



# Mark Scheme (Results)

Summer 2017

Pearson Edexcel International GCSE  
in Biology (4BI0) Paper 1B  
Science (Double Award) (4SC0) Paper 1B

Pearson Edexcel Level 1/Level 2 Certificate  
Biology (KBI0) Paper 1B  
Science (Double Award) (KSC0) Paper 1B

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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) (i)       | A trachea / windpipe;<br>B bronchus / bronchi;<br>C bronchioles / bronchiole / bronchiol;  | Ignore left / right                | 3     |
| (ii)            | branches / branching;  | Ignore trunks and leaves and roots | 1     |
| (b)             | 1. diaphragm;<br>2. contracts (ONCE);<br>3. flattens / moves down / lowers / eq;<br>4. intercostal muscles;<br>5. ribs move up / out / ribcage expands / eq;<br>6. <u>volume</u> increases;<br>7. <u>pressure</u> decreases;   |                                    | max 4 |
| (c) (i)         | 1. passive smoking / others inhale smoke / eq;<br>2. causes cancer / contains carcinogens;<br>3. asthma / emphysema / COPD / bronchitis / infection / eq;<br>4. carbon monoxide reduces transport of oxygen / binding with haemoglobin / eq;<br>5. causes CVD / heart disease / eq;<br>6. discourage smoking / eq; | Ignore death                       | max 3 |
| (ii)            | 1. slows growth / development / still growing / not fully developed / eq;<br>2. children smaller / lungs are smaller;  |                                    | max 1 |

Total 12 marks

| Question number | Answer   | Notes  | Marks |
|-----------------|--|--|-------|
| 2 (a) (i)       | 1. starch column all no;<br>2. glucose column yes for starch and glucose;<br>3. glucose column no for starch and maltase, and starch and boiled amylase;                   |  | 3     |
| (ii)            | 1. increase / eq;<br>2. water enters / eq;<br>3. osmosis;<br>4. high conc. of <u>water</u> to low conc. of <u>water</u> / <u>water</u> down a concentration gradient / eq; | Allow correct reference to water potential.                          | max 3 |
| (iii)           | 1. Benedict's;<br>2. boil / heat / warm / use waterbath / eq;<br>3. (brick) red means glucose present / blue means glucose absent;   | Allow green / yellow orange<br>Allow Mp2 and Mp3 independent of test | 3     |

|     |  |                       |       |
|-----|--|-----------------------|-------|
| (b) | 1. use lipid + bile + lipase;<br>2. use lipid + lipase;<br>3. use lipid + bile;<br>4. see if fatty acids/glycerol produced;<br>5. measure pH / use (universal) indicator / pH meter /eq;<br>6. leave for same time / stated time <u>eq</u> ; | Ignore test for lipid | max 3 |
|-----|--|-----------------------|-------|

Total 12 marks

| Question number | Answer   | Notes   | Marks   |
|-----------------|--|---|---|
| 3 (a)           | (i)  | 8 / eight;  | 1   |
|                 | (ii)   | 4 / four;   | 1   |
|                 | (iii)  | Gg / heterozygous / heterozygote;   | 1   |
|                 | (iv)   | 0.25 / 25% / ¼ / 1 in 4;  | 1   |
| (b)             | (i)  | 1. rare / random / chance / spontaneous;<br>2. change to DNA / allele / gene / chromosome(s); | Allow genetic information / genome / nucleotides /<br>2                                     |
|                 | (ii)   | characteristic and benefit described;   | eg. black fur for camouflage<br>immunity = 0<br>disease resistant = 1<br>resistant = 0<br>1 |
| (c)             | 1. frequency decreases / fewer alleles;<br>2. (affected) individuals die / few survive;<br>3. less reproduction / fewer offspring / decide not to have children;<br>4. <u>allele</u> not passed on / eq; | individuals do not live long enough to reproduce = 2<br><br>ignore gene not passed on         | max 3   |

Total 10 marks

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 4 (a)           | <p>1. sperm/ male gametes have X or Y / sperm are X and Y;</p> <p>2. eggs / female gametes are X / eq;</p> <p>3. XX is female / mother is XX / X sperm meets X egg produces female;</p> <p>AND</p> <p>XY is male / father is XY / Y sperm meets X egg produces male;</p> | <p>Ignore gene</p> <p>allow MP1 and MP2 from a Punnett square</p>         | max 2 |
| (b)             | <p>1. more sperm;</p> <p>2. sperm have one tail / head;</p>  | <p>Allow converse</p> <p>Ignore damaged / deformed / healthy</p>          | 2     |
| (c)(i)          | <p>24.75 million / 24 750 000 / <math>2.475 \times 10^7</math> / <math>24.75 \times 10^6</math>;;</p>  | <p>Allow one mark for 45% , 45 or 0.45 in working</p>                     | 2     |
| (ii)            | <p>1. fewer moving sperm / less/no movement / swimming;</p> <p>2. fail to reach egg / eq;</p> <p>3. less <u>fertilisation</u> / <u>fertilises</u> ;</p>  | <p>Allow converse</p> <p>ignore lowers fertility as fertility in stem</p> | max 2 |

