



Mark Scheme (Results)

Summer 2016

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

Pearson Edexcel Level 1/Level 2 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)           | respiration / aerobic respiration / anaerobic respiration;   |  | 1     |
| (b)             | pollination / transfer pollen / eq;  | Ignore reproduction / collect nectar                 | 1     |
| (c)             | 1. producer;<br>2. <u>secondary consumer</u><br>3. <u>tertiary consumer</u> ;  | Reject primary consumer<br>Ignore carnivore          | 2     |
| (d)             | 1. avoids closing unnecessarily / by accident / due to wind / debris / when no insect is present / only closes with an insect / must be a <u>big</u> insect / eq;<br>2. avoids wasting energy / enzymes / digestive fluid; |  | 2     |
| (e)             | 1. solution (more) concentrated / reduced water potential / less water in cell / more ions / minerals / solutes / high salt concentration / eq;<br>2. water enters by <u>osmosis</u> ;                                     | Allow converse for Mp1<br>Ignore water concentration | 2     |

|         |  |   |       |
|---------|--|---|-------|
| (f)     | <p>1. prevent infection / disease / may be pathogenic;</p> <p>2. prevent competition (for food) / prevent loss of energy from insect / prey;</p>                                       | <p>Ignore harm / illness / produce toxins</p> <p>Eg. prevent decomposition of insect / feeding on insect / taking nutrients from insect / digesting insect</p> <p>Ignore digesting / decomposing / feeding on plant</p> | 2     |
| (g) (i) | <p>(slower rate)</p> <p>1. no/less mechanical digestion / mechanical breakdown / not broken into pieces / eq;</p> <p>2. less surface area / small SA:VOL;</p> <p>3. (for) enzymes;</p> | <p>Allow converse</p> <p>Ignore crush / chew</p>  | Max 2 |
| (ii)    | <p>protease / carbohydrase / lipase / eq;</p>  | <p>Allow any named digestive enzyme</p>   | 1     |

|     |  |  |              |
|-----|--|--|--------------|
| (h) | <p>1. temperature;</p> <p>2. (kinetic) energy / collisions / <u>movement</u> of molecules / enzymes / substrates / more enzyme substrate complexes;</p> <p>OR</p> <p>3. size / shape / mass of insect;</p> <p>4. (surface area for) enzyme contact / eq;</p> <p>OR</p> <p>5. composition of insect / type of insect;</p> <p>6. exoskeleton / indigestible;</p> <p>OR</p> <p>7. amount of enzyme / enzyme concentration;</p> <p>8. collisions / more enzyme substrate complexes / eq;</p> | <p>Pairs of Mps are linked</p> <p>Ignore enzymes work faster / denature</p> <p>Ignore pH</p> <p>Ignore shell</p> | <p>Max 4</p> |
|-----|--|--|--------------|

| Question number | Answer                                   | Notes   | Marks |
|-----------------|--|---|-------|
| 2 (a)           | different diet / different species / eq; | <p>Ignore nitrogen</p> <p>Eg. eat different food / eat more food / different amounts of protein / different amounts of nitrogenous food / different amounts of nitrogen compounds in food / one is carnivorous</p> <p>Eg. type of fish / breed of fish / strains of fish / genes in fish / metabolism of fish</p> | 1     |
| (b)             | 28.9 / 28.92;                            | <p>Allow one for 0.4 / 0.0723 / 2.5 in working</p> <p>Allow 28.9 / 28.92 in working for 2 marks if 29 on answer line</p>  | 2     |

|     |  |  |       |
|-----|--|--|-------|
| (c) | <ol style="list-style-type: none"><li>1. plant / algae growth / algal bloom / eq;</li><li>2. algae block light;</li><li>3. less photosynthesis;</li><li>4. decomposers / decomposition / bacteria / microbes / <u>microorganisms</u> / fungi;</li><li>5. respiration; ONCE</li><li>6. oxygen depletion / anoxic; ONCE</li><li>7. death of plants / fish / organisms;</li></ol> |  | Max 5 |
|-----|--|--|-------|



|            |  |  |          |
|------------|--|--|----------|
| <p>(d)</p> | <p>1. dead / attenuated / harmless / inactive / weakened / modified / pathogen / bacteria / microbe / microorganism / virus / eq;</p> <p>2. antigens;</p> <p>3. memory cells;</p> <p>4. secondary immune response / <u>faster immune response / antibody produced faster / sooner / quicker / more ;</u></p> | <p>Dead form of the disease = 0<br/>Dead strain = 0<br/>Ignore dead virus</p> <p>Ignore antibody production in primary immune response</p> | <p>4</p> |
|------------|--|--|----------|

