
GCSE

SCIENCE B

SCB3HP - Unit 3 Making My World a Better Place
Mark scheme

4500
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 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. Boldening

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 boldened. 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 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 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 2 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 and Spec Ref
1(a)(i)	(house) becomes damp / increase moisture / humidity		1	AO2 3.5.3.3.1
	(so there is an increase) mould / spores / (dust) mites		1	
1(a)(ii)	any two from: <ul style="list-style-type: none"> • (increase) ventilation • dry clothes outdoors • (use a) dehumidifier • (use a) tumble dryer / take to a laundrette 	allow examples of ventilation	2	AO1 3.5.3.3.4
1(b)	(people may) get cancer;	accept ionising / mutations	1	AO1 3.5.3.3.7/8
	(because) radon (gas is released)	allow birth defects if no other marks awarded allow radiation sickness for 1 mark	1	
Total			6	

Question	Answer	Extra information	Mark	AO and Spec Ref
2			6	AO1 3.5.3.1.1

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	At least one greenhouse gas is identified or a way they are produced is identified	at least one greenhouse gas is identified and is linked to a way it is produced	Greenhouse gases are identified and are correctly linked to descriptions of the ways the gases are produced

examples of the points made in the response

- carbon dioxide
 - released from power stations
 - released from cars / vehicles
 - released from domestic sources e.g fires
 - released from trees that have been cut down (through deforestation)
 - produced by (humans) burning fossil fuels
 - released from trees that have been cut down (through deforestation)
 - produced through decay / decomposition (of trees)
- methane
 - released from landfill
 - released from rice fields / farming / cattle / faeces
 - released from trees that have been cut down (through deforestation)
 - through decomposition or microbial action
- nitrous oxide
 - released from vehicles
 - released from power stations
 - produced by (humans) burning fossil fuels
 - released through farming
 - through the increased use of nitrogen based fertilisers

extra information

allow

- water vapour
 - released from power stations
 - released from cars / vehicles
 - produced by (humans) burning fossil fuels

ignore reduced photosynthesis due to deforestation

ignore respiration of humans / animals

ignore references to the consequences of greenhouse gas emissions e.g. global warming

Total			6	
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Question	Answers	Extra information	Mark	AO and Spec Ref
3 (a)(i)	any one from: <ul style="list-style-type: none"> (to allow the wire) to reach the (same) temperature (as the water) (to allow time) for the wire to return to normal 		1	AO3 3.5.2.2.1c
3 (a)(ii)	(it is) between 40 and 50 (degrees)		1	AO2 3.5.2.2.1c
3 (a)(iii)	(repeat) the investigation at smaller intervals (of temperature between 40 and 50)	allow specified number above 40 and below 50	1	AO2 3.5.2.2.1c
3 (b)(i)	(they will be) pulled together	allow pushed together allow tighter fit	1	AO2 3.5.2.2.1c
3 (b)(ii)	≤ 36.9 (this is) below body temperature		1 1	AO3 3.5.2.2.1c
3 (b)(iii)	any one from: <ul style="list-style-type: none"> applies (constant) pressure on the bones (bones) heal faster less likely to get abnormalities (in the way the bone reforms) bones less likely to move when healing 		1	AO3 3.5.2.2
Total			7	

Question	Answers	Extra information	Mark	AO and Spec Ref
4 (a)	any three from: <ul style="list-style-type: none"> • reduce costs / money spent on drugs that don't work • reduce amount of drugs wasted • (patients get) effective treatment sooner • reduce the number of asthma attacks / serious complications • (patients) won't be taking (other) drugs which are harmful to the body • identify <u>type</u> sooner or severity (of the mutation) 	allow won't waste time taking drugs that do not work	3	AO3 3.5.1.1
4 (b)	any three from: <ul style="list-style-type: none"> • (it would be) tested on a (small) group of volunteers (who are not deaf) • (then) on a group of people who are deaf • monitored for safety or dosage • (finally) it is licensed for use 	ignore testing on animals or cells / tissues if no other mark awarded allow 1 mark for testing / trialling on humans	3	AO2 3.5.1.1.1
Total			6	

