



**General Certificate of Secondary Education (GCSE)  
November 2012**

**Science B**

**SCB3HP**

**(Specification 4500)**

**Unit 3: Making My World A Better Place**

**Final M/S**

**Mark Scheme**

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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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## MARK SCHEME

### 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	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 2 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	answer	extra information	mark
1(a)(i)	anomalous result of 32 at 4% experiment 2		1
1(a)(ii)	45 36	do not allow average that has used the anomalous result	1 1
1(a)(iii)	four or five points plotted correctly  curve of best fit	2 or 3 points plotted correctly for 1 mark.	2 1
1(a)(iv)	The heart rate rapidly drops (until 6% alcohol)  (and then) starts to level off <b>or</b> rate of decrease slows down		1 1
1(b)(i)	$126 - 31 = 95$ $(95 / 126) \times 100$ $= 75.4$	allow range 75–75.4  correct answer with or without working gains <b>3</b> marks	1 1 1
1(b)(ii)	any <b>one</b> from: <ul style="list-style-type: none"> <li>• humans are very different from fleas</li> <li>• the fleas were immersed in the alcohol</li> </ul>	accept millions of people have drunk wine and not died	1
<b>Total</b>			<b>12</b>

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<b>2</b>			
<p>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.</p>			
<b>0 marks</b>	<b>Level 1 (1–2 marks)</b>	<b>Level 2 (3–4 marks)</b>	<b>Level 3 (5–6 marks)</b>
No relevant content	There is a brief and incomplete account.	There is an account which contains some clear explanations, although there may be some incorrect statements.	The account is balanced and accurate and is presented in a logical sequence. It will include both 'for' and 'against' statements which are clearly explained.
<p><b>examples of the points made in the response against:</b></p> <ul style="list-style-type: none"> <li>• Safety of the process is compromised, as steps are missed out.</li> <li>• Not tested on human cells, therefore any problems with the drug may not be identified early.</li> <li>• If there are any safety concerns with the drug, it is less likely to be picked up before licensing. Therefore people with HIV will be affected.</li> <li>• Testing on animals puts animals at greater risk / more animals tested on.</li> </ul> <p><b>for:</b></p> <ul style="list-style-type: none"> <li>• Healthy volunteers aren't used so they won't be affected if there was a problem with the drug.</li> <li>• Cheaper, because they don't have to pay volunteers or scientists to test on tissue samples</li> <li>• Quicker, so more people can benefit from the drug.</li> <li>• Still tested on animals before humans so still relatively safe.</li> </ul> <p><b>Conclusion with justification</b></p>		<p><b>extra information</b></p>	
<b>Total</b>			<b>6</b>

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question	answer	extra information	mark
<b>3(a)</b>	rocks / soil under the house	accept poor ventilation	1
	contain (high levels of ) uranium / radium		1
<b>3(b)</b>	any <b>three</b> from: <ul style="list-style-type: none"> <li>• (will I) live longer <b>or</b> will it work?</li> <li>• is there a risk of other cancer forming?</li> <li>• are there any possible side-effects / tiredness / sickness</li> <li>• initial worsening of symptoms?</li> <li>• Will the treatment affect other medical conditions or pregnancy issues</li> </ul>		3
<b>3(c)</b>	tracer travels around the body (in bloodstream)	accept absence of gamma rays / tracer after blockage	1
	(tracer) emits gamma ray signals		1
	which are detected (by gamma camera)		1
	(there is a) build-up of gamma rays / tracer at site of blockage		1
<b>3(d)</b>	monitor radiation levels		1
	to make sure they're not exposed to too much radiation		1
<b>Total</b>			<b>11</b>



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question	answer	extra information	mark
<b>4(a)</b>	any <b>one</b> from: <ul style="list-style-type: none"> <li>• bloodworm</li> <li>• water louse</li> <li>• sludgeworm</li> <li>• rat-tailed maggot</li> </ul>		1
<b>4(b)(i)</b>	look for as many different lichens on trees as possible		1
	identify the lichens		1
	find the least tolerant lichen in the forest		1
	use the chart to find the level of pollution		1
<b>4(b)(ii)</b>	Bryoria only found at Site <b>A</b> or no Bryoria at Site <b>B</b>		1
	Site <b>B</b> polluted by chemicals blown in wind (from factory)		1
<b>4(c)(i)</b>	(carbon dioxide from) increased use of fossil fuels	} allow any suitable named example	1
	(methane from) decomposing rubbish in landfill / cultivating rice / cattle farming		1
	(nitrous oxide from) (increased) use of fertilisers / from vehicle exhausts		1

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question	answer	extra information	mark
4(c)(ii)	(greenhouse gases) absorb more long-wave radiation heat is retained	accept (greenhouse gases) allow more short-wave IR from the sun to pass to Earth's surface but absorb long-wave IR from surface of the Earth for <b>2</b> marks	1 1
<b>Total</b>			<b>12</b>

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<b>question</b>	<b>answer</b>	<b>extra information</b>	<b>mark</b>
<b>5(a)</b>	PVOH (bag) is water soluble		1
	so it is put in washing machine with laundry where it dissolves		1
	reducing handling of dirty laundry		1
<b>5(b)</b>	EVOH		1
<b>Total</b>			<b>4</b>

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question	answer	extra information	mark
<b>6(a)</b>	necklace is attached to cathode / negative terminal		1
	bar of silver is attached to anode / positive terminal		1
	(immersed) in aqueous silver nitrate / silver nitrate solution	accept aqueous silver solution	1
	electricity passed through / attached to battery and turned on.		1
	silver ions move from anode to cathode		1
<b>6(b)</b>	$3e^-$		1
	Au		1
<b>Total</b>			<b>7</b>

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question	answer	extra information	mark
<b>7(a)</b>	(there are) variations / mutations in the pathogens		1
	(the) antibiotics / penicillin kill non-resistant strains		1
	(but) resistant strains survive		1
	(and) they reproduce (passing on resistant gene)		1
<b>7(b)</b>	any <b>one</b> from: <ul style="list-style-type: none"> <li>• screening patients before admission to hospital</li> <li>• use of different antibiotics <b>or</b> more powerful antibiotics</li> <li>• better hygiene in hospitals reduces spread</li> </ul>		1
<b>7(c)</b>	(inject) a mild or dead form of infecting organism		1
	(lymphocytes) produce antibodies against it	allow 'white blood cells'	1
	next infection, antibodies are produced quickly, preventing disease		1
<b>Total</b>			<b>8</b>