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# Mark Scheme (Results)

## November 2020

Pearson Edexcel International GCSE
In Human Biology (4HB1)
Paper 02

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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.

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<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><th>Name of disease</th><th>Type of organism</th><th>Method of transmission</th></tr>
<tr><td>malaria</td><td>protozoan;</td><td>mosquito;</td></tr>
<tr><td>poliomyelitis</td><td>virus;</td><td>air/water;</td></tr>
<tr><td>typhoid</td><td>bacterium;</td><td>food/water/housefly;</td></tr>
</table>
</td><td>For methods of transmission:<br><br>Allow anopheles/vector<br><br>Allow droplets for water<br><br>Allow vector for housefly</td><td>6</td></tr>
<tr><td>(b)</td><td>• caused by a fungus (1)<br>• (antibiotics) only effective against bacteria/ not effective against fungi (1)</td><td>Allow (antibiotics) do not kill fungi</td><td>2</td></tr>
</table>

Total 8 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 2 (a) (i) | C; (lipase) | | 1 |
| (ii) | A; (carbon, hydrogen, oxygen) | | 1 |
| (iii) | C; (liver) | | 1 |
| (b) | • show effect of enzyme (1)<br>• show that bile salts on their own don't break down fat (1) | Ignore control | 2 |
| (c) | • create alkaline/optimum pH (1)<br>• for enzyme to work quickly (1) | Allow increases/adjusts pH | 2 |
| (d) | • increase rate of digestion (1)<br>• with no bile salts change occurred after 15 minutes/digested more slowly in tube A (1)<br>• occurred after 5 minutes with bile salts present/digested more quickly in tube B (1) | | 3 |

Total 10 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 3 (a) (i) | C; (red blood cells) | | 1 |
| (ii) | any three from<br>• more carbon dioxide (1)<br>• less oxygen (1)<br>• moister (1)<br>• warmer (1) | | 3 |
| (iii) | • large surface area (1)<br>• thin (walled)/wall one cell thick (1)<br>• good blood supply (1)<br>• moist lining (1) | | 3 |
| (b) | • thin wall (1)<br>• narrow lumen (1) | Allow references to only one blood cell passing through | 2 |
| (c) | • breathing (out)/exhalation more difficult/not smooth/shortness of breath/faster breathing rate (1)<br>• as lungs would not squeeze out air/forced exhalation(1) | | 2 |

Total 11 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 4 (a) (i) | • axes labelled (1)<br>• suitable scale (1)<br>• axes correct way round (1)<br>• correct plots (1)<br>• lines labelled/key given (1) | | 5 |
| (ii) | any two from<br>• <u>volume</u> of water (1)<br>• mass of carbohydrate/aspirin (1)<br>• temperature (1)<br>• time interval between each reading (1) | Allow type of aspirin<br>Allow amount as an alternative to mass<br>Ignore concentration | 2 |
| (iii) | pH (1) | | 1 |
| (b) | • (aspirin) dissolves/reduces pH more quickly (1)<br>• (when combined) with sucrose (1)<br>• so will act more quickly/relieves pain faster (1) | | 3 |

Total 11 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 5 (a) (i) | Eustachian tube (1) | | 1 |
| (ii) | any three from<br>• pinna (1)<br>• semi-circular canals (1)<br>• auditory nerve (1)<br>• cochlea (1) | Ignore oval/round window/ultriculus / stacculus<br>Allow organ of corti | 3 |
| (b) (i) | 4 of<br>• transmit vibration (1)<br>• from ear drum/tympanum (1)<br>• across middle ear/to (named) ossicles (1)<br>• to oval window/cochlea (1)<br>• amplify vibration (1) | | 4 max |
| (ii) | A; (air) | | 1 |
| (c) | • equalises pressure (1)<br>• either side of eardrum (1)<br>• which allows it to vibrate/transmit vibrations (1) | Allow tympanic membrane | 3 |

Total 12 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 6 (a) (i) | A; (brain) | | 1 |
| (ii) | B; (endocrine) | | 1 |
| (b) (i) | • 75 (from weight of man) (1)<br>• 320 × 2 (extra from drinking beer) (1)<br>• 715cm$^3$ (1) | | 3 |
| (ii) | • 715 - 75 (1)<br>• (640 ÷ 75) × 100 (1)<br>• = 853% (1) | | 3 |
| (c) | any two from<br>• increases permeability of collecting duct (1)<br>• more water reabsorbed (1)<br>• into blood (1) | | 2 |
| (d) | any two from<br>• red blood cells loses water (1)<br>• become distorted (1)<br>• less oxygen transported (1)<br>• volume of plasma decreases (1)<br>• blood becomes thicker/more difficult to circulate(1)<br>• increase in blood pressure (1) | Ignore less water in blood<br>Allow water potential decreases | 2 |
| (e) | any three from<br>• waste products continue to be produced (1)<br>• toxic (1)<br>• need to be removed in urine (1)<br>• less reabsorption of water (1)<br>• less ADH produced (1) | Allow named waste product(s) | 3 |

Total 15 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 7 (a) | • plasma contains no cells (1)<br>• plasma colourless/whole blood red (1) | Allow reverse for whole blood | 2 |
| (b) | any six from<br>• blood of patient contains antibodies (1)<br>• (antibodies) bind to Ebola/virus antigens/antibody-antigen complex formed/antibodies complementary to (virus) antigens (1)<br>• phagocytes engulf (antibody-antigen complex) (1)<br>• Ebola/virus destroyed (1)<br>• testing of patient's blood ensures no disease present/prevents transfer of disease (1)<br>• removal of red blood cells ensures no reaction when blood transfused/no agglutination (1)<br>• anti-Ebola antibodies in transfused blood help person with disease to recover (1)<br>• more effective than medicine (1)<br>• quicker effect (1) | Ignore fight disease/virus<br><br>Allow passive artificial immunity | 6 |

Total 8 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 8 (a) | any three from<br>• change in base sequence/named mutation (1)<br>• of DNA (1)<br>• causing change in genotype/gene (1)<br>• incorrect protein produced (1)<br>• change in phenotype/characteristics (1) | Allow change in DNA for mps 1 and 2 (1) | 3 |
| (b) (i) | father $X^HY$ mother $X^HX^h$ (1)<br>gametes $X^H$ Y $X^H$ $X^h$ (1)<br>F1 $X^HX^H$ normal female; $X^HX^h$ carrier female; $X^HY$ normal male; $X^hY$ haemophiliac male (1) | | 4 |
| (ii) | (chance of first and second child is) ¼/0.25/25% (1)<br>for both is ¼ x ¼/0.25 x 0.25 (1)<br>= 1/16/0.0625/6.25% (1) | | 3 |
| (c) | any five from<br>• males only have one X chromosome (1)<br>• two X chromosomes/H and h needed to be a carrier (1)<br>• recessive allele/h (1)<br>• carried on X chromosome (1)<br>• either present or not (1)<br>• no chance for dominant allele to be present (1)<br>• to mask recessive (1) | | 5 |

Total 15 marks

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