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Pearson Edexcel

Mark Scheme (Results)

November 2021

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 (a) (i)	• transport oxygen; • from lungs; • to (body) tissues/cells;	Allow organs	3
(ii)	• haemoglobin to carry/combine with oxygen; • no nucleus, so more haemoglobin; • biconcave shape to increase surface area; • small/flexible (cell) membrane to pass through capillaries; • thin membrane to reduce diffusion distance;		4
(b) (i)	vein;		1
(ii)	• valve present/large lumen/thin (muscular) walls; • only found in veins/not found in arteries/other blood vessels;		2
(iii)	• distance 13-15 mm; • divide by 10 = 1.3-1.5;	Ecf: max 1 mark if mp1 incorrect but division by 10 of their value is correct	2 Total 12

Question number	Answer	Notes	Marks

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2	(a)	4 of • add powder to water (in a test tube); • add Benedict's reagent/solution; • heat tube in a water bath; • observe any colour change/description of colour change; • wear goggles;		4 max
	(b) (i)	powder Y;		1
	(ii)	• powder W; • powder Z;		2
	(iii)	powder X;		1
	(iv)	protein;		1
				Total 9

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Question number	Answer	Notes	Marks
3 (a)	C hypothalamus; A does not control sweating B does not control sweating D does not control sweating		1
(b)	B motor; A transmits impulse from sensory to motor C alternative name for A with same function D transmits impulse to brain		1
(c)	• (sweat) evaporates from (the surface of) the skin; • using heat from body/blood; • cools body/reduces body temperature;		3
(d)	• runs in families; • must be faulty/mutated gene/chromosome/allele; • which transfers/passes on information to offspring;		3
(e)	obesity / high sugar intake / high BMI;		1
(f)	• exercise/activity of individual varies; • greater rate of aerobic respiration; • heat given off as by-product/increased body temperature; • external temperature varies; • hotter more sweating/cooler less sweating; • mass of individual varies; • volume of water in the body/fluid intake varies;	Allow reverse argument for mps 2 and 3	5 Total 14

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Question number	Answer	Notes	Marks
4 (a) (i)	• suitable scales; • axes labelled; • correct plots;;	Number of teeth on X axis, number of students on Y axis	4
(ii)	• $\frac{13}{30}$; • x 100; • 43.3(%);	Allow 43(%)	3
(b)	• wisdom teeth/molars not developed; • jaw too small to accommodate extra teeth;		2
(c)(i)	• sugar coats/left in teeth/forms plaque; • bacteria use sugar (for respiration/energy); • convert sugar to lactic acid; • acid dissolves/erodes/breaks down enamel;	Allow feed on Allow release acid	4
(c)(ii)	any two from • regular brushing of teeth/use fluoride toothpaste/flossing; • visit dentist regularly; • add fluoride to tap water		2 Total 15

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Question number	Answer	Notes	Marks
5 (a)	• addition of figures = 1690; • divide by 10 = 169;		2
(b)	makes it faster/decreases reaction time;		1
(c)	• caffeine has to be absorbed; • into blood; • transported to nervous system/brain;	Ignore body	3
(d)	• can't control what is in food/drink; • could contain caffeine/other factors that would affect result/to ensure caffeine is the cause;	Ignore coffee	2
(e)	185 ± 5 mm;		1 Total 9

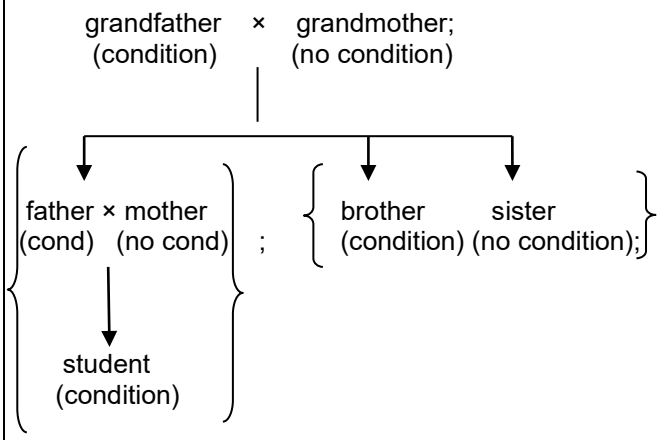
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Question number	Answer	Notes	Marks
6 (a)	• where two bones; • come together/meet;		2
(b) (i)	• humerus; • ulna;		2
(ii)	• covers end (of ball) of humerus/L; • covers depression in ulna/M;		2
(c)	• movement not smooth/bones grind/rub together/less shock absorption/increased friction; • painful;		2
(d)	any four from • attached to end of muscle/attach muscle to bone; • inelastic/do not stretch; • muscle contracts; • pulls tendon; • causing M/ulna/bone to move;		4 Total 12

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Question number	Answer	Notes	Marks
7 (a) (i)	C; (pathogen) A not all bacteria cause disease B not all fungi cause disease D not all protozoa cause disease		1
(ii)	• Ebola caused by a virus; • antibiotics only affect bacteria/not active against viruses;		2
(b) (i)	• 700 - 180 = 520; • 520 ÷ 5 (= 104); • 100 (AU per hour);	Ecf max 2 marks if first mp incorrect but value divided by 5 to arrive at correct answer Max 1 if first answer correct but division is incorrect	3
(ii)	• B is bactericidal; • because population decreases/kills bacteria;		2
(iii)	• antibiotic B; • because it kills bacteria/causes population to decrease; • but symptoms may be less severe/mild/reduced; • antibiotic A leaves large numbers alive/bacterial population remains constant/only stops/reduces population growth; • these can still cause disease;		3 Total 11

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Question number	Answer	Notes	Marks
8 (a) (i)	B; (an alternative form of gene) A it is not an allele C it is not an allele D it is not an allele		1
(ii)	only expressed in the homozygous state/not expressed in the heterozygous state;	Allow valid descriptions/examples of homozygous/heterozygous states	1
(b) (i)			3
(ii)	• occurs only in males/not females/more common in males/females are carriers; • recessive; • probably sex-linked/carried on X chromosome;		3 Total 8

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