



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

**Science B**

**SCB2HP**

**(Specification 4502)**

**Unit 2: SCB2HP**

**Final M/S**

**Mark Scheme**

## Mark Scheme- General Certificate of Secondary Education Science A- SCB2HP March 2013

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.

### **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.

In order to attain a mark within a certain level, **both** the science **and** the QWC must be of a standard appropriate to that level.

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**Question 1**

question	answer	extra information	mark
<b>1(a)(i)</b>	helps enzymes		1
	digest protein	accept digest food	1
<b>1(a)(ii)</b>	indigestion/heartburn/acid reflux	allow damage to stomach wall <b>or</b> ulcers <b>or</b> corrosion of the stomach lining	1
	take an antacid	accept named antacids allow acid suppression (drugs) accept neutralising/neutralising agent	1
<b>1(b)(i)</b>	starts purple and ends as red		1
	goes through blue–green–orange	allow <b>1</b> mark for the correct colour change but from the wrong starting point (red to purple).	1
<b>1(b)(ii)</b>	The mixture would go green	accept 7	1
<b>1(c)(i)</b>	alkaline because of OH <sup>-</sup> (ions)	accept a soluble base accept a pH greater than 7	1
<b>1(c)(ii)</b>	acidic because of H <sup>+</sup> (ions)	accept a pH less than 7	1

**Question 1 is continued on the next page**

**Question 1 continued**

<b>1(d)(i)</b>	NaCl H <sub>2</sub> O	<p>either order</p> <p>must be correct upper and lower case</p> <p>2 must be subscript</p> <p>any balancing except 1 in front of all formulae loses <b>1</b> mark</p> <p>accept ClNa or OHH for NaCl and H<sub>2</sub>O</p>	<p>1</p> <p>1</p>
<b>1(d)(ii)</b>	sodium chloride		1
<b>Total</b>			<b>12</b>

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**Question 2**

question	answer	extra information	mark
<b>2(a)(i)</b>	95 / 60 = 1.58 h		1
	1.58 x 0.96		1
	= 1.52 (kWh)	correct answer with or without working gains <b>3</b> marks  if answer incorrect, allow their 1.58 x 0.96 for <b>1</b> mark or correct answer from their 1.58 x 0.96 for <b>2</b> marks	1
<b>2(a)(ii)</b>	1.52 / 6 = 0.25 (kWh) energy rating <b>C</b>	allow ecf from (a)(i) for both marks if energy rating correct	1 1
<b>2(b)</b>	less energy needed for heating water		1
<b>2(c)</b>	any <b>two</b> from: <ul style="list-style-type: none"> <li>• so people can compare energy efficiency of different machines</li> <li>• so people can choose the cheapest to run</li> <li>• to encourage people to save energy</li> </ul>		2
<b>Total</b>			<b>8</b>



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**Question 3**

question	answer	extra information	mark
<p><b>3(a)</b></p>	<p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• (aluminium) windows (1) because corrosion resistant (1)</li> <li>• (steel) girders / supports / framework (1) because has high tensile strength (1)</li> <li>• (copper) for wiring (1) because a good conductor of <u>electricity</u> (1) <b>or</b> (copper) for plumbing (1) because does not react with water/good <u>heat</u> conductor (1)</li> </ul>	<p>no mark for metal metal must match use</p> <p>accept strong</p> <p>accept any metal with correct use in buildings</p>	<p>max. 4</p>

**Question 3 continues on the next page . . .**

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**Question 3 continued**

question	answer	extra information	mark
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<b>3(b)</b>			<b>6</b>
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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 student's account is brief and incomplete. There are a number of inaccuracies and incorrect statements. There is no attempt to describe the production of glass, cement or mortar.	The student's account is lacking in some detail and may contain a small number of incorrect statements. The production of one of glass, cement or mortar is given but with errors.	The student's account is complete in all details. The production of one of glass, cement or mortar is given correctly.

