



Mark Scheme (Results)

Summer 2021

Pearson Edexcel International GCSE
In Biology (4BI1) 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 | Mark |
|-----------------|---|----------|
| 1(a) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • so that sperm can swim / can reach egg / otherwise they cannot swim / otherwise they cannot reach egg / eq (1) • can fertilise egg / fertilisation can occur / (if abnormal) will not fertilise egg (1) • so (initial) fertility is not reduced / or (if abnormal) fertility of these men will (already) be reduced (1) | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(b)(i) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • thickens / maintains, uterine wall / lining / endometrium / maintains pregnancy / eq (1) • inhibits FSH production / prevents more eggs maturing / eq (1) • inhibits LH production / prevents ovulation / eq (1) | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(b)(ii) | <ul style="list-style-type: none"> • male sex hormone / increase male hormone level (1) • because progestin reduces testosterone / eq (1) | 1 |

| Question Number | Answer | Mark |
|------------------|--|----------|
| 1(b)(iii) | <ul style="list-style-type: none"> • testes / testicles (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(c)(i) | <ul style="list-style-type: none"> • reduce sperm production / eq (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(c)(ii) | <ul style="list-style-type: none"> to measure if sperm count fell / below 1 million per cm^3 / fertility dropped / eq (1) | 1 |

| Question Number | Answer | Mark |
|------------------|---|----------|
| 1(c)(iii) | <ul style="list-style-type: none"> prevent fertilisation / eq, as sperm production may be above 1 million per cm^3 / still high / eq (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(d) | <ul style="list-style-type: none"> to ensure sperm production stays below 1 million per cm^3 / stays low / eq (1) to see if, the treatment / progestin works / lowers sperm production (1) | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---|----------|
| 1(e) | <ul style="list-style-type: none"> $98.4 \times 320/100 = 314.88$ $= 320 - 315$ 5 (2) <p>$100 - 98.4 = 1.6\%$</p> <p>$1.6 \times 320 / 100 = 5.12 = 5$ (2)</p> | <p>Allow 1 mark for 315</p> <p>or 1.6 in working</p> <p>Allow 5.1 or 5.12</p> <p>award full marks for correct answer no working</p> | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1 (f) | <p>An answer that includes any 4 of the following points</p> <p><i>(For / positive about method)</i></p> <ul style="list-style-type: none"> • reduces pregnancy / 98.4 % work / (very) effective / eq (1) • 75% / most men / partners / couples, happy to continue (1) • do not need to be remember to take / eq (1) • does not require surgery / reversible (1) • no need for women to take hormones (1) <p><i>(Against / negative about method)</i></p> <ul style="list-style-type: none"> • side effects / acne / mood disorders / skin infections / skin irritation / eq (1) • does not protect against STI / named disease / eq (1) • suppression phase takes a long time / 26 weeks / eq (1) • may not be reversible / reduce long term male fertility / may take time to reverse / eq (1) | 4 |

total =16 marks

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(a) | An answer that makes reference to two of the following points: <ul style="list-style-type: none"> • cytoplasm (1) • ribosomes (1) • cell membrane (1) • DNA (1) | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(b)(i) | The only correct answer is B bacteria are pathogens <i>A is not correct because it is not possible to conclude that the bacteria are decomposers</i> <i>C is not correct because it is not possible to conclude that the bacteria are microscopic</i> <i>D is not correct because it is not possible to conclude that the bacteria are non-living</i> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(b)(ii) | An answer that makes reference to two of the following points: <ul style="list-style-type: none"> • vaccination / inoculated (1) • (same) antigens / (same) protein (on bacteria) (1) • <u>secondary</u> immune response (1) • memory cells (1) • (make) <u>large numbers</u> antibodies / (make) antibodies produced <u>fast</u> / <u>soon</u> / eq (1) | 4 |

