



GCSE MARKING SCHEME

SCIENCE B

JANUARY 2013

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2013 examination in GCSE SCIENCE B. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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GCSE SCIENCE B – UNIT 1 (FOUNDATION TIER)

SECTION A

Question	Answers	Marks
1 (a)	Top down: Crust, mantle, molten iron outer core, solid iron core	4
(b) (i)	Tectonic, continental	2
(ii)	Earthquakes, volcanoes, (accept tsunami)	2
2 (a)	Any 1 of: <ul style="list-style-type: none"> • less power stations / less land used • less impact on habitats • less fossil fuels burned • less greenhouse gases / reduced global warming • less acid rain 	1
(b) (i)	9000/1200, = 7.5 years	2
(ii)	Decreases	1
(iii)	Decreases	1
(c) (i)	2.5 x 300 (1) Calculation of units = 750 (1)	2
(ii)	750 (allow ecf) x 12 (1) Answer = 9000p or £90 (1)	2
3 (a)	Signals not absorbed / blocked by atmosphere (1) Earth based cheaper (1)	2
(b) (i)	Similar pattern of circulating matter (1) larger gap between event horizon and rotating matter (1)	2
(ii)	Any 2 of gamma, X rays, UV, visible, IR, microwaves, radiowaves.	2
4 (a) (i)	Any 2 of: burning, respiration, decay	2
(ii)	Photosynthesis / ocean uptake	1
(b) (i)	Any 2 of: Deforestation, more demand for electricity, more use of fossil fuels, more industry, more animals bred for providing food, more transport	2
(ii)	Global warming	1
(c) (i)	1.6 (tonnes)	1
(ii)	1.4 (tonnes)	1
(iii)	No – bigger carbon footprint or wte	1

Question	Answers	Marks
<p>5 (a) (i)</p> <p>(ii)</p> <p>(b)</p>	<p><i>1 mark for the following point:</i> dark coloured moths increase</p> <p><i>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above.</i> so more trees must have been covered in soot</p> <p>C</p> <p><i>1 mark for the following point:</i> less sooty deposits</p> <p><i>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above:</i> so light coloured moths are better camouflaged</p>	<p>2</p> <p>1</p> <p>2</p>
<p>6 (a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(iv)</p> <p>(v)</p> <p>(b)</p>	<p>Mammalia</p> <p>Carnivora</p> <p>Move in search of food</p> <p>Both have vertebral column</p> <p><u>P</u>anthera <u>l</u>eo</p> <p>Down: Chordata, Mammalia, Carnivora (1), Crocuta (1), crocuta (1)</p> <p><i>1 mark for correct use of bold capital letters.</i></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>3</p> <p>1</p>

SECTION B

Question	Answers	Marks
7 (a)	<p>Indicative content</p> <ul style="list-style-type: none"> • Collect some water in your large tray. • Use the same technique each time you collect a sample – holding the net in the same way for the same length of time. • Scoop up some of the material from the bottom of the stream, or stir the bottom material and place the net downstream to catch it. • Try to identify the animals against the indicator chart. • Count the animals. • Pour the water gently back into the pond or stream. • Repeat at different times / different sections of the stream. <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6

Question	Answers	Marks
(b) (i)	In descending order: <ul style="list-style-type: none"> • Mayfly Nymph • Stonefly Nymph • (<i>Caddis fly larva</i>) • Dragonfly Nymph • Bloodworm • Bristleworm 	5
(ii)	5/6 correct (3) 3/4 correct (2) 1/2 correct (1)	3
(iii)	A - good water quality B – polluted C – becoming cleaner / low levels of pollution	3
(iv)	Quotes examples of preferred water quality for the invertebrates (x3), e.g. Mayfly Nymph – pollution intolerant / large numbers indicate good water quality. Explanation must coherently and correctly connect points to achieve 3 marks.	3
(c)	<i>1 mark for the following point:</i> adults breathe surface air. <i>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above:</i> so do not indicate water quality.	2
(d)	Collect more than one sample at each location, Collect samples in the same way	2

GCSE SCIENCE B – UNIT 1 (HIGHER TIER)

