# GCSE MARKING SCHEME

## SCIENCE B

## JANUARY 2015

## INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2015 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.

**GCSE SCIENCE B FOUNDATION TIER**

**JANUARY 2015 MARK SCHEME**

## Section A

<table>
<tr><th colspan="3">Question</th><th>Marking point</th><th>Marks</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>More land for (any) building [1] more land for food [1]</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><u>Endangered</u> animals (are bred) [1] in zoos/wildlife parks [1]</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Protect (endangered) animals / prevent extinction of an animal</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>[1 x 3]<br><table><tr><th></th><th>Intensive farming</th><th>Organic farming</th></tr><tr><td>Uses pesticides</td><td>✓</td><td></td></tr><tr><td>Produces more food</td><td>✓ (1)</td><td></td></tr><tr><td>Produces cheaper food</td><td>✓ (1)</td><td></td></tr><tr><td>Does not use caged animals</td><td></td><td>✓ (1)</td></tr></table></td><td>3</td></tr>
<tr><td>2</td><td>(a)</td><td>(i)</td><td>Explosion</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Expand</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Red</td><td>1</td></tr>
<tr><td></td><td></td><td>(iv)</td><td>Microwave</td><td>1</td></tr>
<tr><td></td><td></td><td>(v)</td><td>Million</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Distance light travels in a year</td><td>1</td></tr>
<tr><td>3</td><td>(a)</td><td>(i)</td><td>Any three of (to max 3 marks):<br>The (% of) carbon dioxide has decreased [1]<br>Sulfur dioxide decreased/No Sulfur dioxide [1]<br>Nitrogen has increased [1]<br>Oxygen has appeared / increased [1]</td><td>3</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Volcanic eruptions released nitrogen [1] and water into the atmosphere [1]</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Venus [1] Most/more carbon dioxide [1]</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>More extreme weather / hotter [1]<br>Melting ice caps / rising sea levels / flooding [1]</td><td>2</td></tr>
</table>

| Question | | | Marking point | Marks |
|---|---|---|---|---|
| **4** | (a) | (i) | All correct [2] one correct [1]<br><br>U-V \| Visible \| I-R | **2** |
| | | (ii) | <u>increases</u><br><u>decreases</u><br><u>decreases</u> | **3** |
| | (b) | | Visible<br><br>Brighter / darker<br><br>I-R | **3** |
| **5** | (a) | | 230 x 8 = 1 840 (W) [1] 1.84 KW [1] | **2** |
| | (b) | | 350 circled [1] | **1** |
| | (c) | (i) | 420 x 20 = 8 400 [1] £84 [1] | **2** |
| | | (ii) | <u>half as much</u> | **1** |
| | | (iii) | Saves more on running costs in a year / saves more than £35 [1] | **1** |
| | (d) | | 420 / 1.84 (ecf) [1] answer = 228.26 / 228.3 hours [1] | **2** |
| **6** | (a) | (i) | No water to heat up | **1** |
| | | (ii) | Flooding of land destroys habitats | **1** |
| | (b) | (i) | 5 p.m. - 7.30 p.m. (+/- 15 mins) | **2** |
| | | (ii) | Between midnight and 6.00 a.m. | **1** |
| | | (iii) | Low demand / ‘spare’ electricity is used | **1** |

## Section B

<table>
<tr><th colspan="3">Question</th><th>Marking point</th><th>Marks</th></tr>
<tr><td>7</td><td>(a)</td><td>(i)</td><td>That is the time <u>photosynthesis</u> occurs [1]</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Light penetrates this layer / does not penetrate lower. [1]</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Respiration [1]</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>
<table>
<tr><th>Temperature ($^0$C)</th><th>Dissolved oxygen (DO) (mg/l)</th></tr>
<tr><td>0</td><td>14.60</td></tr>
<tr><td>6</td><td>12.43</td></tr>
<tr><td>10</td><td>11.27</td></tr>
<tr><td>14</td><td>10.29</td></tr>
<tr><td>20</td><td>9.07</td></tr>
<tr><td>26</td><td>8.09</td></tr>
<tr><td>30</td><td>7.54</td></tr>
<tr><td>40</td><td>6.41</td></tr>
</table>
Table [1]<br>DO scale which covers at least half the axis [1]<br>Points [2]<br>Smooth curve [1]</td><td>5</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>As temperature increases the dissolved oxygen decreases / negative correlation [1] non uniformly [1]</td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Between 44-45˚C (from candidates graph)</td><td>1</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>Temperature increases (May-Aug) <u>and</u> then decreases (to Nov) [1] (May to August) DO decreases <u>and</u> then increases (to November) [1] reference to months [1]</td><td>3</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Each line [1] x 4
<table>
<tr><th>Month</th><th>Dissolved oxygen levels (mg/l)</th><th>Condition of fish</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>June</td><td>8</td><td>OK</td></tr>
<tr><td>July</td><td>5</td><td>Stressed</td></tr>
<tr><td>August</td><td>3</td><td>Choking</td></tr>
<tr><td>September</td><td>5</td><td>Stressed</td></tr>
</table></td><td>4</td></tr>
</table>