<p><b>examples of the points made in the response</b></p> <ul style="list-style-type: none"> <li>• limestone is used as building blocks (however described)</li> <li>• limestone used to make cement</li> <li>• by heating with clay</li> <li>• for use in mortar</li> <li>• by mixing cement with sand and water</li> <li>• to hold blocks in place</li> <li>• limestone used to make glass</li> <li>• by heating with sodium carbonate and sand</li> <li>• for use in windows</li> </ul>	<p><b>extra information</b></p>
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<b>Total</b>			<b>10</b>
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**Question 4**

question	answer	extra information	mark
4(a)	longitudinal	ignore sound wave	1
4(b)	0.07 (seconds)	ignore digits after 7 accept 13 kHz= 13 000 Hz for 1 mark accept 13 000 x 0.026 correctly calculated for 1 mark 25 ÷ their answer X correctly calculated for 1 mark accept 338 for 1 marks accept m/s as the unit for the wave speed for 1 mark	max 3
4(c)	any <b>five</b> from: <ul style="list-style-type: none"> <li>• receptor (in) ear</li> <li>• (sends information along) sensory neurone</li> <li>• information is an impulse</li> <li>• to brain</li> <li>• which is the coordinator or which coordinates the response</li> <li>• (that sends information along) motor neurone (to muscle / effector)</li> </ul>	ignore 'message'	5
4(d)	(receptors in the) thermoregulatory centre (detect change and) cause constriction of blood vessels / arteries / arterioles supplying skin capillaries so less blood flows to surface so less heat lost <b>or</b> more heat kept in	do <b>not</b> accept capillaries constrict or move do <b>not</b> accept veins  ignore sweating <b>or</b> hair movement	1 1 1 1
<b>Total</b>			<b>13</b>

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**Question 5**

question	answer	extra information	mark
<b>5(a)</b>	Olivia is albino so must have inherited one albino gene from each parent	allow parents carry the albino gene	1
	(both) parents are <b>not</b> albino	allow albino gene must be recessive as not seen in the parents	1
	so albino allele <u>hidden</u> / <u>masked</u> by the normal allele so is recessive		1
<b>5(b)</b>	R r		1
	Sharron is not albino so must have R		1
	but father (John) is albino so can only supply r (recessive) alleles		1
<b>5(c)</b>	<p><b>Pros:</b></p> <p>parents can be sure child not affected <b>or</b> can have a healthy child</p> <p>they do not allow the 'bad' allele to survive</p> <p>costs to NHS reduced</p> <p><b>Cons:</b></p> <p>ethical issues concerning discarded embryos</p> <p>possible harm to mother <b>or</b> possible harm to embryo</p> <p>possibility of selecting sex of child</p> <p><b>Conclusion:</b></p> <p>must be based on at least one pro and one con</p>	<p>need at least one pro and one con for full marks</p> <p>ignore 'cost' unqualified</p> <p>Ignore 'against God will'.</p> <p>allow embryo rights idea, 'even affected embryos have a right to life / cannot be asked.</p> <p>ignore designer babies unqualified.</p> <p>a conclusion based on at least 1 pro and 1 con gains <b>1</b> mark. To gain full marks at least one pro and one con must be mentioned.</p>	<p>max. 3</p> <p>1</p>
	<b>Total</b>		

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**Question 6**

question	answer	extra information	mark
<b>6(a)</b>	no, because hydrocarbons only have carbon and hydrogen (and ethanol has oxygen)	accept no because it contains oxygen	1
<b>6(b)</b>	O <sub>2</sub> CO <sub>2</sub> + H <sub>2</sub> O 13 oxygen 8 carbon dioxide 10 water	either order all correct	1 1 1
<b>6(c)</b>	(in Experiment B) larger surface area of base of beaker to absorb heat screen stops draughts beaker has lid to reduce heat loss by evaporation / convection	accept (the idea of) preventing heat escaping	1 1 1
<b>Total</b>			<b>7</b>