SECTION A

Question	Answers	Marks
1 (a)	<p>Indicative content</p> <ul style="list-style-type: none"> • Collect some water in your large tray. • Use the same technique each time you collect a sample – holding the net in the same way for the same length of time. • Scoop up some of the material from the bottom of the stream, or stir the bottom material and place the net downstream to catch it. • Try to identify the animals against the indicator chart. • Count the animals. • Pour the water gently back into the pond or stream. • Repeat at different times / different sections of the stream. <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6

Question	Answers	Marks
(b) (i)	In descending order: <ul style="list-style-type: none"> • Mayfly Nymph • Stonefly Nymph • (<i>Caddis fly larva</i>) • Dragonfly Nymph • Bloodworm • Bristleworm 	5
(ii)	5/6 correct (3) 3/4 correct (2) 1/2 correct (1)	3
(iii)	A - good water quality B – polluted C – becoming cleaner / low levels of pollution	3
(iv)	Quotes examples of preferred water quality for the invertebrates (x3), e.g. Mayfly Nymph – pollution intolerant / large numbers indicate good water quality. Explanation must coherently and correctly connect points to achieve 3 marks.	3
(c)	<i>1 mark for the following point:</i> adults breathe surface air. <i>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above:</i> so do not indicate water quality.	2
(d)	Collect more than one sample at each location, Collect samples in the same way	2

SECTION B

Question	Answers	Marks
2 (a)	Top down: crust, mantle, molten outer (iron) core, solid/ iron/ inner core	4
(b) (i)	Tectonic, continental	2
(ii)	Earthquakes, volcanoes.(accept tsunami)	2
3 (a)	<p><i>Any two points from:</i></p> <ul style="list-style-type: none"> • need less power from national grid / less power stations / burn less fossil fuels • burning fossil fuels releases CO₂ / less CO₂ formed • and acid(ic) gases / less acid gases formed <p><i>In each case, the third mark can be awarded if the conclusion correctly and coherently follows from the main point. Any of the following:</i></p> <ul style="list-style-type: none"> • therefore less greenhouse gases / reduced global warming • therefore less acid rain • therefore less impact on habitats. 	3
(b) (i)	Total return = £1200 (1), 9000/1200 = 7.5 years (1)	2
(ii)	<p>Cost of electricity could change, so each unit generated saves different amount (2) OR sunlight varies, so different amount exported to grid(2) OR feed in tariff changes, so different income for generating electricity (2)</p> <p><i>In each case, the conclusion must correctly and coherently follow from the main point to achieve 2 marks.</i></p>	2
(c)	<p>Convert £90 to 9000p OR 12p to £0.12 (1) Calculation of units = 750 (1) Time = 258.6/259/260(h)(1)</p>	3

Question	Answers	Marks
<p>4 (a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(c)</p>	<p>Earth based cheaper (1) but signals absorbed / blocked by atmosphere (1). Accept converse.</p> <p>Similar pattern of circulating matter (1) larger gap between event horizon and circulating matter (1)</p> <p>Non-spinning - Any 2 of: narrower spectrum, higher peak or converse, peak at same frequency</p> <p>Value from graph = 7×10^{16} Hz (1) Substitution/manipulation (1) Answer = 4.3×10^{-9} m (1)</p> <p>Any 3 of: <ul style="list-style-type: none"> • sharing cost • scientific expertise • technology • equipment / facilities / locations </p>	<p>2</p> <p>2</p> <p>2</p> <p>3</p> <p>3</p>
<p>5 (a)</p> <p>(b) (i)</p> <p>(ii)</p>	<p>Any 3 of: (Pollution has increased). Dark moths are at an advantage / well camouflaged (or converse) (1) less predation on black forms / fewer black moths eaten (1) more predation on light forms / more light moths eaten (1) more black forms survive (1) to breed / pass on genes (1)</p> <p><i>1 mark for the following point:</i> less sooty deposits / cleaner surfaces</p> <p><i>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the statement above:</i> so light moths should increase</p> <p>Increases chances of survival if environment changes</p>	<p>3</p> <p>2</p> <p>1</p>