| Question | | | Marking point | Marks |
|---|---|---|---|---|
| | (e) | | Indicative content<br>• Food supply / prey of the anchovies will increase i.e. zooplankton and phytoplankton.<br>• Less competition for these food sources will result in an increase in invertebrates and bivalves.<br>• Animals that feed on anchovies will decrease in number e.g. gulls, waders and bass.<br>• Since they have no other food source they may die.<br>• Ospreys will decrease / die.<br>• Bald eagles will feed more on Sea Ducks so their numbers will decrease meaning less competition for swans so their number will increase<br><br>**Marking bands**<br><br>**5-6 marks.**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>The candidate does not make any attempt or give a relevant answer worthy of credit. | 6 |

**GCSE SCIENCE B HIGHER TIER**

**JANUARY 2015 MARK SCHEME**

**Section A**

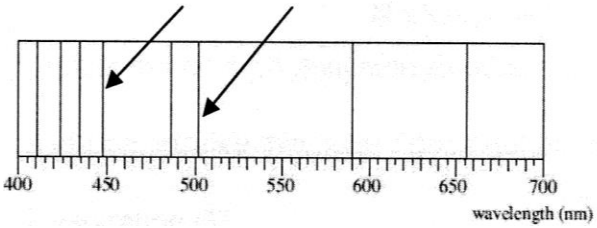
<table>
<tr><th colspan="3">Question</th><th>Marking point</th><th>Marks</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>That is the time <u>photosynthesis</u> occurs [1]</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Light penetrates this layer / does not penetrate lower [1]</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Respiration [1]</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><th>Temperature (˚C)</th><th>Dissolved oxygen (DO) (mg/l)</th></tr><tr><td>0</td><td>14.60</td></tr><tr><td>6</td><td>12.43</td></tr><tr><td>10</td><td>11.27</td></tr><tr><td>14</td><td>10.29</td></tr><tr><td>20</td><td>9.07</td></tr><tr><td>26</td><td>8.09</td></tr><tr><td>30</td><td>7.54</td></tr><tr><td>40</td><td>6.41</td></tr></table>Table [1]<br>DO scale which covers at least half the axis [1]<br>Points [2]<br>Smooth curve [1]</td><td>5</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>As temperature increases the dissolved oxygen decreases / negative correlation (1) non uniformly [1]</td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Between 44-45˚C (from candidate graph)</td><td>1</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>Temperature increases (May-Aug) <u>and</u> then decreases (to Nov) [1] (May to August) DO decreases <u>and</u> then increases (to November) [1] reference to months [1]</td><td>3</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Each line [1] x 4<table><tr><th>Month</th><th>Dissolved oxygen levels (mg/l)</th><th>Condition of fish</th></tr><tr><td></td><td></td><td></td></tr><tr><td>June</td><td>8</td><td>OK</td></tr><tr><td>July</td><td>5</td><td>Stressed</td></tr><tr><td>August</td><td>3</td><td>Choking</td></tr><tr><td>September</td><td>5</td><td>stressed</td></tr></table></td><td>4</td></tr>
</table>

| Question | Marking point | Marks |
|---|---|---|
| (e) | **Indicative content**<br>• Food supply / prey of the anchovies will increase i.e. zooplankton and phytoplankton.<br>• Less competition for these food sources will result in an increase in invertebrates and bivalves.<br>• Animals that feed on anchovies will decrease in number e.g. gulls, waders and bass.<br>• Since they have no other food source they may die.<br>• Ospreys will decrease / die.<br>• Bald eagles will feed more on Sea Ducks so their numbers will decrease meaning less competition for swans so their number will increase<br><br>**Marking bands:**<br><br>**5-6 marks.**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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 terminology and inaccuracies in spelling, punctuation and grammar.<br><br>**0 marks**<br>The candidate does not make any attempt or give a relevant answer worthy of credit. | 6 |

