Version 1.0

General Certificate of Secondary Education (GCSE)
March 2013

Science B SCB3HP

(Specification 4502)

Unit 3: SCB3HP

Final M/S

Mark Scheme

Mark Scheme - GCSE - Science A- SCB3HP 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 <u>not</u> allow

Ignore of 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(a)(iii) 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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COMPONENT NAME: Making my World a Better Place

SERIES: March 2013

Question 1

question	answer	extra information	mark
1(a)(i)	alpha / α		1
1(a)(ii)	not alpha because it has passed through the paper is beta because some is stopped by the aluminium. not gamma as no radiation has passed through the lead	 allow 'could be gamma which has been stopped by lead'	1 1 1
1(b)(i)	high-energy (radiation)		1
1(b)(ii)	**one** from: • destroys the <u>cancerous</u> cells • stops <u>cancerous</u> cells from growing	 allow cancerous cells more vulnerable to effects of radiation	1
1(b)(iii)	**one** from: • also kills <u>healthy</u> cells • can cause cancer in other cells		1
Total			**7**

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Question 2

question	answer	extra information	mark
2(a)	reduces oxygen-carrying capacity (of blood)		1
2(b)	lower energy output	inefficient, wastes money	1
2(c)(i)	alarm sounds if CO gets high in a short time/ above 145 alarm sounds if CO is at a low level for a longer time (10 minutes or more)	accept any number in this range	1 1
2(c)(ii)	146–151		1
Total			**5**

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Question 3

question	answer	extra information	mark
3(a)	7 (years)	correct answer with or without working gains **2** marks if answer incorrect, allow 525 / 75 for **1** mark	2
3(b)	20 × 10 – 120 = (£) 80	 **3** marks for correct answer with or without working	1 1 1

Question 3 continues on the next page

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Question 3 continued

question	answer	extra information	mark

3(c) **6**

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 which identifies at least one measure that could be installed within budget with a brief justification using at least one piece of information from the table.	There is a clear account which describes at least one measure that could be installed within budget with a description of some costings, using at least two pieces of information from the table.	There is a detailed account which describes at least one measure that could be installed within budget with a detailed explanation of cost savings over the ten year period

examples of the points made in the response

- draught proofing and a hot water jacket
  - These will cost him £60
  - These will save him £540 over the ten years.
- He cannot afford to buy loft insulation and draught proofing.
- loft insulation and a hot water jacket.
  - It would cost £320
  - but he would only save £480 over the ten years.
- Draught proofing
  - Would cost £40, but would save £360 over the ten years
- Loft Insulation
  - Would cost £300, and would save £300 over the ten years
- Hot water tank jacket
  - Would cost £20 and would save £180 over the ten years

extra information

Advice needs to be within the budget.

Question 3 continues on the next page….

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Question 3 continued

question	answer	extra information	mark
3(d)	a measure of the rate of heat loss through a material	accept 'rate of heat passing through a material'	1
Total			**12**

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Question 4

question	answer	extra information	mark
4(a)	carbon dioxide methane	either order accept 'water vapour'	2
4(b)(i)	four or five points plotted correctly	two or three points plotted correctly for **1** mark.	2
4(b)(ii) **view with 4(b)(i)**	(nitrous oxide emissions) initially rise then fall peak in 1990		1 1 1
4(b)(iii)	all new cars have catalytic converters		1
Total			**8**

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Question 5

question	answer	extra information	mark
5(a)	platelets cause clotting which forms a barrier (to pathogens)		1 1
5(b)(i)	Chromosomes removed from human cells / nucleus Gene cut from chromosome using enzymes gene put into sheep cell chromosome / nucleus (using enzymes)	use of enzyme must be used at least once to get full marks	1 1 1 1
5(b)(ii)	any **one** from: • less / no risk of infection / rejection • large quantities		1
5(b)(iii)	any **two** from: • ethical / moral • concern about the effect on (health) of sheep **or** long-term effects not known **or** concern about effect of the gene pool (of sheep) • concern about the effect on the food chain	ignore not natural or cost ignore religious arguments if no other marks awarded 'we don't know the long term effects' gains **1** mark	2
Total			**9**

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Question 6

question	answer	extra information	mark
6(a)(i)	**one** from: • reduces landfill • less harmful effect on wildlife	ignore 'eco-friendly'	1
6(a)(ii)	broken down by biological means eg microbes, bacteria, fungi		1 1
6(a)(iii)	photo-degradable		1
6(b)(i)	water-soluble biodegradable	either order	1 1
6(b)(ii)	EVOH / ethylene vinyl alcohol		1
Total			**7**

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Question 7

question	answer	extra information	mark
7(a)	the bacteria have become antibiotic resistant		1
	due to mutation	accept in response to contact with antibiotics	1
7(b)	introduction of mild / dead form of bacterium / virus		1
	causes white blood cells to produce antibodies		1
	so that if infected again, the antibodies are produced (quickly)		1
7(c)	it's a virus	allow not a bacterium	1
Total			**6**

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Question 8

question	answer	extra information	mark
8(a)	positively charged ions move to the cathode		1
	through the (aqueous) electrolyte		1
	negative ions travel to the anode	accept passage of electrons through the electrical circuit	1
8(b)	positive copper ions		1
	gain electrons **or** need $2e^-$		1
	to form an atom		1
Total			**6**

UMS conversion calculator www.aqa.org.uk/umsconversion