AO2 1.2.1e |
| Total | | | 6 | |

| 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 one from: <ul style="list-style-type: none"> only considers 16-year-olds only about some / 5 countries | 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 |
| Total | | | 7 | |

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

| 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 two from: <ul style="list-style-type: none"> • unethical / immoral • cloned child would have to give up a kidney • possible operation complications | 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 |
| Total | | | 8 | |

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

| 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>either increase</p> <p>as more sea to live in</p> <p>or</p> <p>as less competition for food</p> <p>or decrease</p> <p>as less space (ice) to lay eggs</p> <p>or</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 |
| Total | | | 5 | |

| 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 |
| Total | | | 5 | |

| 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 one from: <ul style="list-style-type: none"> • (test for) toxicity • (test for) dosage • (test for) efficacy | 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 two from: <ul style="list-style-type: none"> • more people take / use legal / non-prescribed drugs • legal / non-prescribed drugs are (more) readily available • alcohol causes liver/brain damage or 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 |
| Total | | | 7 | |

| Question | Answers | Extra information | Mark | AO / Spec. Ref. |
|-----------|--|---|------|-----------------|
| 9(a)(i) | <p>any one from:</p> <ul style="list-style-type: none"> • (same) (type of) weed killer • (same) volume / 5dm³ of solution used (on each area) • effect on daisies (not other weeds / plants) • (same) area / 10m² • (same) time or (effect after) two weeks | <p>ignore references to same lawn / weather / soil, which are not given in the question.</p> <p>allow amount of solution used</p> <p>do not allow amount / volume / concentration of weed killer</p> <p>do not allow number of daisy plants</p> | 1 | AO2 1.2.3d |
| 9(a)(ii) | more (daisies) growing after use of weed killer or after two weeks | allow it does not fit pattern (of other results) | 1 | AO3 1.2.3d |
| 9(a)(iii) | <p>any one from:</p> <ul style="list-style-type: none"> • as a control • to compare (to the other areas) • to check other factor(s) are not affecting the results / daisies | <p>ignore to see if it / water has an effect</p> <p>do not allow as a control variable</p> | 1 | AO2 1.2.3d |
| 9(a)(iv) | 80 (arbitrary units of weed killer) also killed all the daisies | <p>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'</p> <p>allow idea that other weed species may not respond in the same way as daisies</p> <p>allow idea that 100 (units) may also kill wanted species / grass</p> | 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. | | | | | |
| 0 marks | Level 1 (1–2 marks) | Level 2 (3–4 marks) | Level 3 (5–6 marks) | | |
| No relevant content. | Reference to at least one environmental factor plants respond to or at least one response or a named hormone | Reference to at least one environmental factor plants respond to and at least one associated response or reference to a named hormone and at least one associated response | Reference to at least one environmental factor plants respond to and at least one associated response and reference to a named hormone | | |
| examples of biology points made in the response: <i>environmental factors</i> <ul style="list-style-type: none"> • light • (direction of the force of) gravity • moisture / water <i>effects on direction of growth</i> <ul style="list-style-type: none"> • shoots grow upwards • shoots grow towards light • shoots grow against (the force of) gravity • roots grow downwards • roots grow towards moisture • roots grow towards (the force of) gravity <i>hormone</i> <ul style="list-style-type: none"> • reference to auxin • unequal distribution of hormone causes unequal growth (rates) | | extra information 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 | | | |
| Total | | | 10 | | |