## Paper 2 B2H Higher

| Question number | Answer | Mark |
|---|---|---|
| 1(a)(i) | B | (1) |

| Question number | Answer | Mark |
|---|---|---|
| 1(a)(ii) | to pump blood around the body under higher pressure | (1) |

| Question number | Answer | Mark |
|---|---|---|
| 1(a)(iii) | An answer that combines the following points of understanding to provide a logical description:<br>• blood would flow backwards from the ventricle to the atrium/blood will leak through (1)<br>• less (oxygenated) blood would be pumped to the body (1) | (2) |

| Question number | Answer | Mark |
|---|---|---|
| 1(b) | An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark):<br>• the blood vessel has thick walls/small lumen (1)<br>• to carry oxygenated blood/to carry blood under higher pressure (1) | (2) |

| Question number | Answer | Mark |
|---|---|---|
| 1(c) | • the fish heart has two chambers rather than four chambers (1)<br>• the fish heart only has one ventricle and one atrium rather than two ventricles and two atria (1)<br>• only deoxygenated blood flows through the fish heart (1)<br>• the fish heart shows a single circulatory system rather than a double circulatory system (1) | (4) |


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| Question number | Answer | Mark |
|---|---|---|
| **2(a)(i)** | • person 2 had a slightly higher blood glucose level than person 1 after fasting (by up to 0.2 mmols/l) (1) | **(1)** |

| Question number | Answer | Mark |
|---|---|---|
| **2(a)(ii)** | • person 3 had a much higher blood glucose level than person 1 two hours after taking glucose (up by up to 5.6 mmols/l) (1) | **(1)** |

| Question number | Answer | Mark |
|---|---|---|
| **2(a)(iii)** | Insulin | **(1)** |

| Question number | Answer | Mark |
|---|---|---|
| **2(b)(i)** | An answer that combines points of interpretation/evaluation to provide a logical description:<br>• levels remain low up until day 14 then rise (1)<br>• they continue to rise to day 23 and drop at day 24 (1) | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **2(b)(ii)** | An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark):<br>• as ovulation occurs (1)<br>• the levels of progesterone released from the corpus luteum increases to maintain the lining of the uterus (1) | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **2(b) (iii)** | An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark):<br>• progesterone levels fall after day 23 to 17.11 (1)<br>• so uterus wall thickness is not maintained and therefore pregnancy has not occurred (1) | **(2)** |


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| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(a)(i)** | 25 × 25 = 625 (1)<br><br>1 ÷ 625 = 0.0016 (1) | award full marks for correct numerical answer without working | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **3(a)(ii)** | An answer that combines points of interpretation/evaluation to provide a logical description:<br>• as light intensity decreases the rate of photosynthesis also decreases (1)<br>• after 20 cm away when light intensity appears to have little effect on the rate of photosynthesis (1) | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **3(a)(iii)** | Use a light meter/lux meter | **(1)** |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **3(a)(iv)** | An explanation that combines identification – improvement of the experimental procedure (1 mark) and justification/reasoning which must be linked to the improvement (1 mark):<br>• collect the gas/oxygen produced in a graduated gas syringe (1)<br>• to reduce the errors generated when counting bubbles which maybe of different sizes (1) | accept alternative gas collection method with measuring cylinder and beehive shelf<br><br>accept leave the apparatus for a longer amount of time | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **3(b)** | An explanation that combines identification via a judgment (1 mark) to reach a conclusion via justification/reasoning (1 mark):<br>• the volume of gas produced would decrease to below four bubbles (1)<br>• because light is needed for photosynthesis (1) | **(2)** |


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| Question number | Answer | Mark |
|---|---|---|
| **4(a)** | An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark):<br>• same temperature to act as control (1)<br>• to provide the optimum temperature for enzyme action in the peas (1) | **(2)** |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **4(b)(i)** | • headed table with units (1)<br>• accurately completed table (1)<br><br>A / B / C<br>$O_2$ used /ml at 10 mins: 0.8 / 0.1 / 0.0<br>$O_2$ used /ml at 20 mins: 1.6 / 0.1 / 0.0<br>$O_2$ used /ml at 30 mins: 2.4 / 0.1 / 0.0 | negative values do not need to be shown if table heading states oxygen used/lost<br><br>accept time in row 1 as an alternative | **(2)** |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **4(b)(ii)** | 2.4 ÷ (30 × 60) (1)<br><br>= 0.0013 (ml/second) (1) | accept 1.6 ÷ (20 × 60)<br>accept 0.8 ÷ (10 × 60)<br><br>award full marks for correct numerical answer without working<br><br>maximum one mark if no unit conversion | **(2)** |


