



**General Certificate of Secondary Education
June 2013**

GCSE Science B

SCB3FP

(Specification 4500)

Unit 3: Making My World a Better Place

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner 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 examiners 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 examiner understands and applies it in the same correct way. As preparation for standardisation each examiner 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, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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.

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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. 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 / ; eg 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	Pluto, Mars, Moon	1
2	Pluto, 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.

4. Quality of Written Communication and levels marking

In Question 6 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.

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Question 1

Question	Answers	Extra information	Mark
1(a)	dizziness itchy nose		1 1
1(b)(i)	any one from: <ul style="list-style-type: none"> • (improve) ventilation in the home • keep homes damp free (so no mould) • vacuuming (to remove dust mites) • make sure the boiler is maintained 		1
1(b)(ii)	corrosive		1
1(b)(iii)	any two from, <ul style="list-style-type: none"> • wear gloves • wear safety glasses • don't eat / drink (whilst using it) • use in a ventilated area 	ignore lock it away allow avoid breathing in fumes / mask if no other marks gained accept protective clothing for 1 mark	2
1(b)(iv)	any one from: <ul style="list-style-type: none"> • recycle it • compost it 	do not accept burning unless qualified	1
Total			7

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Question 2

Question	Answers	Extra information	Mark
2(a)	<p>The diagram consists of five rectangular boxes. On the left, there are two boxes: 'Photochromic' (top) and 'Smart Paint' (bottom). On the right, there are three boxes: 'Coating on cars' (top), 'Spectacle Lenses' (middle), and 'Thermometer strip' (bottom). Lines connect 'Photochromic' to 'Coating on cars' and 'Spectacle Lenses'. Lines connect 'Smart Paint' to 'Spectacle Lenses' and 'Thermometer strip'.</p>	two lines from a box cancels mark	1 1
2(b)(i)	thermochromic		1
2(b)(ii)	<p>advantages, one from:</p> <ul style="list-style-type: none"> • you can see if the temperature <u>has</u> risen above freezing at any point • reduce the possibility of food poisoning (from incorrectly stored food) • stops shops selling unsafe food <p>disadvantage, one from:</p> <ul style="list-style-type: none"> • additional cost • (label) cannot be reused 		1 1
Total			5

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Question 3

Question	Answers	Extra information	Mark
3(a)(i)	<pre> graph LR Cholera --> Bacteria Cholera --> Fungi Measles --> Viruses </pre>	two lines from a box cancels mark	1
			1
3(a)(ii)	pathogens breathing infected		1 1 1
3(b)(i)	45	accept 44-46	1
3(b)(ii)	2		1
3(b)(iii)	75	accept 74-76	1
3(c)	decrease		1
	any one from: <ul style="list-style-type: none"> • due to herd effect / less likely to come into contact with an infected person / pathogen • immune / have antibodies 		1
Total			10

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Question	Answers	Extra information	Mark
4(a)	for decoration		1
	to prevent corrosion		1
4(b)(i)	anode		1
4(b)(ii)	1.25	accept any value from 1.2 to 1.3	1
Total			4

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Question 5

Question	Answers	Extra information	Mark
5(a)(i)	to cure a disease		1
	to improve the person's quality of life		1
5(a)(ii)	an antibiotic		1
	aspirin		1
	an antidepressant		1
5(b)	nicotine		1
5(c)(i)	three bars correctly plotted	two bars correctly plotted for 1 mark. ± 0.5 square tolerance on plotting ignore width	2
5(c)(ii)	any three from: <ul style="list-style-type: none"> fewer prescriptions before 2009 / number of prescriptions went up biggest rise in 2009 / bigger rise in 2009 than 2007/2008 increase (in prescriptions) continues in 2010 / 2011 increase in 2010/2011 faster than 2007/2008 	ignore reference to people wanting to stop or give up smoking 'it' must be qualified	Max 3

Question 5 continues on the next page...

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Question 5 continued

5(c)(iii)	two from, smoking banned in some places advertising changed / strict control over advertising restricted displays / not on display NHS campaigns (Health) education classes in schools age related restriction availability of nicotine/smoking replacement aids	accept described example e.g. removal of sports sponsorship allow warning signs (on packets) accept 'tax increasing cost' / price increases	2
Total			13

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Question 6

Question	Answers	Extra information	Mark
6	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.		6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content	<p>There is a description which identifies at least one property of X rays or indicates its use in diagnosis or treatment of disorders.</p> <p>or</p> <p>There is a brief account which describes at least one possible disadvantage of the use of X-rays.</p>	<p>There is an account which identifies a property of X-rays.</p> <p>and</p> <p>at least one use in the treatment or diagnosis of disorders OR at least one possible disadvantage of the use of X-rays is described.</p>	<p>There is a description of the properties of X-rays and their use in the treatment and diagnosis of disorders. At least one disadvantage is described.</p>
<p>examples of the points made in the response</p> <p>Properties:</p> <ul style="list-style-type: none"> • X rays can pass through materials • Different materials allow different amounts of X rays through / bone doesn't let as much through • They are ionising <p>Uses:</p> <ul style="list-style-type: none"> • (cannot pass through bone so) identify fractures. • (passes through different materials by different amounts so) can be used to identify tumours • (ionising) so can be used to treat cancer. <p>Possible disadvantages:</p> <ul style="list-style-type: none"> • (Too many X-rays) can cause cancer • Damage healthy cells. • Can cause a health risk to the radiographers/hospital workers. <p>Possible damage to unborn fetuses</p>			<p>extra information</p>
Total			6

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Question 7

Question	Answers	Extra information	Mark
7(a)(i)	any one from: <ul style="list-style-type: none"> • carbon dioxide • nitrous oxide 	accept water <u>vapour</u> do not accept methane allow carbon monoxide	1
7(a)(ii)	methane	accept nitrous oxide if not given in 7(a)(i) allow carbon dioxide if not given in 7(a)(i)	1
7(a)(iii)	Kyoto (agreement)		1
7(b)(i)	control or to show any effect was caused by the fertiliser or to compare the fertiliser with water / Test 1	ignore 'fair test'	1
7(b)(ii)	there is a <u>greater</u> increase with fertiliser / between Test 1 and Test 2/3 or number of (duckweed) leaves increase <u>more</u> with <u>more</u> fertiliser added	allow the number of leaves increase for 1 mark	2
7(b)(iii)	any four from: <ul style="list-style-type: none"> • (cause the) algae / plants to grow (<u>rapidly</u>) <u>on the surface</u> • this prevents sunlight reaching the plants (underneath) • the plants die and bacteria break down the plants • (bacteria) uses up the oxygen (in the pond) • so fish die 	ignore plants / animals do not allow 'kills all living things' if no other marks awarded, eutrophication gains 1 mark	Max 4
Total			10

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Question 8

Question	Answers	Extra information	Mark
8(a)	9	correct answer with or without working gains 2 marks if answer incorrect allow 360 / 40 for 1 mark	2
8(b)(i)	(insulated) shutters		1
8(b)(ii)	(thermal) curtain lining	allow ecf from (a)	1
8(c)	any one from: <ul style="list-style-type: none"> • reduces convection (currents) • traps air (between window and blind) • prevents radiation from leaving (the room) 	ignore draughts ignore traps heat	1
Total			5

UMS Conversion Calculator www.aqa.org.uk/umsconversion