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Mark Scheme (Results)

November 2020

Pearson Edexcel International GCSE
In Human Biology (4HB1)
Paper 01R

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General Marking Guidance

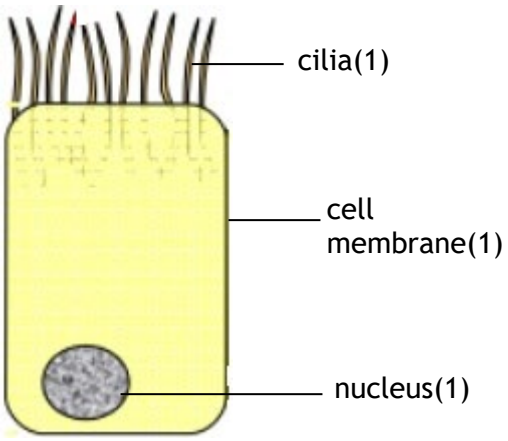
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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)	transport oxygen to body cells		1
(b)	• (X) plasma (1) • (Y) platelets (1)		2
(i)	Evidence of division by 5(1) 3:1	full marks for correct final answer	2
(ii)	• white blood cells/lymphocytes increase in number (1) • (white blood cells)used in defence against disease(1) • produce antibodies/phagocytosis(1)	Ignore fight disease/pathogen Allow kill/destroy pathogen/bacteria	2

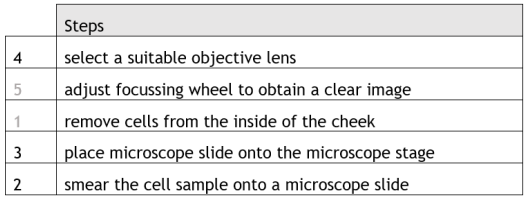
Total for Question 1 = 7 marks

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Question number	Answer	Notes	Marks
2 (a) (i)			3
(ii)	cilia → moves mucus through the trachea cell membrane → controls entry and exit of nucleus → holds the genetic code makes proteins site where most chemical reactions occur	Reject more than one line from each structure	3
(b) (i)	Tar (1)		1
(ii)	• (cilia)burned/destroyed/reduced in number(1) • paralysed/cannot beat to and fro/move mucus(1)		2

Total for Question 2 = 9 Marks

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Question number	Answer	Notes	Marks
3 (a) (i)		One mark for 4 before 5. One mark for 3 before 2	2
(ii)	more detail/organelles can be seen/organelles/named organelle seen more clearly (1)		1
(iii)	reference no stain applied to specimen(1)		1
(iv)	• reference to sterilising (named) equipment (1) • wash hands to avoid cross contamination(1) • incubate/store in sealed petri dish / container	allow valid sterilisation technique	2
(b) (i)	10 × 40 = 400	Full marks for correct answer without working	1
(ii)	reference to 1000 (1) 0.018 × 1000 = 18 (μm)	Full marks for correct final answer	2

Total Question 3 = 9 marks

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Question number	Answer	Notes	Marks
4 (a)	• ankles(1) • protein(1)		2
(b) (i)	• axes labels(1) • axes scales(1) • correctly plotted bars(1)	Max 2 marks for line graph	3
(ii)	improved/varied/balanced diet/education (in nutrition) / international aid/less protein in diet in 2010(1)		1
(iii)	• 95 ÷ 1978 (x 100) (1) • 4.8(%)	Full marks for correct final answer	2

Total for Question 4 = 8 marks

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Question number	Answer	Notes	Marks
5 (a) (i)	**C** green vegetables and red meat		1
(ii)	• (iron) needed for production of haemoglobin(1) • (haemoglobin/red blood cell) binds to/transports oxygen(1) • oxygen needed for (aerobic) respiration/energy(1) • for growth of fetus(1)		4
(b) (i)	Any four from: • take temperature of water (at the start) (1) • reference to measuring mass of food(1) • place food on holder(1) • burn food(1) • reference to time (for burning food)(1) • take temperature of water after burning/once food is completely burnt/measure change in temperature(1)	Allow amount for mass Allow food is heated/set alight	4
(ii)	Any three from: • add a lid(1) • reference to stirring/even heat distribution(1) • insulate the copper can/move food closer (to the can/water) (1) • reference to preventing heat loss(1)	Allow cover the beaker	3

