



**General Certificate of Secondary Education
March 2012**

Science B

SCB2FP

(Specification 4500)

Unit 2: My Family and Home

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 9(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)	<table border="1"> <thead> <tr> <th data-bbox="335 544 541 609">Stimulus detected</th> <th data-bbox="541 544 817 609">Letter from the photograph</th> </tr> </thead> <tbody> <tr> <td data-bbox="335 609 541 647">taste</td> <td data-bbox="541 609 817 647">B</td> </tr> <tr> <td data-bbox="335 647 541 685">light</td> <td data-bbox="541 647 817 685">D</td> </tr> <tr> <td data-bbox="335 685 541 723">sound</td> <td data-bbox="541 685 817 723">E</td> </tr> <tr> <td data-bbox="335 723 541 761">smell</td> <td data-bbox="541 723 817 761">A</td> </tr> </tbody> </table>	Stimulus detected	Letter from the photograph	taste	B	light	D	sound	E	smell	A	<p>1 mark for each correct letter accept capital or lower-case letters accept correct names instead of letters: taste – tongue (do not accept mouth) light – eye(s) sound – ear(s) smell – nose more than one letter /name in the box negates the mark if name and letter given, both must be correct for the mark</p>	max. 4
Stimulus detected	Letter from the photograph												
taste	B												
light	D												
sound	E												
smell	A												
1(b)	brain		1										
Total			5										

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question	answer	extra information	mark
2		<p>1 mark for each correct link extra lines from type of radiation negates the mark</p>	max 3
Total			3

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question	answer	extra information	mark
3	quarrying	allow phonetic spelling	1
	quicklime		1
	slaked lime		1
	carbon dioxide		1
	glass		1
Total			5

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question	answer	extra information	mark
4(a)	pH	do not accept any other answer	1
4(b)(i)	hydrochloric (acid)		1
4(b)(ii)	red	accept orange ignore numbers	1
4(c)(i)	neutralisation	ignore neutral	1
4(c)(ii)	a gas is produced	allow carbon dioxide is produced ignore reasons allow <u>sodium chloride</u> is bad for you ignore salt	1
4(d)	too strong / too alkaline	allow very strong / alkaline allow it is corrosive allow it is irritant do not allow too concentrated ignore reason unless scientifically incorrect	1
Total			6

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question	answer	extra information	mark									
5(a)	on chromosomes	either order	1									
	in the nucleus	ignore DNA	1									
5(b)(i)	the environment	accept light / sunlight / nutrients / water do not accept gravity do not accept temperature do not accept weather apply list principle	1									
5(b)(ii)	allele(s)	ignore dominant / recessive	1									
5(c)(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>R</td> <td>r</td> </tr> <tr> <td>R</td> <td>RR</td> <td>Rr</td> </tr> <tr> <td>r</td> <td>Rr</td> <td>rr</td> </tr> </table>		R	r	R	RR	Rr	r	Rr	rr	All 3 correct for 2 marks 1 or 2 correct for 1 mark	2
	R	r										
R	RR	Rr										
r	Rr	rr										
5(c)(ii)	rr correctly identified		1									
Total			7									

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question	answer	extra information	mark
6(a)(i)	porpoise	apply list principle	1
6(a)(ii)	chicken	apply list principle	1
6(b)(i)	20–20,000	allow (15–20) – (18 000–20 000)	1
6(b)(ii)	busy road traffic normal talking whisper	any 2 or 3 correct for 2 marks, 1 correct for 1 mark ignore vacuum cleaner otherwise deduct 1 mark for each incorrect answer	2
6(c)(i)	each 5 dB increase halves time limit (for exposure)	for 1 mark accept as the loudness increases the time limit decreases	2
6(c)(ii)	1 hour		1
Total			8

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question	answer	extra information	mark
7(a)	polymer		1
7(b)(i)	waterproof / water resistant or resistant to corrosion	ignore strong ignore does not rust	1
7(b)(ii)	poor conductor of electricity	accept (good) electrical insulator	1
7(b)(iii)	poor conductor of heat	accept heat insulator	1
7(b)(iv)	flexibility / flexible	accept strong allow rot-proof ignore waterproof	1
7(c)(i)	composite		1
7(c)(ii)	because composites combine the properties of <u>both</u> materials		1

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question	answer	extra information	mark
8(a)(i)	burning / combustion		1
8(a)(ii)	fission	allow fusion	1
8(b)	the National Grid	accept National Power Grid allow The Grid / Power Grid	1
8(c)	any three from: <ul style="list-style-type: none"> • disease A has an effect over a greater distance than disease B • disease B has a greater effect at <u>shorter distances</u> than disease A • risk of both diseases is greater in younger people (than in older) • the closer to the cables the higher the risk • the risk reduces faster with increased distance for B • neither disease is increased at 500m 		3
Total			6

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question	answer	extra information	mark
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9(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.	The method shows little organisation and would not allow a comparison of the two bulbs.	The method shows some structure that could be followed by another person and which could enable a comparison to be made.	There is a method in a clear and logical sequence which could be easily reproduced by another person and would enable a comparison to be made.
<p>examples of science points in the answer:</p> <ul style="list-style-type: none"> • same volume of water • same initial temperature • same stirring technique / stir • same external temperature / stand on same surface / draught exclusion <p>either</p> <ul style="list-style-type: none"> • same length of time for bulbs to be turned on • measure the start temperature and end temperature and calculate temperature rise • calculate temperature rise per second <p>or</p> <ul style="list-style-type: none"> • measure the start temperature • time taken for temperature to rise the same number of degrees • calculate temperature rise 		<p>extra information</p> <p>to say 'repeat for both bulbs' is sufficient for both bulbs reference.</p>	

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question	answer	extra information	mark
9(b)(i)	$200 - 194.6 = 5.4$		1
	$5.4 / 200$	allow ecf from their $200 - 194.6$	1
	$= 0.027$	allow 2.7% NB $(200 - 194.6) / 200$ gains 2 marks correct answer with or without working gains 3 marks deduct 1 mark if a unit is given	1
9(b)(ii)	any two from: <ul style="list-style-type: none"> • they are both very inefficient • efficiency increases as power increases • halogen bulbs are more efficient 	allow as the power increases it gives out more light accept halogen bulbs give out more light for the same wattage / power	2
Total			11

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