GCSE

Science B

SCB1FP

Mark scheme

4500

June 2016

Version 1.0: Final Mark Scheme

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 <u>not</u> 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 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

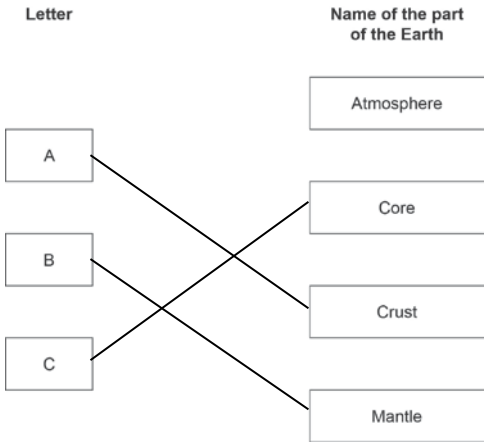
- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

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)		mark the letter more than one line **from** a letter cancels that mark	3	**AO1** 3.3.1.2,2
1(b)	the core		1	**AO1** 3.3.1.2.3
1(c)	atmosphere		1	**AO1** 3.3.1.2,3
Total			**5**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	Telescope		1	**AO1** 3.3.1.1.2
2(a)(ii)	The big bang		1	**AO1** 3.3.1.1.5
2(a)(iii)	The red shift		1	**AO1** 3.3.1.1.4
2(a)(iv)	Stars moving away from us		1	**AO1** 3.3.1.1.4
Total			**4**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)(i)	balanced		1	**AO1** 3.3.1.4.2
3(a)(ii)	chlorine		1	**AO1** 3.3.1.4
3(a)(iii)	three		1	**AO2** 3.3.1.4.2
3(b)	ions		1	**AO1** 3.3.1.3.3
Total			**4**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	The amount of dry air used for each leaf The amount of light on each leaf The temperature		1 1 1	**AO3** 3.3.2.1,5a
4(b)(i)	165		1	**AO2** 3.3.2.1,5a
4(b)(ii)	10(%)	15 ÷ 150 = 0.1 **or** 15 ÷ 150 = blank for 1 mark	2	**AO2** 3.3.2.1,5a
4(b)(iii)	because (leaf) A lost the greater amount of water **OR** (leaf) B lost the smaller amount of water	'it' is A unless otherwise defined. allow (water absorber) A absorbed the most water. do not allow 'leaf gains mass'	1	**AO3** 3.3.2.1,5a
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	cabbage		1	**AO2** 3.3.2.2,5
5(a)(ii)	any **one** from: • caterpillar • chicken • fox		1	**AO2** 3.3.2.2,5
5(a)(iii)	(the direction of) transfer/flow/movement of energy (the direction of) transfer/flow/movement of biomass	the 'idea of' in both cases answers in either order	1 1	**AO2** 3.3.2.2,5
5(b)	any **three** from: • respiration • faeces/excretion/urine/waste • heat • movement	ignore unscientific synonyms for bodily functions	3	**AO1** 3.3.2.2,8a, 8b
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	fibre are 1.2p each **or** plastic are 1.4p each (so) fibre is the cheapest	1 mark for calculation allow 140p for 100 plastic cartons **there is no mark for this statement unless based on calculation**. accept converse argument	1 1	**AO2** 3.3.1.4
6(a)(ii)	any **three** from: • easily recycled • (disposal) causes no/less pollution • no/less landfill • made from recycled waste paper • do not use petrochemicals (non-renewable resources) • strong(er) (than foam plastic) when <u>dry</u>	ignore reference to cost ignore ecofriendly allow converse arguments for foam plastics	3	**AO3** 3.3.1.4
6(a)(iii)	they lose their strength when wet		1	**AO3** 3.3.1.4
Total			**6**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	photosynthesis		1	**AO1** 3.3.2.3,1,2
7(a)(ii)	any **two** from • carbon dioxide • water • (energy from sun) light	ignore chlorophyll	2	**AO1** 3.3.2.3,1
7(a)(iii)	any **two** from: • fats • proteins • nucleic acids	ignore carbohydrates/glucose/starch if no other marks allow carbon dioxide	2	**AO1** 3.3.2.2,2
7(a)(iv)	respiration	ignore 'breathing'	1	**AO1** 3.3.2.3,4
7(b)(i)	decay / decomposition / rotting by decomposers / microbes / bacteria / fungi	ignore detritus feeders eg 'worms'	1 1	**AO1** 3.3.2.2,10,11
7(b)(ii)	(the idea of) availability for re-use by other organisms		1	**AO1** 3.3.2.2,10,11
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)(i)	it is found as the metal (so it does not need extraction) because it is very unreactive	accept not (usually) found as a compound	1 1	**AO1** **AO3** 3.3.1.3,6
8(a)(ii)	the higher the reactivity; the more energy needed	allow converse	1	**AO3** 3.3.1.3,9
8(a)(iii)	the value increases as the percentage decreases	allow converse	1	**AO3** 3.3.1.3,9
8(b)(i)	aluminium is more reactive than carbon	allow converse	1	**AO1** 3.3.1.3,9a
8(b)(ii)	electrolysis		1	**AO1** 3.3.1.3,9a
Total			**6**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
9			6	**AO1** **AO2** 3.3.1.3,2

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 information given	Some parts of an atom are named	There is an attempt to describe the structure of an atom which may refer to beryllium	The structure of an atom is described correctly with correct references to beryllium

examples of the points made in the response

protons

neutrons

electrons

protons in nucleus

neutrons in nucleus

nucleus central

the mass number is 9

the atomic number is 4

4 protons

5 neutrons

4 electrons

electrons in orbits/shells/layers around nucleus

2 electrons in first shell

2 electrons in second shell

extra information

a labelled diagram alone can achieve a maximum of level 2 because the rubric has been ignored.

Total			6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10(a)	variation/mutation (produces black fur)		1	**AO1** **AO2** 3.3.2.1,6,7,8
	idea of camouflage so avoids predation **or** survives	ignore 'natural selection'	1	
	reproduces **or** passes on allele	do not allow 'characteristic' for 'gene'	1	
10(b)	3 from proconsul are extinct closeness of relationships e.g. chimpanzees are closest to humans separation e.g. different primates started to separate about 40 million years ago **or** humans evolved 5 million years ago	allow max 2 examples for 2 marks allow one mark for any correct date all answers must be judged on merit by looking at the evolutionary tree.	3	**AO2** 3.3.2.1
Total			**6**	