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# Mark Scheme (Results)

## January 2023

Pearson Edexcel International GCSE
In Human Biology (4HB1)
Paper 01

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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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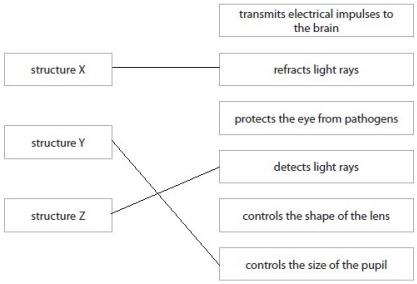
| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 1 (a) (i) |  | | 3 |
| (ii) | A;<br><br>B, C and D do not describe stereoscopic vision. | | 1 |
| (b) (i) | build-up of protein/cloudy/opaque;<br>in the lens; | | 2 |
| (ii) | surgery/operation to replace the lens/lens replacement; | | 1 |
| (iii) | 39 000$^{0}$000 x 43 ÷ 100;<br>16.77 million/16.8 million/16 770 000; | | 2 |
| (iv) | vitamin A; | | 1 |

Total 10 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 2 (a) (i) | movement/swimming; | | 1 |
| (ii) | C;<br>A, B and D do not release energy | | 1 |
| (iii) | three from:<br>• produces a haploid cell / reduces the number of chromosomes by half/to 23;<br>• so at fertilisation the diploid/full number of/46 chromosomes is restored;<br>• prevents doubling of chromosomes at fertilization;<br>• introduces (genetic) variation; | | 3 |
| (b) (i) | sperm<br>egg<br>X / Y<br>X / XX / XY<br>X / XX / XY<br>; | One for egg<br>One for sperm<br>One for the offspring | 3 |
| (ii) | Two from:<br>• acrosome;<br>• contains enzymes;<br>• digests/breaks down the egg cell membrane; | | 2 |

Total 10 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 3 (a) (i) | B:<br>A, C and D are not correct as bile is not produced in the gall bladder, small intestine or stomach. | | 1 |
| (ii) | Three from:<br>• <u>emulsifies/emulsification</u> fat/lipid;<br>• increases surface area (of fat/lipid);<br>• for lipases/enzymes to digest/work;<br>• neutralises the contents from the stomach; | | 3 |
| (b) (i) | • it contains starch;<br>• it contains protein;<br>• it does not contain reducing sugars/glucose; | | 3 |
| (ii) | • contains amylase/carbohydrase;<br>• digested/breaks down the starch;<br>• into glucose/maltose; | | 3 |
| (c) | Five from:<br>• peristalsis;<br>• of the food bolus;<br>• (circular) muscles (behind the bolus) contract to push it along;<br>• fibre is indigestible/not broken down;<br>• adds bulk;<br>• stimulates muscles to contract; | | 5 |

Total 15 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 4 (a) (i) | cell wall/capsule/slime coat; | | 1 |
| (ii) | 55 ÷ 30 000 = 0.0018:<br>1.8/1.83/1.833; | | 2 |
| (b) (i) | more densely/higher populated/more people/overcrowded/more waste/rubbish/sewage; | | 1 |
| (ii) | • fly lands on faeces (of person with a stomach ulcer);<br>• transfers the bacteria to food;<br>• person ingests the contaminated food; | | 3 |
| (c) (i) | Two from:<br>• high/medium levels in less well developed/poorer countries;<br>• where sewage treatment is less effective/water not clean/poor sanitation;<br>• more densely/highly populated;<br>• healthcare/vaccines to treat infected people is less effective/available; | accept reverse arguments | 2 |
| (ii) | Five from:<br>• bacteria mutate/acquire resistant plasmids;<br>• people do not finish the course/over-use of antibiotics;<br>• resistant bacteria survive (and non-resistant bacteria die);<br>• (resistant bacteria) reproduce/multiply;<br>• offspring are antibiotic resistant/not affected by antibiotics;<br>• antibiotic that will be effective is needed/used;<br>• more serious infection occurs; | | 5 |

Total 14 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 5 (a) (i) | • use people from a range of ages;<br>• hearing test using high frequency sounds;<br>• control other variables e.g. sex, other health issues/same distance from sound source; | | 3 |
| (ii) | exposure to loud noises/genetic cause/infection | | 1 |
| (b) (i) | • vibrations of the eardrum not transferred to the ossicles;<br>• vibrations are not transferred to the cochlea;<br>• hair cells are not stimulated/impulses not generated/not transferred to the auditory nerve/brain; | | 3 |
| (ii) | Two from:<br>• conditions are moist/warm;<br>• ideal conditions for bacterial growth/to multiply;<br>• pathogens/bacteria more likely to get trapped; | | 2 |
| (iii) | Three from:<br>• semi-circular canals;<br>• contain fluid (in three tubes);<br>• as the head moves so does the fluid;<br>• transmits the information to the brain/cerebellum;<br>• (cerebellum)co-ordinates a response to maintain balance/control balance; | | 3 |

Total 12 marks

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| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 6 (a) (i) | 18-12;<br>6; | accept 17.8/17.9 | 2 |
| (ii) | Two from:<br>• volume of milk;<br>• volume of the starter culture/live yoghurt;<br>• type of starter culture<br>• type of milk;<br>• type of live yoghurt;<br>• mixing; | reject 'amount' | 2 |
| (iii) | • repeat the investigation at more temperatures;<br>• between 20°C and 60°C; | | 2 |
| (iv) | • heated to kill (unwanted) bacteria in the milk;<br>• cooled so that the bacteria in the starter culture are not killed; | | 2 |
| (b) | Any two from:<br>• pH 4.4 inhibits the bacteria/bacterial growth;<br>• denatures enzymes;<br>• changes the shape of the active sites<br>• lactose cannot bind to the enzyme/no enzyme-substrate complexes formed; | | 2 |
| (c) (i) | Any two from:<br>• the beads can be re-used;<br>• product doesn't need to be treated to remove the enzyme;<br>• large surface area to increase the rate of reaction;<br>• enzyme more temperature stable; | | 2 |
| (ii) | • long/villi/microvilli to increase surface area;<br>• concentration gradient maintained with blood flow;<br>• short diffusion distance; | | 3 |

Total 15 marks

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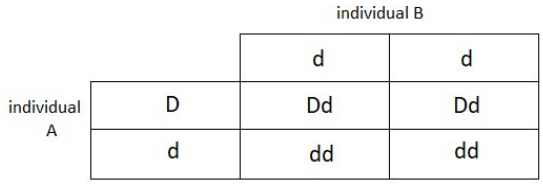
| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 7 (a) | Any three from:<br>• changes the DNA/base/codon sequence;<br>• changes the order of the amino acids/different amino acid coded for;<br>• changes the function/shape of the protein/different protein;<br>• affects a characteristic or function/genotype in the individual; | | 3 |
| (b) (i) | Two from:<br>• dialysis has to be completed several times a week/transplant permanent;<br>• increased life expectancy;<br>• less restrictions on diet;<br>• better quality of life/freedom to move around/normal lifestyle; | | 2 |
| (ii) | 100 x 3233÷4733;<br>= 68.3/68 | | 2 |
| (iii) | Two from:<br>• people have two kidneys;<br>• two recipients from one donor;<br>• living donation/can live with just one; | | 2 |
| (c) (i) | 0.5:1; | Accept 1:2 | 1 |
| (ii) | <br>• correct genotype individual A;<br>• correct genotype individual B;<br>• 50% offspring heterozygous/correct genotype and affected;<br>• 50% homozygous recessive/correct genotype and not affected; | | 4 |

Total 14 marks

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