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| Question number | Answer | Mark |
|---|---|---|
| **4(b)(iii)** | An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark):<br>• the peas in respirometer A are germinating so using up oxygen (1)<br>• during the process of respiration to release energy for growth (1) | **(2)** |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **4(c)** | Any one improvement from:<br>• soda lime (1)<br>• cotton wool soaked with potassium hydroxide (1) | accept other relevant chemical that would remove carbon dioxide | **(1)** |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **5(a)(i)** | • 156 ÷ 10 (1)<br>• 16 units (1)<br>Answer to two significant figures | award full marks for correct numerical answer without working | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **5(a)(ii)** | An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark):<br>• an increase in the units of insulin injected would cause more blood glucose to be converted to glycogen and stored in the liver/muscles (1)<br>• leading to blood glucose levels becoming critically low/person would become hypoglycemic (1) | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **5(b)(i)** | B | **(1)** |


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| Question Number | Indicative content | Mark |
|---|---|---|
| ***5(b)(ii)** | Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.<br><br>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.<br>**AO1 (6 marks)**<br><br>• the thyroid gland produces thyroxine<br>• thyroxine helps to regulate metabolic rate<br>• low levels of thyroxine should stimulate the production of TRH<br>• TSH being produced and more thyroxine being released<br>• an underactive thyroid would cause less thyroxine to be produced<br>• metabolic rate to drops<br>• less energy (calories) are needed for tasks<br>• more fat storage so the person gains body mass | **(6)** |

| Level | Mark | Descriptor |
|---|---|---|
| | 0 | No rewardable material. |
| Level 1 | 1–2 | • Demonstrates elements of biological understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1)<br>• Presents an explanation with some structure and coherence. (AO1) |
| Level 2 | 3–4 | • Demonstrates biological understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1)<br>• Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1) |
| Level 3 | 5–6 | • Demonstrates accurate and relevant biological understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1)<br>• Presents an explanation that has a well–developed structure which is clear, coherent and logical. (AO1) |


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| Level | Mark | Descriptor |
|---|---|---|
| | 0 | No awardable content |
| Level 1 | 1–2 | • The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question.<br>• Lines of reasoning are unsupported or unclear. (AO2) |
| Level 2 | 3–4 | • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question.<br>• Lines of reasoning mostly supported through the application of relevant evidence. (AO2) |
| Level 3 | 5–6 | • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question.<br>• Lines of reasoning are supported by sustained application of relevant evidence. (AO2) |

| **Question number** | **Answer** | **Mark** |
|---|---|---|
| **6(a)(i)** | B | **(1)** |

| **Question number** | **Answer** | | **Mark** |
|---|---|---|---|
| **6(a)(ii)** | An explanation that combines identification - application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark):<br><br>• fish produce ammonia as a waste product which the bacteria convert (into nitrites then nitrates) (1)<br>• this prevents the pH from getting too high and prevents the fish from dying (1) | accept pH above 7.4 | **(2)** |


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| Question number | Answer | Mark |
|---|---|---|
| **6(a)(iii)** | An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark):<br><br>• the aquatic plant will take up nitrates by active transport (1)<br>• against the concentration gradient/from where there is a low concentration to where there is a high concentration of nitrates (1) | **(2)** |

| Question number | Answer | Additional guidance | Marks |
|---|---|---|---|
| **6(b)** | An answer that combines the following points of application of knowledge and understanding to provide a logical description:<br><br>• a description of the use of a quadrat either by random sampling or using a belt transect (1)<br>• a sample size 10–100 and count the number of clover plants in each quadrat (1)<br>• multiplication factor dependent on the number of quadrats sampled (1) | to gain maximum marks steps must be in a logical sequence | **(3)** |

| Question number | Answer | Mark |
|---|---|---|
| **6(c)** | An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (3 marks):<br><br>• clover/leguminous plants could be used in crop rotation (1)<br>• where at intervals (2–3 years) a field is planted with clover/leguminous plants and left fallow (1)<br>• the clover/leguminous plants will have colonies of nitrogen fixing bacteria which will produce nitrates (1)<br>• the nitrates will increase the fertility of the soil and negate the need for atrificial fertilisers (1) | **(4)** |


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