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Mark Scheme (Results)

November 2020

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

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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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Question number	Answer	Notes	Marks
1 (a)	any three from • oesophagus (1) • stomach (1) • small intestine/ileum/duodenum (1) • large intestine/rectum (1)		3
(b) (i)	protease/pepsin/trypsin (1)		1
(ii)	• chewing/grinding/mastication (1) • (mix with) saliva (1) • digestion of starch (1) • to maltose (1)		4
(c)	any three from • provides bulk (1) • helps peristalsis (1) • prevents constipation (1) • reduces risk of bowel cancer (1)		3

Total for question = 11 marks

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<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a) (i)</td><td>• genetic material made of RNA (1)
• no DNA (1)</td><td></td><td>2</td></tr>
<tr><td>(ii)</td><td><table><tr><th>Disease</th><th>Blood Tested (✓)</th></tr><tr><td>anaemia</td><td></td></tr><tr><td>cystic fibrosis</td><td></td></tr><tr><td>gonorrhoea</td><td>✓</td></tr><tr><td>HIV</td><td>✓</td></tr><tr><td>scurvy</td><td></td></tr></table></td><td>-1 for each extra tick</td><td>2</td></tr>
<tr><td>(iii)</td><td>• donor/blood transfused into person with Ebola (1)
• needs to be compatible/matched/same group/not rejected (1)
• otherwise agglutination/clumping occurs (1)</td><td>R clotting</td><td>3</td></tr>
<tr><td>(iv)</td><td>• cause blood cells to burst/cells are damaged/destroyed/lose structure (1)
• results in loss of function (1)</td><td></td><td>2</td></tr>
<tr><td>(v)</td><td>• antibodies in donated blood (1)
• can destroy virus in infected person (1)</td><td></td><td>2</td></tr>
<tr><td>(b)</td><td>• uracil present, not thymine (1)
• guanine would pair with cytosine/adenine with uracil (1)
• percentage of G and C/A and U would be the same (1)</td><td></td><td>3</td></tr>
</table>

Total for question = 14 marks

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Question number	Answer	Notes	Marks
3 (a) (i)	A (1) (aorta) B it is not the pulmonary artery C it is not the pulmonary vein D it is not the vena cava		1
(ii)	C (1) (right atrium) A it is not connected to the left atrium B it is not connected to the left ventricle D it is not connected to the right ventricle		1
(b) (i)	circle drawn beyond by-pass vessel and around end of coronary vessels (1)		1
(ii)	• no/less blood to heart <u>muscles</u> (1) • no/less oxygen/glucose transported (1) • no/less CO_2 removed (1)		3
(iii)	• takes blood beyond blockage (1) • to supply heart muscles (1)		2

Total for question = 8 marks

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Question number	Answer	Notes	Marks
4 (a)	• bell-shaped line (1) • peak at 37°C ± 3°C (1)		2
(b)	• increase in temperature (1) • molecules have more (kinetic) energy (1) • more collisions (1) • more enzyme-substrate complexes formed (1) • greater rate of activity (1)		5
(c)	• hot (1) • because optimum temperature is between 60-75°C (1)		2

Total for this question = 9 marks

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Question number	Answer	Notes	Marks
5 (a) (i)	• axes labelled (1) • suitable scale (1) • independent variable on X axis (1) • correct plots (2) • suitable curve (1)	-1 for each incorrect plot	6
(ii)	• mean/average calculated (1) • reliable / reproducible / repeatable (1) • eliminate anomalies (1)		2
(b) (i)	70 x 100 (1) 90 78%/77.78/77.8 (1)	correct answer = full marks	2
(ii)	• travels in the blood (1) • time to reach/affect nerve (1)	R heart	2
(c)	• carries impulses to heart muscle (1) • reduces rate of contraction (1)		2

Total for question = 14 marks

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Question number	Answer	Notes	Marks
6 (a) (i)	any three from • prevents excessive loss of blood (1) • forms scab over wound (1) • prevents entry of bacteria /pathogens/microorganisms(1) • so prevents infection (1) • allows wound to heal (1)		3
(ii)	• (allele) on X/sex chromosome (1) • passed on to offspring/inherited by children (1)		2
(b) (i)	D; (X^hY) A the genotype is not X^hX^h B the genotype is not X^HX^h C the genotype is not X^HY		1
(ii)	B; (X^HX^h) A the genotype is not $X^h X^h$ C the genotype is not X^HY D the genotype is not X^hY		1
(iii)	• offspring genotypes X^HX^h and X^hY (1) • 1 carrier female to 1 haemophiliac male = 50%/0.5/½ (1)	full marks for correct figures only.	2
(iv)	• unusual for female to be haemophiliac (1) • both alleles have to be affected (1) • must have a haemophiliac father and mother with haemophilia/carrier (1)	any correct reference to excessive blood loss	3

Total for question = 12 marks

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Question number	Answer	Notes	Marks
7 (a) (i)	• allows protein to stay longer in stomach/gut (1) • gives time for full digestion (1)		2
(ii)	• diet largely/entirely milk when young (1) • changes to solids when older (1)		2
(iii)	• biuret test (1) • add reagent to solid (1) • blue to lilac/pale purple (1)		3
(b) (i)	• temperature (1) • volume of milk (1) • volume/concentration of chymosin (1)		3
(ii)	$\frac{238 + 232 + 241 + 229}{4}$ (1) = 235 (1)		2
(iii)	not included when calculating mean (1)		1
(iv)	bubbles of different sizes/volume of CO_2 variable (1)		1

Total for this question = 14 marks

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Question number	Answer	Notes	Marks
8 (a) (i)	arrow pointing from top to bottom (1)		1
(ii)	• provides energy/ATP (1) • for synthesis of acetylcholine/neurotransmitter (1) • movement of vesicles/exocytosis (1)		3
(b) (i)	• impulses can't pass to intercostal muscles/diaphragm (1) • unable to contract and move ribs/increase volume of thorax/chest (1)		2
(ii)	• prevents breakdown of neurotransmitter/acetylcholine (1) • which can compete with curare for/binds to, receptor sites (1)		2

Total for this question = 8 marks

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