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 3 (a) (i)       | 1. homozygous recessive = 11 / eleven;<br>2. homozygous dominant = 0 / zero / none;  |   | 2     |
|                 | (ii) $(\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}) = 0.125 / 12.5\% / 1/8;$   |   | 1     |
| (b)             | 1. (less) supply of glucose / oxygen;<br>2. (less) <u>aerobic</u> respiration;<br>3. (more) <u>anaerobic</u> respiration;<br>4. less energy / ATP;<br>5. lactic acid / low(er) pH;<br>6. enzymes <u>denature</u> ;<br>7. (muscle) cells die / cannot contract; | 1. ignore supply energy<br><br>Allow idea that before blockage blood supplies oxygen for aerobic respiration for Mp1 and Mp2<br><br>7. Ignore fatigue | Max 5 |

| Question number | Answer  | Notes  | Marks |
|-----------------|---|--|-------|
| 4 (a) (i)       | <u>plastic</u> ;  |  | 1     |
| (ii)            | 1. repeated / ten trays / lots of plants / several trays / eq;<br>2. calculates average / mean;<br>3. discard anomalies / check for anomalies / concordant results / eq;      | Allow outliers   | Max 2 |
| (iii)           | 1. carbon dioxide;<br>2. temperature / heat;<br>3. water / humidity / moisture;<br>4. soil type / soil mass / amount of soil / minerals / ions / fertiliser / <u>soil</u> pH; | Ignore light / time / wind / oxygen<br><br>4. Ignore nutrients | Max 3 |

|     |  |   |              |
|-----|--|---|--------------|
| (b) | <p>1. no light;</p> <p>2. prevents growth of other plants /<br/>less competition from other plants /<br/>fewer weeds /<br/>prevents photosynthesis of other plants;</p> <p>OR</p> <p>3. absorbs heat / warmer soil / insulates /<br/>eq;</p> <p>4. affects enzymes / affects reactions /<br/>affects respiration /<br/>affects movement of molecules;</p> <p>OR</p> <p>5. plastic prevents <u>evaporation</u>;</p> <p>6. soil retains water /<br/>more water for the plants to use;</p> <p>OR</p> <p>7. prevent pest access;</p> <p>8. less plant damage / eq;</p> | <p>Only allow maximum of two<br/>reasons and two explanations</p> <p>Ignore attracts heat</p> <p>Ignore photosynthesis</p> <p>Ignore microorganisms</p> | <p>Max 4</p> |
|-----|--|---|--------------|

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 5 (a) (i)       | the greater the mass the longer the gestation period / positive correlation / eq;  | Allow converse                                 | 1     |
| (ii)            | 1. roe;<br>2. long gestation period / longer than Sika / eq;<br>3. small mass / same mass (as Sika) / mass same as deer with gestation 77 days less / eq;  | long gestation period compared to its mass = 2 | 3     |
| (b)             | 1. <u>diffusion</u> ;<br>2. <u>glucose</u> / <u>oxygen</u> ;<br>3. respiration / energy / ATP;<br>4. amino acids;<br>5. protein synthesis;<br>6. vitamins / named vitamin / minerals / named mineral / fatty acids / glycerol;<br>7. remove <u>carbon dioxide</u> / remove <u>urea</u> ; | 6. Ignore nutrients                            | Max 4 |

Total 8

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 6 (a)           | 6 to 7;  | Allow 0.6 to 0.7 <u>cm</u>                                   | 1     |
| (b)             | retina / fovea / yellow spot / macula;   |  | 1     |
| (c)             | 1. <u>radial</u> muscles contract;<br>2. <u>circular</u> muscles relax;<br>3. pupil gets bigger / wider / dilates / expands / eq;<br>4. more light enters eye; | Ignore references to iris size<br><br>Reject ciliary muscles | Max 3 |

Total 5



