



**General Certificate of Secondary Education
June 2012**

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	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 6(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.

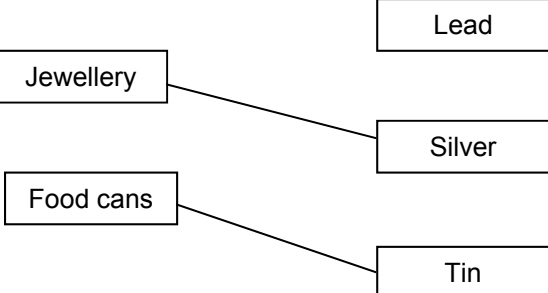
Level 3: detailed

- 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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question	answer	extra information	mark
1(a)	A – battery B – electrolyte C – cathode		1 1 1
1(b)(i)	 <pre> graph LR Jewellery --- Lead Jewellery --- Silver Food_cans[Food cans] --- Tin </pre>	1 mark for each correct line more than one line from an item negates the mark	2
1(b)(ii)	any one from: <ul style="list-style-type: none"> • taps • cutlery • cooking utensils • computer / electronic connectors • keys • door handles • 1p and 2p coins • light fittings 	ignore food cans / jewellery ignore coins unspecified	1
1(c)	burns to person fumes (damage nose / throat / lungs)	ignore corrosive / toxic if no other marks awarded allow damage to the person for 1 mark	1 1
Total			8

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question	answer	extra information	mark
2(a)	electromagnetic		1
	X-rays		1
	bones		1
	skin / fat		1
2(b)(i)	alpha / α	ignore radiation / ray	1
2(b)(ii)	beta / β	ignore radiation / ray	1
2(b)(iii)	gamma / γ	ignore radiation / ray	1
Total			7

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question	answer	extra information	mark
3(a)	virus		1
3(b)(i)	overall incidence has risen correct dates (between 2001 and 2010) by 340 – 350 or (incidence) rises (from 2001) till 2003 (incidence) then dips (from 2003) and rises (from 2005) (incidence) then decreases from 2008 / 1400 people		1 1 1 or 1 1 1
3(b)(ii)	the number of children vaccinated decreased there was a lot of publicity about the side-effects of MMR vaccine		1 1
3(c)(i)	any two from: <ul style="list-style-type: none"> • paracetamol • aspirin • ibuprofen • codeine • co-codamol 	accept any reasonable suggestion 'painkillers' is insufficient accept 'calpol' accept Nurofen	2
3(c)(ii)	idea of development of resistance to antibiotics (needless) cost to NHS	ignore 'allergic' ignore side affects	1 1

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question	answer	extra information	mark
3(d)	(C) E A D B	if sequence incorrect, allow E at beginning = 1 mark B at end = 1 mark A D in correct sequence <u>in middle</u> = 1 mark allow B E A D for 1 mark	max 3
Total			13

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question	answer	extra information	mark
4(a)		<p>1 mark for each correct line</p> <p>extra lines from a material negate the mark</p>	3
4(b)	<p>(thermochromic spoons) change colour if the food / spoon is too hot or when the food is the correct temperature</p> <p>(so you) don't burn the baby's mouth</p>	allow converse for metal spoons	<p>1</p> <p>1</p>
Total			5

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question	answer	extra information	mark
5(a)(i)	0.5 years or 6 months	correct answer with or without working gains 2 marks if answer incorrect 30 / 60 gains 1 mark if no units given assume years	2
5(a)(ii)	any one from: <ul style="list-style-type: none"> • double glazing • (cavity) wall insulation • floor insulation 	allow 'thermal curtain lining'	1
5(b)	because (cost is double but) the U-value is much lower or less than half or very low so it is more (more than twice as) effective or better insulator or loses less heat	if no other marks gained idea of B saving more money than A gains 1 mark	1 1
5(c)	because (the pockets in) bubble wrap traps air air is a good insulator or (trapped) air reduces heat loss (through convection currents)	accept converse for cling film 'bubble wrap is a good insulator' is insufficient	1 1
Total			7

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6(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	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. OR At least one advantage has been described and clearly explained.	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.
examples of the points made in the response selective breeding: <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 advantages to farmer: <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	
6(b)	cloning or tissue propagation / culture / micropropagation identical (to) or the same (as)	allow asexual reproduction or vegetative propagation allow exact copies of 'like' is insufficient	1 1
Total			8

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question	answer	extra information	mark
7(a)(i)	combustion of fuels eg transport or power generation or industrial activity	allow 'respiration' ignore breathing	1
7(a)(ii)	any one from: <ul style="list-style-type: none"> • farming rice • landfill • (farming) cattle • sewage treatment 		1
7(a)(iii)	any one from: <ul style="list-style-type: none"> • transport • using fertilisers • power generation 	eg driving cars but cars alone is insufficient do not accept nuclear power ignore factories / industry	1
7(b)	(increase in gases) absorbs more (long-wave) radiation <u>from the Earth</u>	allow prevents re-radiation	1
	(which) keeps heat in the atmosphere		1
Total			5

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question	answer	extra information	mark
8(a)	any four from: pros: <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) cons: <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 opinion / conclusion with an explanation based on interpretation of the graph	must give at least one pro and one con for 4 marks maximum 3 if only one side of the argument given ignore numbers an opinion without supporting explanation is insufficient	max. 4
8(b)(i)	lines extrapolated on graph will cross over by 2018	allow because men are going down and women are going up	1

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question	answer	extra information	mark
8(b)(ii)	any two from: <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 	allow more health warnings targeted at women or cost of cigarettes owtte	2
Total			7