Total = 7 marks

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|------------------------------------|----------|
| 3(a)(i) | An answer that makes reference to the following points: <ul style="list-style-type: none"> • extension / pointed / elongated / eq (1) • increased surface area / increased surface area to volume ratio (1) | Allow from labelled diagram | 2 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|--|--|----------|
| 3(a)(ii) | An answer that makes reference to one of the following points: <ul style="list-style-type: none"> • involve (movement of) water (only) (1) • must pass through cell membrane (1) | Allow converse Allow converse | 1 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|--|----------|
| 3(b)(i) | An explanation that makes reference to three of the following points: <ul style="list-style-type: none"> • more water taken up in light (1) • more water lost in light (1) • evaporation from leaves creates a transpiration stream / transpiration pull / sets up water potential gradient / eq (1) • stomata open in light (1) • (more water is taken up than lost because) water used to fill cells / growth / turgor/ photosynthesis (1) | Allow converse Allow converse Allow converse Ignore refs to temp | 3 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|------------------------|----------|
| 3(b)(ii) | An answer that makes reference to two of the following points: <ul style="list-style-type: none"> • humidity / moisture (1) • temperature (1) • wind / air flow / eq (1) • time (1) | Ignore CO ₂ | 2 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 3(c)(i) | potometer / bubble potometer / volume potometer (1) | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---|----------|
| 3(c)(ii) | An answer that makes reference to three of the following points: <ul style="list-style-type: none"> • measure distance bubble moves (1) • calibrate (scale) / calculate volume by multiplying distance by (cross sectional) area / eq (1) • use reservoir to reset / eq (1) • repeats (to calculate mean) (1) • ref to measuring / stated time (1) | <ul style="list-style-type: none"> • measure volume lost from beaker (1) • use scale on beaker / note volume before and after time period (1) | 3 |

Total = 12 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 4(a) | <ul style="list-style-type: none"> unfiltered increase of 28.5g growth rate in unfiltered $28.5 \div 180 = 0.158$ $0.214 - 0.158 = 0.056$ (3) <p>or $38.5 - 28.5 = 10$ kg</p> <p>$10 \div 180 = 0.056$ allow 0.05 recurring</p> | <p>Allow 1 mark for 28.5 or 10 kg</p> <p>Allow 1 mark for $\div 180$</p> <p>Allow 0.0556 or 0.055 recurring for 3 marks</p> <p>Award full marks for correct numerical answer without working</p> | 3 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 4(b) | <p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> (in unfiltered water there is) less growth / eq (1) less oxygen (1) less respiration (1) more disease / damage gills / eq (1) | 3 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 4(c) | <ul style="list-style-type: none"> species / type / mass of fish (at start) / eq (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 4(d) | <ul style="list-style-type: none"> use a net /cage / shoot predators / make noise / eq (1) | 1 |

Total = 8 marks

| Question Number | Answer | Mark |
|-----------------|--------|------|
| 5(a) | | 1 |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 5(b)(i) | <p>The only correct answer is C 7.5</p> <p><i>A is not correct as is not 2.5</i></p> <p><i>B is not correct as is not 4.5</i></p> <p><i>D is not correct as is not 8.5</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(b)(ii) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • lower / eq (1) • denatured / change in shape of active site / eq (1) • urea does not bind (into active site) / fewer E/S complexes / eq (1) | 2 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|--|---|----------|
| 5(c) | <p>A description that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • nitrogen fixing / fixation (1) • (nitrogen fixing / fixation) nitrogen gas to ammonia (1) • nitrifying / nitrification (1) • (nitrifying / nitrification) ammonia to nitrite / nitrite to nitrate / ammonia to nitrate (1) • denitrifying /denitrification (1) • (denitrifying /denitrification) nitrate to nitrogen gas / reduces nitrogen available to plants / eq (1) | <p>Allow nitrogen to nitrates / amino acids /eq</p> <p>eg nitrifying bacteria convert nitrate to nitrogen gas scores mp 3 but not mp 4</p> | 5 |

