



**General Certificate of Secondary Education
June 2012**

Science B

SCB3HP

(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	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.

4. Quality of Written Communication and levels marking

In Question 4(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.

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COMPONENT NAME: Making My World a Better Place

SERIES: June 2012

question	answer	extra information	mark
1(d)	any two from: <ul style="list-style-type: none">• lower energy output or inefficient• (forms) carbon monoxide• soot		2
Total			10

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question	answer	extra information	mark
2(a)	<p>any four from:</p> <p>pros:</p> <ul style="list-style-type: none"> men are always decreasing men decrease faster women go up (at the start) men drop by a greater proportion / percentage / amount (than women) <p>cons:</p> <ul style="list-style-type: none"> we don't know when the health warning started not enough information (to draw a conclusion) could be another factor causing the decrease <p>opinion / conclusion with an explanation based on interpretation of the graph</p>	<p>must give at least one pro and one con for 4 marks</p> <p>maximum 3 if only one side of the argument given</p> <p>ignore numbers</p> <p>an opinion without supporting explanation is insufficient</p>	max. 4
2(b)(i)	lines extrapolated on graph will cross over by 2018	allow because men are going down and women are going up	1
2(b)(ii)	<p>any two from:</p> <ul style="list-style-type: none"> idea of improvements in healthcare (would alter the rates of change) idea of change in smoking habits (would alter the rates of change) it's <u>only</u> a prediction or not enough data / information to be sure 	<p>allow more health warnings targeted at women or cost of cigarettes</p> <p>owtte</p>	2
Total			7

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question	answer	extra information	mark
3(a)	atom / group of atoms		1
	loses / gains an electron		1
3(b)(i)	e ⁻		1
	Ag	accept Ag (s)	1
3(b)(ii)	cathode	allow negative electrode do not accept negative anode	1
3(b)(iii)	to allow <u>ions</u> to move (to the cathode)		1
Total			6

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question	answer	extra information	mark
4(a)			
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	<p>There is a brief account of selective breeding which misses out key stages in the process. At least one advantage to the farmer has been identified.</p> <p>OR</p> <p>At least one advantage has been described and clearly explained.</p>	There is a clear account which may have some minor omissions, eg characteristics become more obvious. At least two advantages have been identified with a description of how one of these advantages the farmer.	There is a clear and detailed account of selective breeding in a logical sequence. At least two advantages have been identified with a clear description of the advantages.
<p>examples of the points made in the response</p> <p>selective breeding:</p> <ul style="list-style-type: none"> farmer selects desirable characteristics in individuals breeds the individuals with each other offspring with the same desirable characteristics are bred again over many generations eventually the characteristic becomes more obvious / pronounced <p>advantages to farmer:</p> <ul style="list-style-type: none"> larger litter produces more pigs to sell for profit less aggressive so that they don't fight and injure each other customers want more lean meat so may be able to charge more 		extra information	

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question	answer	extra information	mark
4(b)	advantages any one from: <ul style="list-style-type: none"> • rapid production / quick • sterile / free from disease • small so many fit in a container / cost effective • identical (so the consumer knows exactly what they will look like) 	ignore cost allow healthy	1
	disadvantages any one from: <ul style="list-style-type: none"> • unfavourable characteristics will be passed on • reduced variation • need laboratory conditions 	allow gene pool	1

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question	answer	extra information	mark
4(c)	<p>any three from:</p> <p>advantages</p> <ul style="list-style-type: none"> • patient / child lives longer • decreases the effects of illnesses on the child • patient can lead a more normal life • better or stronger immune system <p>disadvantages</p> <ul style="list-style-type: none"> • long-term monitoring needed • results in time lost from school or intrusive • doesn't prevent SCID in future generations (not germ line) • may have (unknown) side effects • risk of infection (reinserting white blood cells) • expensive (because of the amount of treatment required) • only effective for a short time 	<p>max 2 for only advantages or disadvantages</p> <p>do not accept healthy immune system</p> <p>do not allow expensive unqualified</p>	3
Total			11

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question	answer	extra information	mark
5(a)	any three from: <ul style="list-style-type: none"> phagocytes (engulf and) digest / break down pathogens lymphocytes produce antibodies (which) destroy / deactivate the pathogens lymphocytes produce antitoxins to neutralise poisons memory cells are produced (against subsequent infection) 	if only 'white blood cells' is used instead of phagocytes or lymphocytes maximum 2 marks	3
5(b)(i)	1380 – 380 1000 / 1380 x 100 72.46%	allow any value between 1370 and 1380 and between 380 and 390 allow ecf from their values allow answers in the range 71 – 73 for 3 marks	1 1 1
5(b)(ii)	increase in number of vaccinations		1
5(c)(i)	any two from: <ul style="list-style-type: none"> cost effective reduces the frequency of certain diseases (in the community) reduces the pool of infective agents stops the spread of disease stops people getting the disease vaccinated against 	'cheap' is insufficient	2

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question	answer	extra information	mark
5(c)(ii)	possible side-effects	ignore religion	1
	weakened / overloaded immune system		1
Total			11

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question	answer	extra information	mark
6(a)	(fertilisers) wash / leach into rivers/lakes		1
	(causing) algae to grow (on the water surface)		1
	(this) prevents sunlight reaching other water plants and they <u>die</u>		1
	bacteria decompose (break down) the dead plants		1
	(which) uses up the oxygen in the lake (by respiration)	do not accept algae / plants use up the oxygen	1
6(b)(i)	oxo-degradation / photodegradation	allow 'oxo-degradable' / photo degradable do not allow degradation / biodegradation	1
6(b)(ii)	any two from: <ul style="list-style-type: none"> • less landfill • won't release toxic products into the environment • won't cause harm to animals 	better for the environment is insufficient	2
6(c)	any two from: <ul style="list-style-type: none"> • Poly-lactic acid (PLA) • EVOH • PVOH 		2
Total			10

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question	answer	extra information	mark
7	research carried out in laboratory or on animals / cells / tissues / computer simulation		1
	clinical trials on healthy volunteers		1
	clinical trials on patients		1
	approved for use on all (appropriate) patients		1
	monitored for side-effects / toxicity / efficacy / dosage throughout its use		1
Total			5