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Mark Scheme (Results)

Summer 2019

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)	molar;	Allow premolar	1
(ii)	C, enamel		1
(iii)	Any three from: • contains ridges/crevices; • larger surface area/more in contact with food; • food trapped; • provides nutrients for bacteria/reference to bacteria digesting/using food/producing acid; • more difficult to clean/reference to location in mouth (making tooth more difficult to reach);	Reject cusp	Max 3
(b) (i)	Any two from: • (both) decrease; • highest % of cases in 1983/lowest % cases in 2013; • (%) 15 year old children with tooth decay always higher/(%) 12 year old children with tooth decay lower; • (%) 15 year old children falls less overall/(%) 12 year old children falls more overall;		Max 2
(ii)	clean/brush/floss teeth (more regularly / properly)/(more/regular) visits to dentist/ reference to fluoride in toothpaste/drinking water/less sugary foods in diet;	Allow better dental hygiene	1

Total question 1 = 8 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>
<table>
<tr><td>Part</td><td>Name of part</td><td>Function</td></tr>
<tr><td>X</td><td>mitochondria;</td><td></td></tr>
<tr><td>Y</td><td></td><td>controls activities of the cell/stores DNA / genetic information;</td></tr>
</table>
</td><td></td><td>1
1</td></tr>
<tr><td>(ii)</td><td>A, more cell structures can be seen with greater resolution</td><td></td><td>1</td></tr>
<tr><td>(iii)</td><td>60mm/6cm;
60 ÷ 0.05;
1200;</td><td>Ecf two marks for correct calculation from incorrect measurement
Full marks for correct final answer</td><td>3</td></tr>
<tr><td>(b)</td><td>• diffusion;
• from a high concentration (in the cell) to a lower concentration (in the blood)/down a concentration gradient;</td><td></td><td>1
1</td></tr>
</table>

Total question 2 = 8 marks

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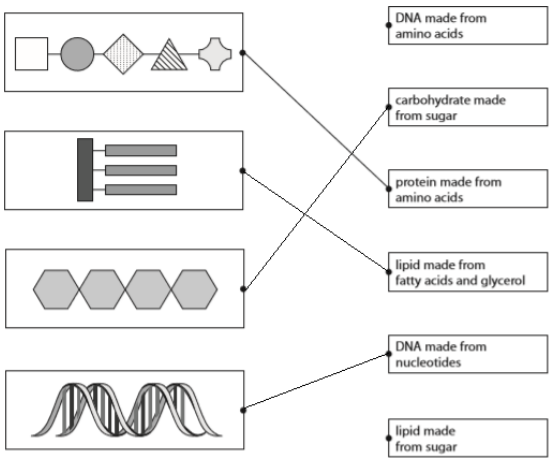
Question number	Answer	Notes	Marks
3 (a) ( )		Do not allow more than one line from each structure	3
(b)	**D** stomach;		1
(c) (i)	3/three		1
(ii)	not washing equipment/transfer of food containing protein into distilled water;	Allow any valid alternative	1
(d)	Hazard: Broken glass - cuts; Reducing risk: Clear up breakages using a dustpan and brush/keep equipment away from edge of tables;	Ignore wear gloves	1
	Hazard: Biuret reagent - irritant; Reducing risk: Wear goggles/wash hands after use/don't use if skin is sensitive;	Ignore wear gloves	1

Total question 3 = 8 marks

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Question number	Answer	Notes	Marks
4 (a)	$\frac{30\,000}{100}$ x 40; 12 000;	Full marks for final correct answer ecf	1 1
(b)	a microorganism/named microorganism that causes disease;		1
(c)	It cannot be transmitted from one person to the next		1
(d)	• use a sample of people/use two groups of people; • feed each sample/group of people a different diet/feed one group a diet with vitamin B and the other without vitamin B; • monitor health/compare (health) of two groups;		1 1 1
(e)	• breakdown of cartilage/cartilage not formed properly/damaged; • bones rub together/more friction between bones/less shock absorption;		1 1

Total question 4 = 9 marks

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Question number	Answer	Notes	Marks
5 (a) (i)	ovulation;		1
(ii)	fertilisation		1
(iii)	Any two from: • zygote/embryo/cells divides/splits; • each half develops into one offspring;		1 1
(b) (i)	**A** FSH and LH;		1
(ii)	Any four from: • removal of egg from female ovary; • collect sperm from male; • egg fertilised; • embryos formed; • embryo inserted into uterus/female;	Allow egg and sperm fuse Allow zygote formed	Max 4

