



**GCSE Science B
(Science in Context)**

Higher Tier

Science B 3H

SPECIMEN MARK SCHEME

Version 1.0

Quality of Written Communication and levels marking

In Question 5(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.

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
1(a)	substance 1 – nicotine		1
	effect – causes addiction to smoking	accept has a vasoconstricting effect	1
	substance 2 – carbon monoxide		1
	effect – replaces oxygen in the bloodstream		1
		accept for either: substance – tar effect – causes cancer	
1(b)(i)	4000 – 2200		1
	= 1800		1
1(b)(ii)	when smoking goes up, cancer goes up		1
	when smoking goes down, cancer goes down		1
	there is a time lag of about 20 years		1
Total			9

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
2(a)	collect samples from stream at various points		1
	identify the organisms on the chart in each sample		1
	identify the least tolerant organism in the sample		1
	use the chart to find the highest level of pollution that the least tolerant organism can survive		1
2(b)	3–4		1
2(c)	fertiliser causes rapid growth of plants / algae	allow overcrowding	1
	lack of light <u>for photosynthesis</u>		1
	plants / algae die and are decomposed (by bacteria)		1
	bacteria respire rapidly and remove oxygen from the water		1
Total			9

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H

COMPONENT NAME: Making My World a Better Place

STATUS: Specimen Version 1.0

question	answer	extra information	mark
----------	--------	-------------------	------

3	<table border="0" style="width: 100%; text-align: center;"> <tr> <td data-bbox="363 577 608 645">Use of new material</td> <td data-bbox="699 577 943 645">New material</td> <td data-bbox="1050 577 1294 645">Property of new material</td> </tr> <tr> <td data-bbox="363 685 608 797">High power electromagnets</td> <td data-bbox="699 685 943 797">Shape memory alloy</td> <td data-bbox="1050 685 1294 797">Returns to original shape when warmed</td> </tr> <tr> <td data-bbox="363 875 608 987">Spectacle lenses</td> <td data-bbox="699 875 943 987">Smart paint</td> <td data-bbox="1050 875 1294 987">Almost zero electrical resistance</td> </tr> <tr> <td data-bbox="363 1066 608 1211">Dental braces</td> <td data-bbox="699 1066 943 1211">Superconductors</td> <td data-bbox="1050 1066 1294 1211">Changes colour reversibly in sunlight</td> </tr> <tr> <td data-bbox="363 1290 608 1413">Frozen food packaging</td> <td data-bbox="699 1290 943 1413">Photochromic plastic</td> <td data-bbox="1050 1290 1294 1413">Glow in the dark</td> </tr> </table>	Use of new material	New material	Property of new material	High power electromagnets	Shape memory alloy	Returns to original shape when warmed	Spectacle lenses	Smart paint	Almost zero electrical resistance	Dental braces	Superconductors	Changes colour reversibly in sunlight	Frozen food packaging	Photochromic plastic	Glow in the dark	max 6
Use of new material	New material	Property of new material															
High power electromagnets	Shape memory alloy	Returns to original shape when warmed															
Spectacle lenses	Smart paint	Almost zero electrical resistance															
Dental braces	Superconductors	Changes colour reversibly in sunlight															
Frozen food packaging	Photochromic plastic	Glow in the dark															

	<p>1 mark for each correct line do not accept 2 lines from material to 2 properties or 2 lines from material to 2 uses</p>	6
--	---	----------

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
4(a)	$10 \div 15 = 2/3$ or 0.67		1
	$12 \times 2/3$ or 12×0.67 = 8 (months)		1
4(b)	silvering reduces heat loss by radiation reflecting heat back into the tank		1
	glass fibre / trapped air is an insulator, so reduces loss by conduction		1
	air trapped in small spaces so there is no convection heat loss		1
Total			5

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
5(a)(i)	loss of confidence by parents in safety of MMR vaccine or parents choosing to give single vaccines instead of the triple vaccine or the reduced number of cases will make vaccination seem less important to parents	do not accept reference to stocks of vaccines running low	1
5(a)(ii)	400 (%)	correct answer if answer incorrect accept $(400-80)/80 \times 100$ for 1 mark	2
5(a)(iii)	because the percentage of children given the MMR vaccine has decreased		1
5(a)(iv)	86% because in 2001, when falls below this %, the number of cases went up rapidly before 2001, cases quite low and % was above 86%	allow answer between 86 and 90%	1 1 1

Question 5 continues on the next page ...

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0****Question 5 continued**

5(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 2.			
0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content.	There is a brief description of the process by which the human body develops immunity after vaccination.	There is a description of the process by which the human body develops immunity after vaccination.	There is a clear and detailed description of the process by which the human body develops immunity after vaccination.
examples of the points made in the response <ul style="list-style-type: none">• when a vaccination is given, dead or weakened pathogens are injected into the body• the white blood cells respond by producing antibodies• some of these white blood cells survive in the body• and act as ‘memory cells’• when the same pathogens enter the body again the white blood cells rapidly produce antibodies• which destroy the pathogen• this prevents illness developing.		extra information	
Total			13

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
6(a)	idea of removing gene for toxin from bacteria	answer must imply insertion of gene at an early stage of development ('insert gene into cotton plant' is not sufficient)	1
	idea of inserting gene into a cotton plant seed		1
6(b)	the toxin in insect pests might kill the predators that eat the insects	accept less food for predators	1
6(c)(i)	with Bt the production costs are lower because the yield is much higher	accept converse arguments	1
	this is because the Bt toxin stops the pests eating the crops		1
6(c)(ii)	with Bt there are fewer cases of poisoning	accept converse arguments	1
	because less pesticide is used	do not accept 'no need to use pesticide' as this is not shown in the data	1
6(d)	two from: <ul style="list-style-type: none">• GM modification could enter the food chain• little known about the effects on humans• possible spread of unknown characteristics		max 2
Total			9

COMPONENT NUMBER: GCSE Science B (Science in Context) 3H**COMPONENT NAME: Making My World a Better Place****STATUS: Specimen Version 1.0**

question	answer	extra information	mark
7(a)	A – cathode		1
	B – anode		1
7(b)	metal electrode is positive		1
	atoms of the electroplating metal lose electrons to become positive ions		1
	which enter the acid solution		1
	$M \rightarrow M^+ + e^-$		1
7(c)	the positive ions in the solution of the electroplating metal are attracted to the key, which is negative		1
	ions of the electroplating metal gain electrons and form metal atoms on the surface of key		1
	$M^+ + e^- \rightarrow M$		1
Total			9