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Mark Scheme (Results)

Summer 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	water; selectively; down; volume; ATP; against;		6

Total 6 marks

Question number	Answer	Notes	Marks
2 (a) (i)	nose/nasal cavity/mouth, trachea/windpipe, bronchi, bronchioles;;	one mark for two correct two marks for four correct	2
(ii)	• large surface area; • thin epithelium/walls;	R cell wall/cell membrane	2
(b) (i)	B; 0.04% A, C and D are all incorrect figures		1
(ii)	• 1200 × 16; • $\frac{19200}{1000}$ = 19 dm^3;	ECF if any value used from table Accept 19.2	2
(iii)	• $\frac{20 \times 10\,500;}{100}$ • $\frac{2100 \times 20;}{100}$ • = 420 cm^3;	2 mark ECF	3
(iv)	• more carbon dioxide in blood/lungs/body; • detected by (chemo)receptors (in arteries); • rate of breathing/tidal volume increases; • increases to remove carbon dioxide;		4

Total 14 marks

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Question number	Answer	Notes	Marks
3 (a) (i)	• time in minutes; • 0-10, 11-20, 21-30, 31-40,41-50,51-60;		2
(ii)	• 75 + 72 + 68; plus/minus 2 for each one • 215 cm^3;	ECF	2
(iii)	• rapid reaction/a lot/large amount of gas produced, at start; • rate slows/less gas (for next 10 minutes); • drops a lot/little gas produced (after 40 minutes);		3
(iv)	any three from • at start plenty of substrate/many E-S complexes formed; • substrate used up/less substrate available; • reaction slows/less gas/product, produced/less enzyme action; • most substrate used at end so little gas produced;		3
(b)	• less gas produced/reaction lower/less; • because active sites blocked;		2

Total 12

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Question number	Answer	Notes	Marks
4 (a)	any two from • hearing/sound; • touch; • taste; • smell;		2
(b) (i)	any two from • as thickness decreases, focal length increases; • interval between focal lengths increases as thickness decreases; • (constant when two variables multiplied hence) inversely proportional;		2
(ii)	diameter decreases;		1
(iii)	any four from • rays from near object diverging; • ciliary muscle contracts; • suspensory ligaments slacken/relax; • so lens becomes thicker/more convex; • more powerful lens/light refracted more/increased refraction; • (allows it to focus because) focal length becomes shorter/decrease;		4
(c) (i)	between 575 and 580 nm;		1
(ii)	• 400 - 530; • 130 nm;	ECF	2
(iii)	• greater range of wavelengths can be seen/absorb light of different wavelengths; • gives better colour perception/vision/differentiation/can see different colours;		2

Total 14

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Question number	Answer	Notes	Marks
5 (a) (i)	• prevent contamination/no mixing with water; • because rainwater will flow away from well;		2
(ii)	allow urine/liquid waste, to soak away/absorbed by soil;		1
(iii)	• prevent smell; • covered to prevent entry of flies/rats; • as these carry bacteria/pathogens; • and spread disease; • long handle to keep hands away from pit entrance/cover faeces; • more likely to be bacteria/pathogens in that area;		5
(b)	• any seven from • equal volumes of two solutions; • same concentrations; • wash concrete slab with one solution; • leave for specified time; • use sterile transfer loop or equivalent; • transfer from slab to Petri dish/nutrient agar; • incubate for specified time; • count colonies/measure inhibition zones; • repeat with second solution; • compare results;		7

Total 15

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Question number	Answer	Notes	Marks
6 (a) (i)	phagocytosis;		1
(ii)	• enclosed bacterium fuses with lysosome; • enzymes break down /digests bacterium; • remains of bacterium removed from white blood cell;		3
(iii)	• label/identify/complementary to bacterium/antigens presented; • so response quicker if new infection/better immune response;		2
(b) (i)	any three from • prick skin to obtain blood; • use a sterile needle/pin • smear/spread blood on slide; • ensure smear is thin; • add stain; • allow to dry;		3
(ii)	any four from • red blood cells would be seen as circle/not in 3D; • white blood cells would be larger than red/rbc too large; • wouldn't see platelets; • because too small for light microscope;		4
(iii)	• no risk of infection; • e.g. AIDS;	R contaminate	2

Total 15

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Question number	Answer	Notes	Marks
7 (a) (i)	• axes labelled with units; • correct way round and suitable scale; • correct plots; • suitable line drawn;		4
(ii)	• only not working correctly when rate falls below 100; • data/year not shown when that occurs/already below 100;		2
(iii)	• 2021/2022; • rate falling at 5-10 units per annum/similar values each year;		2
(iv)	• not very accurate/results vary/fluctuate; • earlier data showed improvement in function; • could happen again/results may change;		3
(b)	any three from • protein broken down into urea/deamination; • toxic; • needs to be excreted; • incorrectly functioning kidney can't remove it all if there is a lot; • less protein less urea;		3

Total 14

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