Total question 5 = 9 marks

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Question number	Answer	Notes	Marks
6 (a)(i)	A aorta;		1
(ii)	D vena cava;		1
(iii)	• wider lumen; • thinner walls; • valves; 	Ignore arrows Accept valves drawn either way round	1 1 1
(iv)	Any three from: (Blood vessel X) • thicker walls/more muscle/elastic fibres in walls to maintain blood flow to maintain/withstand high (blood) pressure; • thinner lumen to maintain high blood pressure; OR (Blood vessel Y) - • less muscle/elastic tissue in walls so slower blood flow; • wider lumen so carries blood at lower pressure; • contains valves to prevent backflow;		Max 3

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(b)	Any four from: • thin wall/wall one cell thick; • contains pores; • shorter diffusion pathway; • narrow lumen; • only one (blood) cell/few (blood) cells at a time can pass through;		Max 4

Total question 6 = 12 marks

Question number	Answer	Notes	Marks
7 (a)	$\frac{14}{100}$ x 250 = 35;	Ecf one mark for correct answer from wrong numbers	1
	35 ÷ 10 = 3.5	Full marks for correct final answer of 3.5	1
(b) (i)	4 x 3.5 = 14 (units);	ecf from 7a	1
	14 – 3 = 11 (hours);	Full marks for correct final answer of 11 hours	1
(ii)	Any two from: • alcohol is a depressant; • (alcohol) affects the nervous system/brain; • slows reactions/increases reaction time;		Max 2
(c)	Any five from: • less/no bile produced; • less/no emulsification of fat; • surface area of fat remains low; • less fat digested/broken down (by lipase); • pH of small intestine remains low/acidic; • enzymes denatured/reduced enzyme activity; • reduced/no digestion by protease / carbohydrase/fewer proteins/carbohydrates digested/broken down; • more fat egested;	Allow trypsin for protease and amylase for carbohydrase	Max 5

Total question 7 = 11 marks

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Question number	Answer	Notes	Marks
8 (a)(i)	• high (blood) pressure (in the glomerulus); • small molecules/named small molecule forced / filtered/pass through (into Bowmans capsule);	Do not allow protein	1 1
(ii)	Any four from: • lower concentration of glucose/oxygen in blood in renal vein; • used in respiration; • less/no urea in renal vein; • urea excreted in urine; • more carbon dioxide in renal vein; • carbon dioxide produced in respiration;	Allow reverse argument throughout	Max 4
(b) (i)	quantity of salt (in food);		1
(ii)	Any two from: • different foods used (which may affect the amount of urea produced/amount of water reabsorbed); • different people used who may be different genders/ages/ have a medical condition/different metabolism (that affects osmoregulation/water balance); • the food/drink consumed by the people prior to the investigation was not taken into account (which will influence the quantity of urea/water in urine produced);		Max 2
(iii)	use one person only (and vary salt intake)/monitor / control food/water consumption/give each person the same food (but vary salt content);	Allow valid alternatives	1

Total question 8 = 10 marks

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Question number	Answer	Notes	Marks
9 (a) (i)	• reference to platelets; • fibrinogen converted to fibrin; • (fibrin) mesh/crosslinks/fibres formed;		3
(ii)	• reduced blood flow to heart/cardiac muscle / tissue/cells; • less oxygen/glucose delivered; • less (aerobic) respiration/energy released (by cardiac tissue);		3
(b)(i)	size of blood clot/volume of water /aspirin solution used/temperature/shape of blood clot/width of straw;	Allow valid alternatives	1
(ii)	use water without aspirin dissolved;		1
(iii)	• the more tablets dissolved the more solution collected; • the more tablets dissolved the quicker the solution is collected; • aspirin dissolves/acts on blood clot; • size of blood clot reduced more quickly with more tablets/blood clot dissolves/breaks down faster with more tablets;		Max 3
(c)	Any four from: • aspirin binds to enzyme/aspirin competes (with substrate) for active site; • active site of enzyme changed/blocked; • less/no substrate binds (to enzyme); • reaction involving release of chemicals reduced/stopped; • platelets do not stick together;		Max 4

Total question 9 = 15 marks

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