
GCSE

FURTHER ADDITIONAL SCIENCE

FAS3FP

Mark scheme

4410

June 2014

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 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

- 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 / ; e.g. 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(a) 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 | Answers | Extra information | Mark | AO spec ref |
|--------------|----------------------|--|----------|---------------|
| 1(a) | transmits | correct order | 1 | AO1 |
| | absorbs | | 1 | 3.1.1b |
| 1(b) | light | allow ultra violet or UV or infrared or IR or gamma | 1 | AO1 3.1.1b |
| 1(c) | 20 | allow 1 mark for correct working, ie $\frac{60}{3}$ provided no subsequent step | 2 | AO2 3.1.1b |
| 1(d) | Killing cancer cells | | 1 | AO1 3.1.1b |
| Total | | | 6 | |

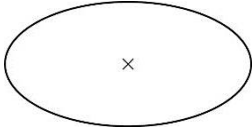
| Question | Answers | Extra information | Mark | AO Spec ref |
|--------------|---------------|--|----------|----------------------|
| 2(a) | turning | allow rotating | 1 | AO1 3.2.2 |
| 2(b) | 64 | allow 1 mark for correct substitution, ie 160×0.4 provided no subsequent step shown | 2 | AO1 AO2 3.2.2b |
| | newton metres | accept Nm | 1 | |
| 2(c) | decreases | allow gets smaller | 1 | AO3 4.5.3 |
| Total | | | 5 | |

| Question | Answers | Extra information | Mark | AO spec ref | | |
|----------|--|---|------|------------------------|----------------|-----|
| 3(a) | | ignore shaded row each correct row = 1 mark | 3 | AO1 3.1.4a, d | | |
| | Cornea | | | | Digital Camera | Eye |
| | Lens | | | | ✓ | ✓ |
| | Pupil | | | | | ✓ |
| | CCD | | | | ✓ | |
| 3(b) | long | | 1 | AO1 3.1.4b | | |
| 3(c) | lens A it is a concave / diverging lens | this mark is only gained if lens A is stated any reference to lens material or mass of lens negates this mark allow it will focus light onto the retina | 1 | AO1 3.1, 3.1.4b | | |
| | | | 1 | | | |
| 3(d) | The refractive index of the lens material | | 1 | AO1 3.1.4f | | |
| 3(e) | 4 | ignore any signs allow 1 mark for correct substitution, ie $\frac{1}{0.25}$ provided no subsequent step | 2 | AO2 3.1.4e | | |

Question 3 continues on the next page . . .

Question 3 continued . . .

| Question | Answers | Extra information | Mark | AO spec ref |
|--------------|--------------------------------|---|-----------|---------------|
| 3(f) | Cauterising open blood vessels | | 1 | AO1 3.1.5f |
| 3(g) | 5 | allow 1 mark for correct substitution, ie $\frac{70}{14}$ provided no subsequent step | 2 | AO2 3.1.3i |
| Total | | | 12 | |

| Question | Answers | Extra information | Mark | AO spec ref |
|--------------|---|--|------------|----------------|
| 4(a) | concentrated | | 1 | AO1 3.2.1a |
| 4(b) |  | judge by eye | 1 | AO2 3.2.1c |
| 4(c) | C A D | 3 correct = 2 marks 1 or 2 correct = 1 mark | 2 | AO1 3.2.1a |
| 4(d) | Lower the athlete's seating position Move the wheels further apart | | 1 1 | AO2 3.2 |
| Total | | | 6 | |

| Question | Answers | Extra information | Mark | AO spec ref |
|--------------|------------------|---|----------|---------------|
| 5(a) | hydraulic | | 1 | AO1 3.2.3 |
| 5(b) | 9 | allow 1 mark for a correct substitution, ie. $\frac{1800}{200}$ provided no subsequent step | 2 | AO2 3.2.3c |
| 5(c) | an environmental | | 1 | AO3 SALoSE |
| Total | | | 4 | |