Total = 9 marks

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 6(a)(i) | <p>The only correct answer is C</p> <p><i>A is not correct as ultrafiltration does not take place in A</i></p> <p><i>B is not correct as ultrafiltration does not take place in B</i></p> <p><i>D is not correct as ultrafiltration does not take place in D</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 6(a)(ii) | <p>The only correct answer is D</p> <p><i>A is not correct as reabsorption does not take place in A</i></p> <p><i>B is not correct as reabsorption does not take place in B</i></p> <p><i>C is not correct as reabsorption does not take place in C</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 6(b)(i) | <ul style="list-style-type: none"> osmoregulation (1) | 1 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|----------------------|----------|
| 6(b)(ii) | <ul style="list-style-type: none"> removal of metabolic waste / waste from chemical reactions (from cells) (1) | Ignore waste removal | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 6(c) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> collecting duct (1) impermeable / less permeable / no change in permeability / eq (1) less water reabsorbed / water is not reabsorbed / less water back into blood / eq (1) more urine produced / dilute urine produced / more water lost / dehydration / eq (1) blood concentration increases / eq (1) | 4 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 6(d)(i) | <ul style="list-style-type: none">• increases permeability of collecting duct (wall) / becomes permeable / will now be permeable / eq (1) | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 6(d)(ii) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none">• decrease (volume) / less urine / eq (1)• increase concentration / eq (1) | 2 |

Total = 11 marks

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 7(a) | <ul style="list-style-type: none"> population (1) | 1 |

| Question Number | Answer | Mark | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|--|--------------------------------|----------------------|--------------------------------|---------|--|----------------------|--------------------------------|----------------------|--------------------------------|-------|----|----|----|-----------|-----------|----------|----|----|----|-----------|----------|---|----|----|-------|----|--|----|--|----------|
| 7(b)(i) | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Species</th> <th colspan="2">Field A</th> <th colspan="2">Field B</th> </tr> <tr> <th>Number of each plant</th> <th>Percentage (%) of each species</th> <th>Number of each plant</th> <th>Percentage (%) of each species</th> </tr> </thead> <tbody> <tr> <td>daisy</td> <td>19</td> <td>76</td> <td>15</td> <td>32</td> </tr> <tr> <td>dandelion</td> <td>4</td> <td>16</td> <td>18</td> <td>38</td> </tr> <tr> <td>buttercup</td> <td>2</td> <td>8</td> <td>14</td> <td>30</td> </tr> <tr> <td>total</td> <td>25</td> <td></td> <td>47</td> <td></td> </tr> </tbody> </table> <p>Scores one mark for 4 and 2 (1) Scores one mark for 32(%) (1)</p> | Species | Field A | | Field B | | Number of each plant | Percentage (%) of each species | Number of each plant | Percentage (%) of each species | daisy | 19 | 76 | 15 | 32 | dandelion | 4 | 16 | 18 | 38 | buttercup | 2 | 8 | 14 | 30 | total | 25 | | 47 | | 2 |
| Species | Field A | | Field B | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Number of each plant | Percentage (%) of each species | Number of each plant | Percentage (%) of each species | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| daisy | 19 | 76 | 15 | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| dandelion | 4 | 16 | 18 | 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| buttercup | 2 | 8 | 14 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| total | 25 | | 47 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|--------------------------|----------|
| 7(b)(ii) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> (although) both / A and B, have 3 different species / same number of species / eq / (1) B (is more diverse) because it has more even / similar numbers of each species / eq (1) | Allow converse | 2 |

| Question Number | Answer | additional guidance | Mark |
|-----------------|---|---|----------|
| 7(c) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • named mineral / nitrate / magnesium (1) • correct function / amino acids/ protein / chlorophyll / photosynthesis /eq (1) | <p>Allow other correct named minerals</p> <p>award mp 2 only if correct mineral given</p> <p>Ignore nitrogen e.g. Nitrogen for amino acids is one mark only</p> | 2 |

total = 7 marks