## Section B

| Question | | | Marking point | Marks |
|---|---|---|---|---|
| **2** | (a) | | 230 x 8 = 1840 (W) [1] 1.84 kW [1] | **2** |
| | (b) | | Any value between 316 and 419 | **1** |
| | (c) | (i) | 420 x 20 = 8 400 [1] £84 [1] | **2** |
| | | (ii) | **A** uses half the units of **D** [1] so would only cost £42 to run saving more than the extra cost (in a year) [1]<br>*The points must be correctly and coherently connected to be awarded two marks* | **2** |
| | (d) | | 420 = 1.84 (ecf) x time [1] manipulation [1] answer = 228.26 / 228.3 hours [1] | **3** |
| **3** | (a) | (i) | An increase in population needs more land for housing / more land for food [1] so forest are cleared for land / for farming [1]<br>*The points must be correctly and coherently connected to be awarded two marks* | **2** |
| | | (ii) | Habitats destroyed [1] so less biodiversity [1]<br><br>Also accept less photosynthesis [1] so adds to greenhouse effect / more $CO_2$[1]<br>*The points must be correctly and coherently connected to be awarded two marks* | **2** |
| | | (iii) | Endangered animals are bred [1] so prevents extinction [1]<br>*The points must be correctly and coherently connected to be awarded two marks* | **2** |
| | (b) | | For intensive farming: higher yield / cheaper [2 max]<br>Against: uses artificial chemicals / animal welfare / quality of product [2 max] Question total [3 max] | **3** |
| **4** | | (i) | The % of carbon dioxide has decreased [1] nitrogen <u>and</u> oxygen has increased [1] | **2** |
| | | (ii) | Volcanic eruptions released (nitrogen and) water into the atmosphere [1] which split into hydrogen and oxygen [1] green plants developed and used water and carbon dioxide in photosynthesis [1] so producing oxygen [1]<br>[Question total 3 max]<br><br>*The points must be correctly and coherently connected to be awarded the marks.* | **3** |
| | | (iii) | More carbon dioxide on Venus [1] gases in the atmosphere absorb (infra-red) radiation emitted from planet surface [1] **which is then** re-emitted back to the planet [1]<br>*The points must be correctly and coherently connected to be awarded two marks.* | **3** |

| Question | | | Marking point | Marks |
|---|---|---|---|---|
| **5** | (a) | (i) | No delay in start up | **1** |
| | | (ii) | Flooding of land destroys habitats | **1** |
| | (b) | (i) | 7.30a.m. and 9a.m. 5p.m. - 7.30p.m. ± 15 mins | **2** |
| | | (ii) | Low demand [1] so 'spare' electricity is used [1] | **2** |
| | (c) | | **Indicative content**<br>• Electricity from power station is increased to a higher voltage<br>• Using a step-up transformer<br>• This reduces the current so there is less heating of the cables<br>• Resulting in a lower energy loss<br>• A step down transformer reduces the voltages for users to a safe level.<br><br>**Marking bands:**<br><br>**5-6 marks**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>The candidate does not make any attempt or give a relevant answer worthy of credit. | **6** |

| Question | | | Marking point | Marks |
|---|---|---|---|---|
| **6** | (a) | (i) | Both must be correct for 1 mark<br>  <br> | **1** |
| | | (ii) | Both must be correct for 1 mark 452 & 507 (nm) | **1** |
| | (b) | (i) | (High energy) gamma rays [1] stretched as Universe expanded [1] | **2** |
| | | (ii) | Conversion 0.1cm to 0.001m [1] subs/manipulate [1]<br>answer = $3 \times 10^{11}$ Hz [1] | **3** |

WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk