



**General Certificate of Secondary Education (GCSE)
March 2013**

Science B

SCB1HP

(Specification 4502)

Unit 1: My World

Final M/S

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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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.

4. **Quality of Written Communication and levels marking**

In Question 3(b) 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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Question1

question	answers	extra information	mark
1(a)(i)	$\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$	CO_2 and H_2O both for 1 mark ignore balancing ignore CaCO_3	1
1(a)(ii)	calcium carbonate		1
1(a)(iii)	A mass is not made or destroyed. B atoms are rearranged (in a chemical reaction)	accept 'mass stays the same' idea	1 1
1(a)(iv)	150	correct answer with or without working gains 2 marks if answer incorrect, allow $111 + 66 = 177$ for 1 mark	2
1(a)(v)	any 2 from <ul style="list-style-type: none"> • a waste of money / reactants / idea • as no more calcite is produced • no more Ca(OH)_2 to react 	allow 'it won't react'	2
1(b)	calcite because it is softer than marble (so won't scratch it)	allow 'not as hard' allow 'lower than 5'	1 1
Total			10

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Question 2

question	answers	extra information	mark
2(a)(i)	electrolysis	Allow 'react (ore) with potassium)	1
2(a)(ii)	any one from: <ul style="list-style-type: none"> • zinc • lead • copper 	allow gold	1
2(a)(iii)	because hydrogen is more reactive than copper	Accept the converse	1
2(b)(i)	carbon reacts with oxygen to make carbon dioxide. carbon dioxide reacts with more carbon to make carbon monoxide	accept $C + O_2 \rightarrow CO_2$ accept $CO_2 + C \rightarrow 2CO$ $2C + O_2 \rightarrow 2CO$ for 1 mark	1 1
2(b)(ii)	$Fe_2O_3 + 3 CO \rightarrow 2 Fe + 3 CO_2$	correct reactants correct products correct balancing	1 1 1
2(b)(iii)	carbon or carbon monoxide is oxidised/takes oxygen iron (oxide) is reduced/ loses oxygen	either order	1 1
Total			10

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Question 3

question	answers	extra information	mark
3(a)(i)	carbon and hydrogen	apply list principle must have both in either order	1
3(a)(ii)	26		1
3(a)(iii)	<p>one from <u>compound</u></p> <ul style="list-style-type: none"> • (<u>atoms</u> in octane are chemically) bonded / joined together • elements / atoms in fixed proportions • compound has different properties to constituent elements <p>one from <u>mixture</u></p> <ul style="list-style-type: none"> • <u>molecules / compounds</u> in crude oil are not (chemically) bonded / joined together • composition in variable • components (often) keep their own properties 	<p>Allow for 1 mark</p> <p>Idea that components of a compound <u>not</u> easily separated</p> <p>OR</p> <p>Components in mixture can be separated by physical means / easily</p>	<p>1</p> <p>1</p>

Question 3 continues on the next page

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Question 3 continued

3(b)	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.	max. 6
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0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	The account has some of the details but is not written in a logical sequence and lacks explanations.	The account contains the essential details of the process but lacks complete explanation and may not be in a logical sequence.	There is a complete account in a logical sequence which includes all essential details of the process with explanations

<p>examples of the points made in the response</p> <ul style="list-style-type: none"> • fractional distillation • oil is heated in furnace • oil boils or evaporates • vapour rises up the column • the small, lighter fractions (molecules) move higher • because smaller molecules have lower boiling point • temperature falls as column ascended • different fractions (molecules) condense at different temperatures. • because different fractions (molecules) have different boiling points 	<p>extra information</p> <p>A logical sequence here is an account which 'flows' and can be followed easily.</p> <p>The points do not have to be in the sequence shown for the account to 'flow'</p>
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Total			10
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Question 4

question	answers	extra information	mark
4(a)	6.36 (%)	accept 6.3–6.4 correct answer with or without working gains 2 marks if answer incorrect, allow $15 \div 236$ or correct percentage for their calculation for 1 mark	2
4(b)	mutation / variation produced striped animals these were less likely to get bitten /attract flies so did not get diseases so <u>survived</u> to reproduce and pass on their genes mention of natural selection	allow white / black interbreeding produced some striped animals	1 1 1 1 1
4(c)	<pre> graph LR Root --- Node1 Node1 --- Horses Node1 --- Node2 Node2 --- Zebras Node2 --- Node3 Node3 --- Gorillas Node3 --- Node4 Node4 --- Gibbons Node4 --- Chimpanzees </pre> <p>horses zebras gorillas gibbons chimpanzees</p>		1
Total			8

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Question 5

question	answers	extra information	mark
5(a)(i)	light (energy)		1
	is absorbed by photosynthesis		1
	and stored as chemical <u>energy</u>	Allow implication of energy stored in food	1
5(a)(ii)	<u>respiration</u> (of stored chemical energy)		1
	produces heat (which leaves the biosphere)		1
5(b)(i)	decay	accept decomposition / rotting / decomposing	1
	by decomposers	allow bacteria / fungus / mould ignore detritivores	1
5(b)(ii)	(fungus) obtains energy		1
	(fungus) obtains raw materials / nutrients / food for growth / reproduction	Do not accept vitamins	1
5(b)(iii)	the idea that: carbon from compounds in the apple is recycled as carbon dioxide / carbon cycle		1
	minerals / nutrients are returned to the soil / recycled		1
Total			11

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Question 6

question	answers	extra information	mark
6(a)	(they would) produce a spectrum of light from the star		1
	measure the red shift (of the black lines in the spectrum compared with the sun)		1
	match red shift to known values of speed (idea) OR the bigger the red shift, the faster the speed		1
6(b)(i)	because it is hotter than mercury, which is closer to the sun	accept converse	1
	because the carbon dioxide in the atmosphere		1
	allows short-wave radiation from the sun to pass through to the surface of venus	allow one mark for greenhouse effect if the last two points not given.	1
	but absorbs long-wave radiation reflected from the surface of venus		1
6(b)(ii)	P2 has suitable temperature for liquid water	ignore reference to oxygen P1 too hot for liquid water	1
	life needs liquid water	If no other marks allow a comparative reference to the temperature of Earth for 1 mark.	1
6(b)(iii)	oxygen is present in P2 atmosphere because	The suggestion that the presence of oxygen in the atmosphere is necessary to support life is incorrect.	1
	oxygen is produced (by plants) by photosynthesis		1
Total			11