| Question | Answers | Extra information | Mark | AO spec ref |
|--------------|--|--|------------|-------------------------|
| 6(a)(i) | increase | | 1 | AO3 3.3.1a, 4.5.4 |
| 6(a)(ii) | A and B and B and C | both required for the mark either order | 1 | AO3 3.3.1a, 4.5.4 |
| 6(a)(iii) | any two from: <ul style="list-style-type: none"> size of nail or nail material current (size of) paper clip length of wire | allow (same) nail allow (same) cell allow p.d. same amount of electricity is insufficient accept type/thickness of wire | 2 | AO3 4.1b |
| 6(b) | 4 B picks up the same number as C, so this electromagnet would pick up the same number as A or direction of current does not affect the strength of the electromagnet | allow it has got the same number of turns as A | 1 1 | AO3 3.3.1a, 4.5.4 |
| 6(c) | 2 | allow 1 or 3 | 1 | AO3 3.3.1a, 4.5.4 |
| Total | | | 7 | |

| Question | Answers | Extra information | Mark | AO Spec ref |
|-----------|--|--|------|------------------|
| 7(a)(i) | 0.00004 | | 1 | AO2 3.1.2b |
| 7(a)(ii) | 0.03 (metres) | <p>allow for 3 marks a correct calculation based on their (incorrect) answer to (a)(i)</p> <p>an answer of 0.06 scores 2 marks</p> <p>allow 2 marks for $1500 \times$ their answer to (a)(i) calculated correctly</p> <p>allow 2 marks for the substitution: 1500×0.00002 or $1500 \times$ half their answer to (a)(i)</p> <p>allow 1 marks for the substitution: 1500×0.00004 or $1500 \times$ their answer to (a)(i)</p> | 3 | AO2 3.1.2b, c |
| 7(a)(iii) | trace with reflected peak at 2 divisions after emitted peak (ignore amplitude) | | 1 | AO2 3.1.2b, c |

Question 7 continues on the next page . . .

Question 7 continued . . .

| Question | Answers | Extra information | Mark | AO Spec ref |
|--------------|--|--|----------|----------------|
| 7(b) | advantage any one from: <ul style="list-style-type: none"> ultrasound is not ionising ultrasound does not mutate cells or cause mutations or increase chances of mutations ultrasound does not turn cells cancerous or produce abnormal growths or produce rapidly growing cells ultrasound does not kill cells accept shielding (for the operator) is not required | instead of cell, any of these words can be used: DNA / genes / tissues / chromosomes / nucleus damages cells is insufficient | 1 | AO1 3.1 |
| | disadvantage any one from: <ul style="list-style-type: none"> (images are) lower quality or less detailed or lower resolution an image cannot be made of <u>all</u> parts (inside the body) | allow less clear accept blurry allow ultrasound images cannot be made of brain / lungs | 1 | |
| Total | | | 7 | |

| Question | Answers | Extra information | Mark | AO spec ref |
|-----------------|---|---|----------|----------------------|
| 8(a) | gravitational attraction (between the satellite and the Earth) | allow gravity allow weight of the satellite | 1 | AO1 3.2.4b |
| 8(b) | any two from: <ul style="list-style-type: none"> mass of satellite speed / velocity (of satellite) radius of orbit / circle | allow height above the Earth radius / height alone is insufficient | 2 | AO1 3.2.4c |
| 8(c)(i) | increasing the height (above the Earth's surface) increases the time (for one orbit) | allow a positive correlation allow as one gets bigger, the other gets bigger, or vice versa ignore they are directly proportional | 1 | AO3 4.5.3 |
| 8(c)(ii) | there is no relationship / correlation | | 1 | AO3 4.5.3 |
| 8(d) | Isaac Newton was a respected scientist who had made new discoveries before | | 1 | AO3 3.2.4, SALoSE |
| Total | | | 6 | |

Question 9 continued . . .

| Question | Answers | Extra information | Mark | AO spec ref |
|-----------------|---------------------------|--------------------------|-------------|------------------------|
| 9(b) | switch mode (transformer) | | 1 | AO1 3.3.2j |
| Total | | | 7 | |