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Mark Scheme (Results)

Summer 2023

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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Question number	Answer	Notes	Marks
1	testis; oviduct; vagina; uterus; urethra; prostate;	Spelling must be correct	6

Question number	Answer	Notes	Marks
2 (a)	• $\frac{6.1}{100}$; • x85; • 5.2;	Allow ecf for mps 2 and 3 If 5.18 given for mp3 then max 2 marks Full marks for correct final answer	3
(b)	• add sample to boiling tube; • add biuret solution; • purple if present, (remains blue if absent);		3
(c)	• $\frac{100}{16}$; • = 6.25/7;	ecf 1 mark max for correct final answer to a division calculation	2
(d)	Any five from: • contains calcium; • contains vitamin D; • vitamin D allows calcium uptake/absorption (from intestine); • calcium absorbed/stored in bones/used to form compact bone; • to strengthen bones/increases bone density; • also contains protein which is required for (bone) development/growth;	Allow makes bones less brittle	5

Total 13

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Question number	Answer	Notes	Marks
3 (a)	Any two from: • diseases caused by pathogens/bacteria/viruses; • diseases can be transferred from one person to another; • diabetes caused by failure to produce insulin/not caused by pathogen;		2
(b) (i)	• 25%/1 in 4 don't know; • $\frac{25 \times 5\,000\,000;}{100}$ **OR** $\frac{5\,000\,000;}{4}$ • = 1.25 (million);	ecf max 1 mark for correct final answer to a calculation	3
(ii)	• $\frac{10 \times 5\,000\,000;}{100}$ • = 0.5 (million);	ecf max 1 mark for wrong calculation but correct answer to the calculation	2
(c) (i)	glucose;		1
(ii)	Any two from: • reference to change in the level of fluid in the eye/ear/leakage of blood into the eye; • blood vessels/neurones in ear/cochlea/eye/retina may be damaged; • reduced blood flow to eye/ear/less nutrients/oxygen delivered;		2
(iii)	Any three from: • glucose/sugar in filtrate/urine; • water moves from cells/tissues into filtrate/urine; • reference to water potential in filtrate/kidney being lower than in surrounding tissue/less water reabsorbed;	Allow reference to water moving from high to low water potential	3

Total 13

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Question number	Answer	Notes	Marks
4 (a) (i)	• glucose; • carbon dioxide and water;	Reject formulae	2
(ii)	aerobic;		1
(iii)	B; (mitochondrion)		1
(iv)	ATP/adenosine triphosphate		1
(b) (i)	Any two from • more people/repeat tests: • different gender/diet/location/age; • carry out test over more years/longer time period; • calculate the mean/ average;		2
(ii)	• 7250 - 6550; • = 700kJ;	ecf if wrong figures used in a subtraction calculation but correct answer 1 mark	2
(iii)	Any five from • metabolic rate increases in colder temperatures; • correct comparative reading from graph e.g. metabolic rate is higher in January compared to July; • (in colder temperatures) increased rate of respiration; • releases heat (energy)/more energy needed; • (energy needed) to maintain body temperature/reference to keeping body warm; • (in warmer weather) more heat lost (by radiation / convection/sweating);	ORA for mps 1, 3, 4, 5, 6 Allow marking point if correct figures given from graph	5
(iv)	uptake of oxygen/carbon dioxide output;	Allow amount of glucose used	1

Total 15

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Question number	Answer	Notes	Marks
5 (a)	*hepatic vein* vena cava; pulmonary artery; pulmonary vein; aorta; renal artery;	Credit correct order	5
(b) (i)	Any four from: • as time spent exercising increases, pulse rate increases; • increase flow of blood (to muscles/cells); • more oxygen/glucose/energy; • more (aerobic) respiration; • more carbon dioxide removed/reference to reduced build-up of lactic acid;	Allow more blood pumped Allow less anaerobic respiration	4
(ii)	Any six from • take pulse before exercise/resting pulse; • finger at wrist/neck; • carry out exercise; • count/record pulse (after exercise); • wait for pulse rate to drop back to normal; • repeat exercise; • reference to control variables e.g. same person/gender/exercise/intensity of exercise/weather conditions;	Allow reference to use of electronic device to measure pulse rate Allow adequate time frame e.g. 5 minutes Allow reference to reliability e.g. more people	6

Total 15

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Question number	Answer	Notes	Marks
6 (a) (i)	• change in genetic code/base sequence/nucleotide sequence/different codon; • of DNA/gene; • different amino acid coded for/different sequence of amino acids; • different (shaped) protein produced;	Allow named mutation e.g. deletion	4
(ii)	Any five from • shape of red blood cell distorted; • different form of haemoglobin; • reduced surface area; • less oxygen carried; • less respiration; • less energy/ATP;	Allow red blood cells are sickle-shaped Allow capillaries blocked/allow less haemoglobin	5
(b)	• woman is Hh; • man is either Hh or hh/heterozygous or homozygous recessive; • one h/recessive allele comes from man; • child is hh/homozygous recessive;		4

Total 13

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Question number	Answer	Notes	Marks
7 (a) (i)	X = pulp (cavity); Y = dentine; Z = enamel;	Allow crown	3
(ii)	• part Z/top surface/crown/enamel; • because it has ridges/crevices; • food becomes trapped/difficult to remove (with brushing);	Allow sugar for food	3
(b)	• bacteria use/feed on food in teeth; • for respiration/energy; • (bacteria) produce (lactic) acid/lactate ; • (acid) dissolves enamel;		4
(c)	• if had teeth could damage mother; • feed entirely from mother's milk/formula milk/babies are breastfed; • solid food not chewed/no solid food/liquid diet;		3
(d)	• alcohol kills bacteria/reduces formation of plaque; • fluoride strengthens enamel/neutralises acid;		2

Total 15 marks

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