



GCSE MARKING SCHEME

JANUARY 2016

**SCIENCE B
UNIT 1 - FOUNDATION TIER
4781/01**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was 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 conference was to ensure that the marking scheme was 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' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCSE SCIENCE B
UNIT 1 FOUNDATION TIER
JANUARY 2016 MARK SCHEME

Section A

Question	Marking point	Marks
1	(a) (i) willow / white spruce	1
	(ii) snowshoe hare / insects	1
	(iii) insects	1
	(b) (i) Any three of: disease competition for nutrients with willow competition for light number of consumers/insects/snowshoe hares Accept deforestation	3
	(ii) sunlight (accept Sun)	1
	(c) 1 mark for each correct response	3

Question	Marking point	Marks																
<p>2 (a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(iv)</p> <p>(v)</p> <p>(b)</p>	<p>$220 \times 16 (1) = 3\,520 \text{ p}$ or $\underline{\pounds}35.20 (1)$</p> <p>2.4 (kW)</p> <p>$270/2.7 (1) = 100 (h) (1)$</p> <p>£33.60</p> <p>210</p> <p>1 mark for each correct column</p> <table border="1" data-bbox="395 600 1246 788"> <thead> <tr> <th>Model</th> <th>Cost to buy (£)</th> <th>Annual running cost (£)</th> <th>10 year running cost</th> <th>Total cost over 10 years</th> </tr> </thead> <tbody> <tr> <td>B</td> <td></td> <td></td> <td>384</td> <td>729</td> </tr> <tr> <td>C</td> <td></td> <td></td> <td>432</td> <td>752</td> </tr> </tbody> </table> <p>Model B</p>	Model	Cost to buy (£)	Annual running cost (£)	10 year running cost	Total cost over 10 years	B			384	729	C			432	752	<p>2</p> <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p>	
Model	Cost to buy (£)	Annual running cost (£)	10 year running cost	Total cost over 10 years														
B			384	729														
C			432	752														
<p>3 (i)</p> <p>(ii)</p> <p>(iii)</p> <p>4. (a) (i)</p> <p>(ii)</p>	<p>All correct (2) 1 or 2 correct (1)</p> <table border="1" data-bbox="695 965 946 1106"> <tbody> <tr> <td></td> </tr> <tr> <td>Ultra violet</td> </tr> <tr> <td>X-ray</td> </tr> <tr> <td>Gamma-ray</td> </tr> </tbody> </table> <p>speed = $2 \times 150\,000\,000 (1) = 300\,000\,000 (m/s) (1)$</p> <p>As you move down the table from radio waves the wavelength (decreases / stays the same / increases). (1) As you move down the table from radio waves the frequency (decreases / stays the same / increases). (1) As you move down the table from radio waves the wave speed (decreases / stays the same / increases). (1) As you move down the table from radio waves the wave energy (decreases / stays the same / increases). (1)</p> <table border="1" data-bbox="502 1559 1137 1892"> <thead> <tr> <th>Effect</th> <th>(✓)</th> </tr> </thead> <tbody> <tr> <td>increases the number of bacteria in water</td> <td>✓</td> </tr> <tr> <td>increases oxygen content of water</td> <td></td> </tr> <tr> <td>causes diseases in surfers</td> <td>✓</td> </tr> <tr> <td>decreases oxygen content of water</td> <td>✓</td> </tr> <tr> <td>increases biodiversity of river animals</td> <td></td> </tr> </tbody> </table> <p>pesticides (1) fertilisers (1)</p>		Ultra violet	X-ray	Gamma-ray	Effect	(✓)	increases the number of bacteria in water	✓	increases oxygen content of water		causes diseases in surfers	✓	decreases oxygen content of water	✓	increases biodiversity of river animals		<p>2</p> <p>2</p> <p>4</p> <p>3</p> <p>2</p>
Ultra violet																		
X-ray																		
Gamma-ray																		
Effect	(✓)																	
increases the number of bacteria in water	✓																	
increases oxygen content of water																		
causes diseases in surfers	✓																	
decreases oxygen content of water	✓																	
increases biodiversity of river animals																		

Question	Marking point	Marks
(b) (i)	N Ireland	1
(ii)	Wales / N Ireland	1
(iii)	Wales	1
5 (a)	gas and dust cloud (1) pulled in by gravity (1) spirals into a disc (1) the Sun forms at the centre (due to gravity pull) (1) other dust particles stuck together (to make rocks which collided) to make planets (1) <p style="text-align: right;"><i>Any four points</i></p>	4
(b) (i)	Sun, comet, asteroid (belt), Saturn	4
(ii)	Oort	1
(iii)	moons	1

Section B

Question	Marking point	Marks																				
6 (a)	Reduction from 29 to 3 (1) = 26 (GW) (1) <i>or</i> 31 – 5 (1) = 26 (GW) (1)	2																				
(b) (i)	I. Area = (60 000/15) = 4 000 (km ²) (1) II. Energy content = (60 000 x 20) = 1 200 000 (units) (1)	2																				
(ii)	CO ₂ released during burning (1) = CO ₂ absorbed during growing / photosynthesis (1) so carbon neutral (1) <i style="text-align: right;">Any two points</i> <i>The points must be correctly and coherently connected to be awarded two marks</i>	2																				
(c)	1 mark for each correct point <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">Steady wind speed (m/s)</th> <th style="width: 25%;">Zero power output</th> <th style="width: 25%;">Maximum power output</th> <th style="width: 25%;">Between zero and maximum power output</th> </tr> </thead> <tbody> <tr style="background-color: #cccccc;"> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>27.2</td> <td>✓</td> <td> </td> <td> </td> </tr> <tr> <td>19.6</td> <td> </td> <td>✓</td> <td> </td> </tr> <tr> <td>12.2</td> <td> </td> <td> </td> <td>✓</td> </tr> </tbody> </table>	Steady wind speed (m/s)	Zero power output	Maximum power output	Between zero and maximum power output					27.2	✓			19.6		✓		12.2			✓	3
Steady wind speed (m/s)	Zero power output	Maximum power output	Between zero and maximum power output																			
27.2	✓																					
19.6		✓																				
12.2			✓																			
(d)	smaller, larger power output, more reliable, less of an eyesore	3																				

Question	Marking point	Marks
(7)	<p>Indicative content</p> <ul style="list-style-type: none"> • power output one nuclear power station is equivalent to 900 wind turbines • nuclear power stations last 3 times longer / in the lifetime of one nuclear power station equivalent 2700 wind turbines. • cost wind turbines more than double the cost of a nuclear power station / nuclear option cheaper per unit produced • wind power is less reliable • radioactive waste more detrimental to the environment since it has to be stored safely for long periods of time / danger of leakage into the ecosystem. <p>Marking bands</p> <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
(8) (i)	$200/1000 (1) \times 100 = 20 (1)$	2
(ii)	Current = $200/230 (1) = 0.87 / 0.9 (A) (1)$	2
(iii)	$5 \times 200 \times 6 (1) = 6000 (Wh) (1)$	2