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Mark Scheme (Results)

Summer 2019

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	A	Marks
1 (a) (i)	X cartilage; Y femur; Z knee cap;		1 1 1
(ii)	**B** ligaments hold the leg bones together A is incorrect as ligaments do not attach muscles to bones C is incorrect as ligaments do not move leg bones D is incorrect as ligaments do not stop the leg bones rubbing together		1
(iii)	hinge/synovial (joint)		1
(b)	In the following order only oxygen; carbon dioxide;		 1 1
(c)	biceps contracted/fatter; triceps relaxed/thinner; 		1 1

Total question 1 = 9 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></td><td></td><td>1</td></tr>
<tr><td>(ii)</td><td>In the following order only:

phagocytes;
enzymes;</td><td></td><td>

1
1</td></tr>
<tr><td>(iii)</td><td>produce antibodies/release antitoxins;</td><td></td><td>1</td></tr>
<tr><td>(b)</td><td><table><tr><th>Bacterial cell</th><th>Human skin cell</th></tr><tr><td></td><td>✓</td></tr><tr><td>✓</td><td>✓</td></tr><tr><td></td><td></td></tr><tr><td>✓</td><td></td></tr></table></td><td>One mark for each correct row</td><td>3</td></tr>
<tr><td>(c)</td><td>D (a single-stranded helix containing the bases AUGC);

A is incorrect as RNA is not a double-stranded helix
B is incorrect as RNA is not a double-stranded helix
C is incorrect as RNA does not contain the base T</td><td></td><td>1</td></tr>
</table>

Total question 2 = 8 marks

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Question number			Answer	Notes	Marks
3	(a)	(i)	A (cornea and lens); B is incorrect as the iris does not play a role in focusing light C is incorrect as the iris does not play a role in focusing light D is incorrect as the pupil does not play a role in focusing light		1
	(b)	(i)	Points as follows: 150:2.7 200:3.2 250:2.3;		1
Clip (b)(i) with (b)(ii) and (b)(iii)		(ii)	Line of best fit missing out point at 150:2.7	Ignore lines that extended beyond points	1
		(iii)	150 lux/150:2.7/2.7 diameter;		1
			does not follow the pattern of other points/trend/not on the line of best fit;		1
		(iv)	As light intensity increases diameter decreases;	ORA	1
	(c)		Idea that distant/far away objects are blurred/difficult to see/ORA; as (light) rays do not meet on the retina/focused in front of retina/meet before the retina/light rays refracted too much;	Reject can't see	1 1

Total question 3 = 8 marks

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Question number	Answer	Notes	Marks
4 (a) (i)	A (psychrophiles); B is incorrect as the temperature of a fridge is not between 12 and 45 degrees C is incorrect as the temperature range is too high for a fridge D is incorrect as the temperature range is too high for a fridge		1
(ii)	increase in growth/maximum growth; (near) optimum/best temperature;	Allow optimum growth.	1 1
(b) (i)	measure diameter/area of inhibition/of the clear zone/area of no bacterial growth; greater the diameter, the more effective the antibiotic;	Allow observe size of the clear zone.	2
(ii)	wash hands/work surface after carrying out procedure; reduces transfer of bacteria; Heat inoculating loop/spreader; To kill bacteria/to prevent contamination; do not open dish following incubation/seal the Petri dish (prior to incubation); reduces risk of bacteria being transferred to student/infection; do not incubate over 25°C; prevents growth of pathogenic bacteria; Sterilise/clean all equipment before/after use; Reduces cross contamination; Seal petri dish/do not open lid of petri dish too far/reduce exposure of contents of dish to air; Reduces contamination by airborne bacteria/to prevent bacteria escaping;	Max 4 if no explanation given.	6 max

Total question 4 = 11 marks

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Question number	Answer	Notes	Marks
5 (a) (i)	175.9 + 178.5 + 166.3 + 167.6 ÷ 4;		1
Clip with table	172.1;	Full marks for correct final answer Reject 172	1
(ii)	Height increases with age (for males / females / both); Males are taller/females are shorter (at all ages); Females increase in height greater compared with males between the ages of 12 and 18; Greatest height increase between ages 12 to 14;		Max 2
(iii)			1
	Use more students in each age group; Use a greater age range of students; Use ages with 1 year gap/13,15,17;	Allow other valid improvements Ignore repeats	1
(b) (i)	71 ÷ 1.46^2;		1
Clip with table	33/33.3;	Full marks for final correct answer One mark for correct calculation with incorrect figures	1
(ii)	student Y is obese;	ECF from b(i)	1
CLIP (b)(i) with (b)(ii)	higher risk of diabetes/heart disease/arthritis/cancers;	Allow other medical condition linked to obesity	1