Question	Answers	Marks
6 (a)	<p>Indicative content:</p> <ul style="list-style-type: none"> • Carbon is recycled via photosynthesis, food chains and respiration. • The role of microbes, bacteria and fungi in transferring carbon by feeding on waste materials from organisms and dead plants and animals. • These microbes respire and release carbon dioxide into the atmosphere. <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6
(b)	<p>Values for 40 km are: car 1.6 coach 0.2 (1) Difference 1.4 (1) Double values 2.8 (table for 100 people) (1) 10 journeys so saving = 28 (Tonnes) (1)</p>	4

GCSE SCIENCE B – UNIT 2 (FOUNDATION TIER)

Question	Answers	Marks
1	(a) (i) Fe, Al (ii) Gold / Au	2 1
	(b) (i) Sodium / Na or any other group 1 element (ii) Carbon / C or any other second period element	1 1
	(c) Halogens	1
2	(a) (i) Diabetes / cardiovascular disease (named) (ii) High blood pressure / stroke	1 1
	(b) Snack - Fruity bars Reason - Lowest energy (accept – no snack – no extra energy)	1 1
	(c) (i) $2 \times 1200 = 2400$ (ii) $2400/800 = 3\text{hrs ecf}$	1 1
3	(a) Red	1
	(b) Potassium chloride	1
	(c) (i) Green (ii) Sodium sulphate, water (iii) Neutralisation	1 1, 1 1
4	(a) Iron oxide, compound	2
	(b) (i) 13.8%	1
	(ii) Add more carbon/manganese	1
	(iii) Chromium, nickel	2
	(iv) Stainless steel / rust resistant	2
(v) Mild steel, easily pressed into shape (2)	2	
5	(a) Two of: Polyester, neoprene, polyester, polystyrene, acrylic plastics	2
	(b) 4. Non-toxic 3. Weather resistant 5. Does not conduct electricity.	1 1 1

Question	Answers	Marks																				
<p>6</p> <p>(a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(b)</p> <p>(c) (i)</p> <p>(ii)</p>	<p>Nn (1)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">...N.....</td> <td style="text-align: center;">...n.....</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">.</td> <td style="text-align: center;">.</td> <td></td> </tr> <tr> <td style="text-align: center;">(1)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">...NN...</td> <td style="text-align: center;">...Nn.....</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">.</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">n</td> <td style="text-align: center;">..Nn...</td> <td style="text-align: center;">nn.....</td> </tr> </table> <p style="margin-left: 150px;">Que:</p> <p style="margin-left: 150px;">(1)</p> <p style="margin-left: 150px;">(1)</p> <p>25% (Allow ecf from a(i))</p> <p>Mutation</p> <p>Chest/lungs</p> <p><i>1 mark can be awarded for making a valid point.</i></p> <p>X-rays <u>ionising</u> radiation/can damage DNA</p> <p><i>The second point can be awarded for coherently and correctly linking the conclusion so causing cancer / mutations</i></p>		...N.....	...n.....			.	.		(1)	N	...NN...	...Nn.....			.			n	..Nn...	nn.....	<p style="text-align: center;">1</p> <p style="text-align: center;">3</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>
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<p>7</p> <p>(a) (i)</p> <p>(ii)</p> <p>(b)</p> <p>(c) (i)</p> <p>(ii)</p>	<p>A, reason – more active ingredient (per gram)/requires more sodium hydroxide to neutralise</p> <p>$50/10 = 5$ (1) $5 \times 2 = 10$ (p) (1)</p> <p>Repeat her experiment</p> <p><i>1 mark can be awarded for making a valid point</i></p> <p>Reduce blood clots</p> <p><i>The second point can be awarded for coherently and correctly linking the conclusion.</i></p> <p>So reducing (the chance) heart attacks</p> <p>Stomach bleeding, stomach ulcers</p>	<p style="text-align: center;">2</p> <p style="text-align: center;">2</p> <p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">2</p>																				

Question	Answers	Marks
8 (a)	$100 \times (2.25 - 0.5) / 0.5 = 350\%$ (take readings from the graph)	3
8 (b)	<p>Indicative content:</p> <ul style="list-style-type: none"> • Increased liver cancer (for males / females). • Increased alcohol consumption (for both men and women). • Lung cancer. Males – rate fallen. • Lung cancer. Females – rate about same / slight increase. • Drop in number of males smoking but not females. <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks the candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6



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