

Mark Scheme (Final)  
January 2015

Pearson Edexcel International GCSE  
in Biology (4BIO) Paper 2B

Pearson Edexcel Certificate in Biology  
KBIO Paper 2B

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| Question number | Answer  | Notes  | Marks      |
|-----------------|---|--|------------|
| 1(a)            | 1. smoking;<br>2. dust / asbestos / working in mines;<br>3. fumes;<br>4. genetic / lack of A1T;<br>5. bronchitis;                           | Ignore infection   | 2          |
| (b)             | 1. digest / breakdown / kill / destroy;<br>2. bacteria / pathogens / viruses/ microorganisms;<br>3. prevent infection/disease/reproduction; |  | 2          |
| (c)             | 2 268 000;;   | 1 mark for<br><br>0.80 / 80% / $80 \div 100$ /<br>divide by 10 multiply by 8 | 2          |
| (d)             | (i) alveoli / alveolus;<br><br>(ii) 1. less surface area;<br>2. <u>diffusion</u> / gas <u>exchange</u> ;<br>3. (insufficient) oxygen;       | Mark first answer in a list  | 1<br><br>2 |

| Question number | Answer  | Notes   | Marks                          |
|-----------------|---|---|--------------------------------|
| (e)             | 1. <u>memory</u> cells;<br>2. antibodies;<br>3. (production and response) sooner / quickly / faster / more / last longer / eq;  | 2. Allow if production by incorrect cell<br>3. Ignore more robust / more powerful                   | 2                              |
| (f)             | (i)<br>1. less mucus / digests mucus / breaks down mucus / thinner mucus / runny mucus;<br>2. wider airways/tubes / more space / less blockage / open up / eq;<br>3. more air / more oxygen;<br><br>(ii)<br>1. increases concentration of oxygen / increases concentration gradient / more oxygen;<br>2. (more) diffusion / (faster) diffusion / (more) gas exchange; | 2. Ignore easier to breath<br>3. Allow more oxygen into blood<br><br>Greater diffusion gradient = 2 | 2<br><br><br><br><br><br><br>2 |

**Total 15 marks**

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 2(a)            | <p>S scale linear and half grid used for plotting;</p> <p>L lines straight and through points;</p> <p>A axis correct way + units for <u>energy in kJ</u>;</p> <p>P points plotted correctly;</p> <p>K key;</p> | <p>If not linear lose S and P</p> <p>Histogram means lose S and L for Max 3</p> <p>Line to origin means lose L</p>   | 5     |
| (b)             | <p>1. increases energy requirement / eq;</p> <p>2. decreases <u>from 25</u>;</p>   | <p>Increases up to a point and then decreases = 1</p> <p>Decrease/level off at 41 = 0</p>                            | 2     |
| (c)             | <p>1. (more) muscle <u>contraction</u>;</p> <p>2. (more) respiration;</p> <p>3. (more) energy/kilojoules required;</p> <p>4. (more) food / glucose required / eq;</p>  | <p>Allow converse</p> <p>More energy for respiration = 2</p> <p>Ignore reference to age</p> <p>3. Allow calories</p> | 3     |

**Total 10 marks**

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 3(a) (i)        | amino acids / protein / DNA / RNA / nucleic acid;  |   | 1     |
| (ii)            | nitrogen-fixing;   | Allow <i>Rhizobium</i>                                | 1     |
| (b)             | 1. nitrifying (bacteria) / nitrification;<br>2. nitrite (to nitrate);  |   | 2     |
| (c) (i)         | 1. more movement / more (kinetic) energy / eq;<br>2. more collisions / more enzyme substrate complexes / eq;                   |   | 2     |
| (ii)            | 1. <u>denatured</u> ;<br>2. <u>active site</u> ;<br>3. shape altered / bonds broken / eq;<br>4. substrate no longer fits / eq; | 1. Ignore inactive / destroyed<br><br>1. Reject death | 3     |

**Total 9 marks**

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 4(a)            | 1. protect from birds;<br>2. protect from seals;<br>3. keep out wild salmon / other fish to avoid competition;<br>4. keep out wild salmon / other fish to avoid disease; | Ignore reference to terms interspecific / intraspecific predation<br><br>Protect from predators alone = 0 must be qualified<br><br>Ignore stop salmon getting out / salmon eating salmon | 3     |
| (b)             | 1. decrease growth;<br>2. idea that bacteria / decomposers / microorganisms involved;<br>3. respiration;<br>4. less oxygen;  | 1 Ignore death<br><br>2. Ignore pathogens<br><br>4. Ignore disease / infection   | 3     |
| (c)             | 1. remove / dispose / eq;<br>2. prevent spread of fungus/disease /pathogen/infection;  |  | 2     |
| (d)             | wrasse eat (sea)lice;  | Wrasse alone = 0   | 1     |

