



**General Certificate of Secondary Education  
March 2012**

**Science B**

**SCB1HP**

**(Specification 4500)**

**Unit 1: My World**

**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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## 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 3 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.

**COMPONENT NUMBER: SCB1HP**

**COMPONENT NAME: My World**

**DATE: March 2012**

question	answers	extra information	mark
<b>1(a)</b>	the fur traps air		1
	air / fur is an insulator	accept air / fur is a poor (thermal) conductor	1
	(air / fur) traps body heat <b>or</b> reduces heat loss	ignore body fat NB: 'keep warm' is stem	1
<b>1(b)</b>	animal <b>B</b>		1
	because it has the lowest surface area to volume ratio	allow lowest surface area / ratio / number	1
	which means it has the lowest (rate of) heat loss (per unit body mass)	if only surface area is mentioned max <b>2</b> marks	1
<b>1(c)</b>	extremophiles	allow cryophiles / psychrophiles	1
	volcanic	accept fumaroles	1
		accept lava allow volcano do <b>not</b> accept hot / heating	
<b>Total</b>			<b>8</b>

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question	answers	extra information	mark
<b>2(a)</b>	(bubble through) limewater	allow bubble through bicarbonate indicator	1
	which goes cloudy (if CO <sub>2</sub> present)	which goes yellow	1
<b>2(b)(i)</b>	because the plug stops liquid splash from the flask <b>or</b> to allow gas to escape	allow stopping the pressure building up	1
<b>2(b)(ii)</b>	line of best fit correctly drawn as curve	ignore extrapolations past 7 minutes allow first point missed	1
<b>2(b)(iii)</b>	8.5 (minutes)	accept value greater than 7	1
	because there are no results after 7 minutes	accept reference to reaction slowing down <b>or</b> reference to line gradually levelling off	1
<b>2(b)(iv)</b>	(carbon dioxide) gas is released during the reaction		1
	so the mass (of content and flask) decreases	accept gas has mass	1
<b>2(c)(i)</b>	CaCO <sub>3</sub> → CaO + CO <sub>2</sub>	correct reactant	1
		correct products	1
<b>2(c)(ii)</b>	mass of carbon dioxide 27.2 – 25 (= 2.2)	ecf	1
	mass of calcium oxide 5 – 2.2 = 2.8 (g)		1
		correct answer with or without working gains <b>2</b> marks	
<b>2(c)(iii)</b>	<u>conservation</u> of mass		1
<b>Total</b>			<b>13</b>

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question	answers	extra information	mark
<b>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.		
<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 an incomplete sequence which shows some progression.	There is a sequence which shows a logical progression but which may lack detail eg compression, time scale, CO <sub>2</sub> dissolving in water.	There is a complete sequence which shows a clear logical progression.
<b>Examples of the points made in the response:</b> <ul style="list-style-type: none"> <li>• carbon dioxide dissolves in sea water</li> <li>• this is removed by marine plants / plankton</li> <li>• which are eaten by marine animals</li> <li>• used to make calcium carbonate in shells / etc</li> <li>• when these creatures die they fall to the sea floor</li> <li>• the shells become part of the sediment</li> <li>• the sediment is affected by pressure</li> <li>• converted to limestone rock</li> <li>• over a long time scale</li> </ul>		<b>Extra information</b>  ignore soft parts decay	
<b>Total</b>			<b>6</b>



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question	answers	extra information	mark
<b>4(a)</b>	(K's) red-shift will be smaller (than L's red-shift)	accept converse argument for L	1
	because (K) is moving (away from Earth) more slowly (than L)	do <b>not</b> allow more red / redder	1
<b>4(b)</b>	the (universe) started at one point	allow description eg tiny ball	1
	then expanded (rapidly)	allow exploded	1
<b>4(c)</b>	to find evidence to support one or both theories	accept 'prove' for 'support'	1
	<b>or</b> to find evidence to disprove one or both theories	accept to gain more knowledge about the universe	
<b>Total</b>			<b>5</b>

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question	answers	extra information	mark
<b>5(a)</b>	the lower the atomic number the lower the boiling point	accept converse accept the lower the atomic number the more negative the boiling point	1
	the pattern is not linear	accept increase in boiling point with atomic number appears to be levelling off	1
<b>5(b)(i)</b>	18		1
<b>5(b)(ii)</b>	(2, 8, 8) or correctly drawn diagram	allow ecf from <b>5(b)(i)</b> correctly drawn	1
<b>5(b)(iii)</b>	-210		1
<b>5(c)(i)</b>	fractional distillation		1
<b>5(c)(ii)</b>	because water in the air would freeze (and block the pipes)		1
<b>5(c)(iii)</b>	gradually heat	ignore values	1
	until argon boils		1
	collect the gas (by condensation)		1
<b>5(c)(iv)</b> E	filament lamps or electrical discharge tubes or lasers or packaging or welding	allow light bulb	1
<b>5(d)</b>	because nitrogen and oxygen are molecules	accept correct description of a molecule	1
	whereas the others are atoms		1
<b>Total</b>			<b>13</b>

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question	answers	extra information	mark
<b>6(a)</b> <b>E</b>	natural selection		1
<b>6(b)</b>	variation exists in gerenuk populations		1
	animals with the longest necks / greatest ability to balance on hind legs could reach more food		1
	animals with these adaptations are more likely (to survive) to breed / produce offspring		1
	and pass on the genes / characteristics		1
<b>Total</b>			<b>5</b>

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question	answers	extra information	mark
<b>7(a)</b>	water vapour	any order	1
	hydrogen	apply list principle	1
	ammonia		1
<b>7(b)(i)</b>	CH <sub>4</sub>		1
<b>7(b)(ii)</b>	because there was (little or) no oxygen in the early atmosphere, so they wouldn't die off	OWTTE	1
<b>Total</b>			<b>5</b>

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question	answers	extra information	mark
<b>8(a)</b>	respiration		1
	releases CO <sub>2</sub> (which is a greenhouse gas)		1
<b>8(b)</b>	(the gases) allow short-wave radiation to reach the Earth		1
	but absorb long-wave radiations (emitted) from the Earth		1
	the gases then emit some of the radiation back to the Earth (keeping the Earth warm)		1
<b>Total</b>			<b>5</b>

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