Question	Answers	Extra information	Mark	AO and Spec Ref
5 (a)(i)	Australia and USA		1	AO1 3.5.3.1.3
5 (a)(ii)	absorb (more) long-wave radiation (from the Earth)	allow reflects short wave / IR back (towards Earth)	1	AO1 3.5.3.1.2
	(which) retains heat in the atmosphere		1	
5 (a)(iii)	<p>any five from:</p> <p>arguments in support of:</p> <ul style="list-style-type: none"> global reduction of 4% which is near target 80% overall success rate some countries have had a (significant) decrease <p>arguments against:</p> <ul style="list-style-type: none"> hasn't hit the 5% target some countries / Canada have had a significant increase some countries weren't included and may have increased emissions (the newspaper) only looked at six / small number of countries 	<p>max 4 marks for one sided argument</p> <p>accept ½ of the countries on the agreement have decreased allow named example e.g. Norway, Romania, UK</p> <p>allow Australia or USA</p> <p>allow extreme weather patterns / climate change is continuing</p>	5	AO3 3.5.3.1.1
5(b)(i)	<p>any one from:</p> <ul style="list-style-type: none"> EVOH PVOH 		1	AO2 3.5.3.1.8
5(b)(ii)	water soluble		1	AO1 3.5.3.1.8
	biodegradable		1	

Question 5 continues on the next page

Question 5 continued

Question	Answers	Extra information	Mark	AO and Spec Ref
5(b)(iii)	any one from: <ul style="list-style-type: none"> • soap is released directly into the machine / onto clothes • no / less (waste) packaging (to recycle or to landfill) • correct amount of soap used (each time so no wastage) • detergent is already measured (so it is easier to use) • convenient to transport a small amount (e.g. take on holiday) • less particulate pollution 		1	AO3 3.5.3.1.8
5(c)	photodegradable	do not allow oxodegradable	1	AO1 3.5.3.1.7
Total			13	

Question	Answers	Extra information	Mark	AO and Spec Ref
6(a)(i)	beta is a particle	allow an electron	1	AO1 3.5.1.3.4
	beta travels through paper and several meters of air	allow is stopped by a thin layer of aluminium/metal/plastic	1	
6(a)(ii)	gamma is a (transverse) wave	allow is part of the electromagnetic spectrum	1	AO1 3.5.1.3.1,2
	gamma travels through many meters of air or thin layers of aluminium / metal / plastic	allow stopped by thick layers of metal / lead	1	
6(b)(i)	monitors radiation (levels exposed to)		1	AO1 3.5.1.3.8
	to help prevent health problems or to make sure the level / exposure does not get too high		1	
6(b)(ii)	any one from: <ul style="list-style-type: none"> • closer to the source • their hands are exposed / in contact with source (more) • their body might be behind a screen 		1	AO3 3.5.1.3.8
6(c)	alpha is stopped by (a few centimetres of) air / skin / the plastic case		1	AO2 3.5.1.3.4
Total			8	

Question	Answers	Extra information	Mark	AO and Spec Ref
7 (a)(i)	any one from: <ul style="list-style-type: none"> it is a good conductor / excellent conductor it is (relatively) inexpensive 		1	AO2 3.5.2.1
7 (a)(ii)	silver		1	AO2 3.5.2.1
	any one from: <ul style="list-style-type: none"> (because it is) a good / excellent electrical conductor corrosion resistant less expensive than gold OR copper		1	
	any one from: <ul style="list-style-type: none"> (because it is) a good / excellent electrical conductor the least expensive 		1	
7 (b)(i)	cathode	allow negative (electrode) do not allow positive (electrode)	1	AO1 3.5.2.1.5
7 (b)(ii)	<u>Cu</u> \longrightarrow Cu^{2+} + <u>2e^-</u>		2	AO1 3.5.2.1.8
7 (b)(iii)	Cu^{2+} + 2e^- \longrightarrow Cu	lhs correct = 1 mark rhs correct = 1 mark allow $\text{Cu} - 2\text{e}^- \longrightarrow \text{Cu}^{2+}$ for 2 marks	1 1	AO2 3.5.2.1.8
Total			8	

Question	Answers	Extra information	Mark	AO and Spec Ref
8 (a)	(spider silk protein) gene is removed / cut from a spider cell / DNA / chromosome (using an enzyme)	use of enzyme must be used at least once to get full marks	1	AO1 3.5.2.3.3
	goat DNA / chromosome is cut open (using an enzyme)		1	
	goat and spider DNA are combined (using an enzyme)		1	
8 (b)(i)	only females produce milk or males don't produce milk		1	AO2 3.5.2.3
8 (b)(ii)	(guarantee) all offspring will be female (and produce milk)	accept converse argument	1	AO2/AO3 3.5.2.3
	(guarantee) all will have the spider silk gene or all will produce spider silk		1	
Total			6	