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General Certificate of Secondary Education
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GCSE Science B SCB3HP

(Specification 4500)

Unit 3: Making My World a Better Place

Final

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.

Further copies of this Mark Scheme are available from: aqa.org.uk

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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 <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.

4. Quality of Written Communication and levels marking

In Question 5 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 1

question	Answers	extra information	Mark
1(a)(i)	corrosive	ignore burns to skin	1
1(a)(ii)	any **two** from: • itchy (skin) • rash • burns • blisters		2
1(b)(i)	photo-degradable		1
1(b)(ii)	water soluble biodegradable		1 1
1(b)(iii)	**one** from: EVOH PLA		1
1(c)	**one** from: • produces toxic materials • takes up space in landfill	allow effect on birds/animals	1
Total			**8**

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Question 2

question	Answers	extra information	Mark
2(a)(i)	any **one** from: • carbon dioxide • nitrous oxide	accept water vapour do **not** accept methane allow carbon monoxide	1
2(a)(ii)	methane	accept nitrous oxide if not given in **2(a)(i)** allow carbon dioxide if not given in **2(a)(i)**	1
2(a)(iii)	Kyoto (agreement)		1
2(b)(i)	control **or** to show any effect was caused by the fertiliser **or** to compare the fertiliser with water / Test 1	ignore 'fair test'	1
2(b)(ii)	there is a greater increase with fertiliser / between Test 1 and Test 2/3 **or** number of (duckweed) leaves increase more with more fertiliser added	allow the number of leaves increase for **1** mark	2

Question 2 continues on the next page

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Question 2 continued

2(b)(iii)	any **four** from: • (cause the) algae / plants to grow (rapidly) on the surface • this prevents sunlight reaching the plants (underneath) • the plants die and bacteria break down the plants • (bacteria) uses up the oxygen (in the pond) • so fish die	ignore plants / animals do not allow 'kills all living things' if no other marks awarded, eutrophication gains **1** mark	Max 4
Total			**10**

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Question 3

question	Answers	extra information	Mark
3(a)	9	correct answer with or without working gains **2** marks if answer incorrect allow 360 / 40 for **1** mark	2
3(b)(i)	(insulated) shutters		1
3(b)(ii)	(thermal) curtain lining	allow ecf from **(a)**	1
3(c)	any **one** from: • reduces convection (currents) • traps air (between window and blind) • prevents radiation from leaving (the room)	 ignore draughts ignore traps heat	1
Total			**6**

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Question 4

question	Answers	extra information	Mark
4(a)	some bacteria (spontaneously) mutate (and become antibiotic resistant) (the antibiotics) kill / destroy bacteria that are not resistant bacteria that are resistant survive and reproduce		1 1 1
4(b)	any **two** from: • wound does not have to be exposed to (pathogens in the) air in order to check for infections • colour change so doctors know it is infected. • antibiotic is released directly at the site of infection • faster / doesn't have to travel in the blood / antibiotic in use before symptoms seen. • reduce chance of side effects • don't waste antibiotics		2
4(c)	any **two** from: • become addicted / dependent (on morphine) • risk of withdrawal symptoms when the morphine stops • side effects eg gut spasm • tolerance		2
Total			**7**

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Question 5

question	answer	extra information	mark

5	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.		6

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is a description which identifies at least one property of X rays or indicates its use in diagnosis or treatment of disorders. **or** There is a brief account which describes at least one possible disadvantage of the use of X-rays.	There is an account which identifies a property of X-rays. **and** at least one use in the treatment or diagnosis of disorders OR at least one possible disadvantage of the use of X-rays is described.	There is a description of the properties of X-rays and their use in the treatment and diagnosis of disorders. At least one disadvantage is described.

examples of the points made in the response	extra information
Properties: • X rays can pass through materials • Different materials allow different amounts of X rays through / bone doesn't let as much through • They are ionising **Uses:** • (cannot pass through bone so) identify fractures. • (passes through different materials by different amounts so) can be used to identify tumours • (ionising) so can be used to treat cancer. **Possible disadvantages:** • (Too many X-rays) can cause cancer • Damage healthy cells. • Can cause a health risk to the radiographers/hospital workers. • Possible damage to unborn foetuses.	

Total			**6**

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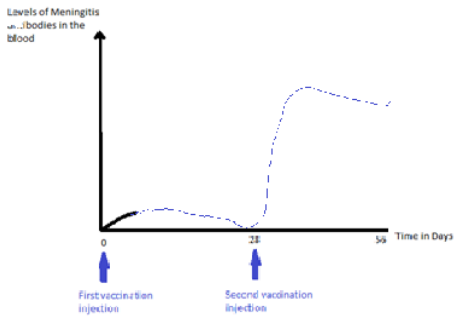
Question 6

question	Answers	extra information	Mark
6(a)	breathed in / through respiratory system	ignore 'through respiration'	1
6(b)(i)	three or four points correctly plotted	one or two points correctly plotted for **1** mark +/- 0.5 square tolerance on plotting	2
6(b)(ii)	over time period shown, there was an overall rise (however) not a constant rise **or** dip / fall between 2002 and 2004		1 1
6(b)(iii)	• since 2006 it has dropped • decreased since percentage was in the 90's • increase in number of people being vaccinated • from 2004 incidence plateaus/levels off • when vaccination reaches 87% (in 2004) rate slows		1 1
6(c)	does not rise after day 20 line rises steeply @ day 45 plateau or very gradual fall		1 1 1
Total			**10**

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Question 7

question	Answers	extra information	Mark
7(a)	e^- Ag	allow e^{-1}/$1e^-$/e^{1-}	1 1
7(b)	four from: • silver atoms (in silver bar) lose electrons • silver ions are released into electrolyte/solution • teapot is negative / the cathode • attracts positive silver ions (from electrolyte) • silver ions gain an e^- • to become a silver atom on teapot		Max 4
Total			**6**

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Question 8

question	Answers	extra information	Mark
8(a)	parents with desired characteristics / lean / fast runners are chosen bred together fastest / leanest offspring are then chosen to breed continues through many generations		1 1 1 1
8(b)	any **four** from: **pros:** • no tissue/organ rejection • potential to treat a range of disorders • reduce demands on donor system **cons:** • other embryos discarded/embryo's right to life • possible (physical) harm to mother/embryo/IVF child • rights of the (IVF) child **not** to be exploited • effect of psychological well-being of the (IVF) child	answer **must** contain at least one pro and one con for **4** marks maximum **3** if only one side of the argument given. ignore religious / ethical reason unless qualified	4
Total			**8**

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