Total question 5 = 10 marks

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<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6 (a) (i)</td><td>Increase/goes up;</td><td>allow equivalent</td><td>1</td></tr>
<tr><td>(ii)</td><td>Information required about other factors, such as diet/exercise/alcohol consumption/age/gender/exposure to pollution/(genetic) history/smokers or non smokers;;</td><td>Allow one mark for reference to lifestyles only</td><td>2</td></tr>
<tr><td>(b)</td><td>Less mucus removed by cilia/more mucus/build up of mucus in lungs/blocks airways/bacteria not removed;
Increased risk of (lung/respiratory) infection/coughing;</td><td></td><td>1
1</td></tr>
<tr><td>(c) (i)</td><td><table><tr><td></td><td>Surface area</td><td>Volume</td><td>SA:V ratio</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td>54;</td><td>27;</td><td>2:1;</td></tr></table></td><td>Allow for SA:V ratio 6:3 ECF</td><td>3</td></tr>
<tr><td>(ii)</td><td>Smaller surface area to volume ratio (in lungs with emphysema);
Reduced/less efficient gas exchange/diffusion of oxygen/carbon dioxide;
Less oxygenated blood/less oxygen transferred (to cells);
Less (aerobic) respiration;</td><td></td><td>Max 3</td></tr>
</table>

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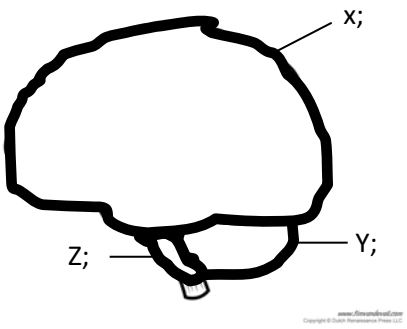
Question number	Answer	Notes	Marks
7 (a)		Letters can be anywhere within outline shown. Allow labels in place of than letters.	3
(b) (i)	Motor;		1
(ii)	Any one from the following: (sensory neurone): longer dendrites/shorter axon/cell body outside of spinal cord/CNS/in middle of neurone/transmit impulse to the CNS/brain/spinal cord (motor neurone) shorter dendrites/longer axon/cell body at one end of neurone/inside spinal cord/transmit impulses from CNS/brain/spinal cord	Answer must be comparative and state which type of neurone is being referred to	1
(iii)	• chemicals/neurotransmitters; • diffuse; • across a synapse; • bind to receptors (on post-synaptic membrane);		3
(c)	• stem cells are undifferentiated/unspecialised/can differentiate; • could be made to form nerve cells; • to replace damaged cells in brain;		1 1 1

Total question 7 = 11 marks

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Question number	Answer	Notes	Marks
8 (a)	Three from: • (parasite) carried by mosquito/mosquito is a vector; • mosquito bites human; • parasite/infected blood drawn/sucked up into mosquito; • infected blood transmitted to other people;		Max 3
(b)(i)	• fewer deaths caused by *P.vivax* in R than Q • (but) more deaths caused by *P.vivax* in R than in Q as a proportion of the total; • 190 000 fewer deaths caused by *P.vivax* in R/300 less deaths in Q caused by *P.vivax*; • 0.5% deaths caused by *P.vivax* in Q/62.5% of deaths caused by *P.vivax* in R;		1 1 1
(ii)	more mosquitoes in one region than another/climate favours breeding of mosquitoes/more dense population of people/better health care/use of (named) preventative measures;		1
(c)	Three from: Fewer people with malaria/reduced incidence of malaria; Immunity/antibodies against parasite/herd immunity; Reduction in population of/death of parasite; Less transmission (from one person to another);		Max 3
(d)	Three from: (sexual reproduction) • gives rise to variation in offspring; • variation provides a survival advantage; • parasite more likely to survive in a changing environment; (asexual reproduction) • parasite can reproduce faster; • no need to find a mate/only one parent needed; • larger number of offspring produced;	Answer must contain at least one advantage of each method	Max 3

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Question number	Answer	Notes	Marks
9 (a) (i)	A (the inheritance of two different alleles, both of which are expressed) B is incorrect as one allele is not expressed in codominant inheritance C is incorrect as the ABO inheritance does not involve the inheritance of multiple alleles D is incorrect as ABO inheritances does not involve the inheritance of multiple alleles		1
(ii)	I^AI^A and I^Ai^o		1
(b) (i)	• blood group O contains no antigens; • antigens removed/digested (by enzyme); • carbohydrase digest carbohydrates; • protease digest proteins;		Max 3
(ii)	reduces need to find donor/cheaper/blood readily available/less chance of transfusing incorrect blood group/less risk of disease/infection;		1
(c) (i)	parent genotypes X^hX^H and X^HY; gametes and linkage X^h X^H X^H Y X^h X^H X^H Y X^hX^H X^hY X^HX^H X^HY ;	One mark for parent genotypes and one mark for gametes **and** linkage	1 1
(ii)	1 in 4/25%/quarter/1/4 /1:3/0.25;		1

Total question 9 = 9 mark

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