Total 8 marks



| Question number | Answer  | Notes   | Marks |
|-----------------|---|---|-------|
| 5 (a)           | <p>S y scale linear and at least half grid;</p> <p>L bars drawn with straight lines;</p> <p>A axes labelled percentage/% and age/years and shows age categories;</p> <p>P all bar heights correct;</p> <p>K good, bad or good and bad;</p>            | <p>Lose mark if line graph</p> <p>Allow half square error</p>                                       | 5     |
| (b)             | as people get older more think cloning is a good idea / eq;   | Allow converse  | 1     |
| (c)             | 120;;   | Allow one mark for 15 /15% / 0.15 in working  | 2     |
| (d)             | <p>1. named example;</p> <p>2. <u>nucleus</u> from body/diploid cell put into empty/enucleated egg cell;</p> <p>3. electricity/ shock ;</p> <p>4. mitosis / cell division;</p> <p>5. embryo;</p> <p>6. uterus / womb;</p> <p>7. <u>surrogate</u>;</p> | <p>eg. Dolly, Molly / Polly / Snuppy, Copycat, Ralph, Injaz, Cupid, Diana</p> <p>Reject meiosis</p> | max 6 |

Total 14 marks



|      |   |   |       |
|------|---|---|-------|
| (ii) | <ol style="list-style-type: none"> <li>1. more photosynthesis;</li> <li>2. more light / more sun / eq;</li> <li>3. high(er) temperature which affects enzymes / kinetic energy / molecular movement / collisions / eq;</li> <li>4. stomata open;</li> <li>5. low CO<sub>2</sub> (may) slow photosynthesis / CO<sub>2</sub> limits photosynthesis / eq;</li> </ol> |   |       |
| (d)  | <ol style="list-style-type: none"> <li>1. measure oxygen / starch / change in CO<sub>2</sub> / eq;</li> <li>2. (how measured) count bubbles / volume / gas syringe / iodine / hydrogencarbonate / eq;</li> <li>3. same time / time stated;</li> <li>4. control of named biotic variable;</li> <li>5. control of named abiotic variable;</li> </ol>                | <p>allow glucose</p> <p>allow Benedict's</p> <p>eg. age / mass / SA</p> <p>eg. light / temperature / CO<sub>2</sub></p> | max 4 |

Total 16 Marks

| Question number | Answer  | Notes  | Marks      |
|-----------------|---|--|------------|
| 7 (a)           | 1. more/faster growth in solution with all mineral ions;<br>2. growth levels off / less growth / decrease in growth / growth stops (45 days / 25 days); | Allow converse for Mp1 and Mp2<br><br>Ignore use of numbers alone            | 2          |
| (b)             | 1. oxygen;<br>2. respiration;<br>3. energy / ATP;<br>4. active transport / active uptake;   |  | max 3      |
| (c)(i)          | 1. (kill) algae / bacteria / microorganisms / pathogens / fungi / virus / eq;<br>2. prevent use of ions (by microbes) / prevent infection / disease ;   | Ignore organisms<br><br>allow nutrients<br>Ignore harm / damage/ kill plants | 2<br><br>2 |
| (ii)            | 1. less/no light / exclude light;<br>2. prevent algae growth / prevent photosynthesis / similar to soil / similar condition for roots / eq;             |  |            |
| (d)(i)          | length / height (of stem);  | Ignore growth  | 1          |
| (ii)            | age / species / mass of plant / size of plant / surface area / eq;  | Allow type   | 1          |