**Total 9 marks**



| Question number | Answer   |       |       |                    |                      |  | Notes   | Marks       |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
|-----------------|--|-------|-------|--------------------|----------------------|--|---|-------------|-------|-------|--------------------|----------------------|---|--------|----|-------|---|-----|---|------|-------|-----|----|---------|---|--------|-----|-----|------|-------|--|---|
| 5(a)            | <table border="1"> <thead> <tr> <th>tube</th> <th>temperature</th> <th>water</th> <th>light</th> <th>% seeds germinated</th> <th>average height in cm</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>(room)</td> <td>no</td> <td>(yes)</td> <td>0</td> <td>0.0</td> </tr> <tr> <td>B</td> <td>room</td> <td>(yes)</td> <td>yes</td> <td>90</td> <td>2.3(1);</td> </tr> <tr> <td>C</td> <td>fridge</td> <td>yes</td> <td>no;</td> <td>10;;</td> <td>(0.3)</td> </tr> </tbody> </table> |       |       |                    |                      |  | tube  | temperature | water | light | % seeds germinated | average height in cm | A | (room) | no | (yes) | 0 | 0.0 | B | room | (yes) | yes | 90 | 2.3(1); | C | fridge | yes | no; | 10;; | (0.3) | <p>First three columns correct for one mark</p> <p>One mark for two % germination correct</p> <p>Two marks for all % germination being correct</p> <p>One mark for both average height being correct</p> | 4 |
| tube            | temperature  | water | light | % seeds germinated | average height in cm |  |   |             |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
| A               | (room)   | no    | (yes) | 0                  | 0.0                  |  |   |             |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
| B               | room   | (yes) | yes   | 90                 | 2.3(1);              |  |   |             |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
| C               | fridge   | yes   | no;   | 10;;               | (0.3)                |  |   |             |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
| (b)             | <ol style="list-style-type: none"> <li>1. seeds split / seeds burst / sprouts / eq;</li> <li>2. <u>root</u> / <u>radicle</u> seen / grows / eq;</li> <li>3. <u>shoot</u> / <u>plumule</u> / <u>stem</u> seen / grows / eq;</li> </ol>  |       |       |                    |                      |  | <p>Ignore leaf/plant emerges / increase in height / become seedlings</p>                                  | 2           |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |
| (c)             | <p>temperature;</p> <p>water / moisture;</p> <p>light;</p> <p>oxygen;</p>  |       |       |                    |                      |  | <p>Allow one mark for two correctly named and two marks for three correctly named</p> <p>Location = 0</p> | 2           |       |       |                    |                      |   |        |    |       |   |     |   |      |       |     |    |         |   |        |     |     |      |       |  |   |

| Question number | Answer  | Notes   | Marks |
|-----------------|---|---|-------|
| (d)             | 1. they germinate/grow / eq;<br>2. reference to (room) temperature and water; | 1. Ignore same result as tube B<br><br>2. Ignore light / oxygen | 2     |
| (e)             | (no oxygen) no respiration;   |   | 1     |

**Total 11 marks**

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 6(a)            | 1. (waste) milk;<br>2. more bacteria (growth) / more microorganism (growth);<br>3. use of more oxygen / eq;  | Reference to the word more must be present ONCE in 2 or 3 | 2     |
| (b)             | 1. concentration / strength / dilution / volume / mass released;<br>2. temperature / light;<br>3. speed of river flow;<br>4. nitrate content <u>of pollutant</u> / bacterial content <u>of pollutant</u> ;         | Ignore quantity / amount                                  | 1     |
| (c)             | protein / amino acids / lipid / fat / carbohydrate / lactose;  | Allow casein<br><br>Ignore minerals / vitamins / sugar    | 1     |
| (d)             | 1. raw has higher B.O.D. / less oxygen available / more oxygen used;<br>2. more bacteria/microorganisms (in raw sewage) / eq;<br>3. more respiration;<br>4. raw sewage has more nutrients / organic material / eq; | Allow converse<br><br>2. Ignore organisms                 | 2     |

**Total 6 marks**

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