Total 11 Marks

| Question number | Answer  | Notes   | Marks   |  |                |            |      |   |          |   |  |   |    |   |
|-----------------|---|---|---|--|----------------|------------|------|---|----------|---|--|---|----|---|
| 8 (a)           | <u>quadrat</u> ; quadrant = 0   |   | 1   |  |                |            |      |   |          |   |  |   |    |   |
| (b) (i)         | <table border="1"> <thead> <tr> <th>Species</th> <th>Number of plants</th> <th>Average (mean) number of plants per m<sup>2</sup></th> </tr> </thead> <tbody> <tr> <td>bunchgrass</td> <td>7</td> <td>0.19</td> </tr> <tr> <td>plantain</td> <td>8;</td> <td>0.22 / 0.222 etc<br/>0.2 with recurring dot;</td> </tr> </tbody> </table> | Species   | Number of plants  | Average (mean) number of plants per m <sup>2</sup> | bunchgrass     | 7          | 0.19 | plantain  | 8;       | 0.22 / 0.222 etc<br>0.2 with recurring dot; |  | 2 |    |   |
|                 | Species   | Number of plants  | Average (mean) number of plants per m <sup>2</sup>        |  |                |            |      |   |          |   |  |   |    |   |
|                 | bunchgrass  | 7   | 0.19  |  |                |            |      |   |          |   |  |   |    |   |
|                 | plantain  | 8;  | 0.22 / 0.222 etc<br>0.2 with recurring dot;               |  |                |            |      |   |          |   |  |   |    |   |
|                 | (ii)  | <table border="1"> <thead> <tr> <th>Species</th> <th>Frequency</th> <th>Percentage (%)</th> </tr> </thead> <tbody> <tr> <td>bunchgrass</td> <td>4;</td> <td>11 / 11.1 /<br/>11.11 etc / 11.1<br/>with recurring<br/>dot;</td> </tr> <tr> <td>plantain</td> <td>8</td> <td>22</td> </tr> </tbody> </table> | Species   | Frequency  | Percentage (%) | bunchgrass | 4;   | 11 / 11.1 /<br>11.11 etc / 11.1<br>with recurring<br>dot; | plantain | 8   |  |   | 22 | 2 |
|                 |   | Species   | Frequency   | Percentage (%)                                     |                |            |      |   |          |   |  |   |    |   |
| bunchgrass      |   | 4;  | 11 / 11.1 /<br>11.11 etc / 11.1<br>with recurring<br>dot; |  |                |            |      |   |          |   |  |   |    |   |
| plantain        | 8   | 22  |   |  |                |            |      |   |          |   |  |   |    |   |

|     |   |  |       |
|-----|---|--|-------|
| (c) | <ol style="list-style-type: none"> <li>1. (several) <u>quadrats</u> / repeated quadrats / eq;</li> <li>2. random;</li> <li>3. use tables / calculator / phone books / generator / eq;</li> <li>4. count / number / how many / cover / density / frequency / eq;</li> <li>5. multiply up to calculate total in large field / multiply up from 36m<sup>2</sup> / eq;</li> </ol> |  | max 4 |
|-----|---|--|-------|

Total 9 Marks

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 9 (a) (i)       | <u>nucleus</u> ;   |   | 1     |
| (ii)            | axon / cytoplasm;  |   | 1     |
| (iii)           | arrow from cell body towards dendrites;                      |   | 1     |
| (b)             | 1. impulse;  | Allow action potential<br>Ignore signal / message   | 2     |
|                 | 2. (to) muscle / gland / effector / eq;                      | reject if other direction described                 |       |
| (c)             | 1. electrical;   | Allow following<br>converses                        |       |
|                 | 2. uses cells / uses neurones / uses nerves / uses CNS / eq; | 1. chemical   |       |
|                 | 3. faster;   | 2. blood  |       |
|                 | 4. specific target / location / eq;                          | 3. slower   |       |
|                 | 5. all or nothing / no dose effect / eq;                     | 4. widespread                                       |       |
|                 | 6. short-lasting / eq;                                       | 5. dose effect                                      |       |
|                 |  | 6. long-lasting;                                    | max 3 |
|                 |  | hormonal is via blood but nervous is electrical = 2 |       |

Total 8 Marks

| Question number | Answer  | Notes                                 | Marks |
|-----------------|---|---------------------------------------|-------|
| 10              | 1. cellulose;<br>2. starch;<br>3. consumers;<br>4. glycogen;<br>5. chromosome / nucleiod;<br>6. plasmids / plasmid;<br>7. photosynthesis / photosynthesising;<br>8. yoghurt / cheese;<br>9. pathogen;<br>10. pneumonia; | Mp 5 must be singular not chromosomes | 10    |

Total 10 Marks

| Question number | Answer   | Notes   | Marks |
|-----------------|--|---|-------|
| 11 (a)          | 1. hyphae / mycelium;<br>2. enzymes;<br>3. extracellular / onto wood / outside organism / eq;<br>4. digest / digestive / breakdown;<br>5. carbon dioxide / water;<br>6. saprotroph / saprophyte / saprobiont / eq;   | 3. Ignore secrete alone<br>4. Ignore decay  | max 4 |
| (b)             | C different fungicides;<br>O same logs / same wood / same tree / same bench / same species / same age of wood / eq;<br>R more than one log used / several logs / repeat / eq;<br>M1 measure mass/weight (of wood) before and after / change in mass/weight (of wood);<br>M2 reference to a stated time period;<br>S1 and S2 same oxygen / temperature / moisture / volume of fungicide / exposed to same fungi / same mass of fungi / eq;; | for each fungicide<br><br><br><br><br>at least a week<br><br>Allow amount<br>ignore light | max 6 |

Total 10 Marks