Total for question 5 = 12 marks

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<table>
<tr><th colspan="2">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6 a</td><td>(i)</td><td>• 24 – 10(1)
• 2 (hours)</td><td>Full marks for correct final answer</td><td>2</td></tr>
<tr><td></td><td>(ii)</td><td>Any two from:
• cell organelles double in number (1)
• named organelle
• protein synthesis(1)</td><td>Ignore DNA/nucleus replicate</td><td>2</td></tr>
<tr><td></td><td>(iii)</td><td>• diploid cells/cells with full number of chromosomes/cells with 46 chromosomes(1)
• genetically identical(1)</td><td></td><td>2</td></tr>
<tr><td></td><td>(iv)</td><td><table><tr><th>Stage</th><th>Events</th></tr><tr><td>metaphase</td><td>chromosomes align at the centre of the cell / equator(1)</td></tr><tr><td>anaphase</td><td>chromatids pulled to opposite poles(1)</td></tr><tr><td>telophase</td><td>nuclear membrane forms (around chromosomes) (1)</td></tr></table></td><td>Allow chromosomes for chromatids throughout
Ignore cytokinesis or description
Allow nucleus formed (around chromosomes)</td><td>3</td></tr>
<tr><td>b</td><td></td><td>Any two from:
• adds nucleotides(1)
• to exposed bases on one strand of DNA molecule/to template strand/by complementary base pairing(1)
• to produce a new DNA strand/molecule(1)</td><td>Allow bases</td><td>2</td></tr>
</table>

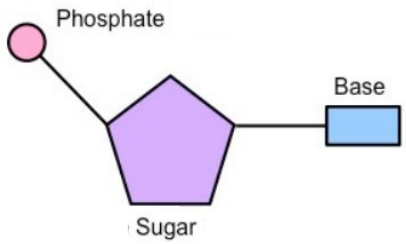
Total for Question 6 = 11 marks

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Question number	Answer	Notes	Marks
7 (a)	Same diagram with the following modifications: • shunt vessel noticeably more narrow(1) • capillaries noticeably wider(1)		2
(b)	Any four from: • capillaries dilated/get wider/vasodilation(1) • to allow greater blood flow nearer to skin surface(1) • shunt vessel constricts/becomes more narrow(1) • to divert more blood through capillaries(1) • more heat lost through skin's surface/by radiation(1)	Allow blood vessels for capillaries Ignore arteries/veins	4
(c)	• (change in body temperature) detected by the hypothalamus(1) • impulses sent to effector/named effector (1) • temperature change reversed/named reverse process (1)	Allow reverse argument for both marking points Allow signals for impulses Allow temperature returns to normal	2

Total for Question 7 = 8 Marks

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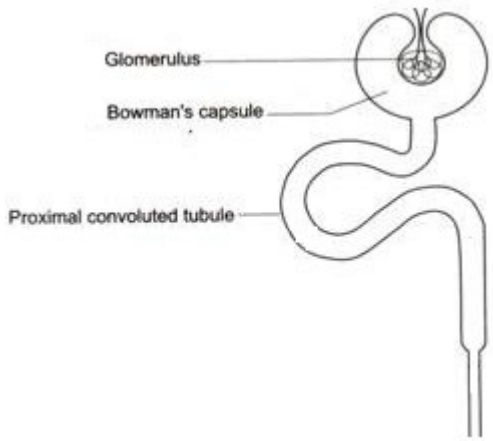
Question number	Answer	Notes	Marks
8 (a) (i)	Any two from: • (movement of substances/named solute or gas) against a concentration gradient(1) • using energy/ATP(1)		2
(ii)	Any two from: • parent homozygous recessive/heterozygous / carriers (1) • one (recessive) allele inherited from each parent (1) • reference to homozygous recessive disorder/caused by recessive alleles (1)		2
(iii)	• protein/CFTR is not modified/folded/protein has an incorrect shape(1) • protein/CFTR not transported (to its destination)(1)		2
(iv)	1408 x 3 (1) 4224	Full marks for correct final answer. Max 2 marks ecf for final answer if it is correct from calculation	2
(v)	• (deoxyribose) sugar(1) • joined to a (nitrogenous) base/named base(1) • phosphate group attached to sugar (1)  	Allow one mark only if all 3 components just listed Fully labelled diagram for full marks	3
(b)	any three from • deletion(1)	allow description of deletion	3

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	• of one codon/TTT (1) • phenylalanine missing from protein (1) • shape of final protein changed/different protein formed (1)		

Total for Question 8 = 14 Marks

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Question number	Answer	Notes	Marks
9 (a) (i)	• evidence of 23500 – 4000 (= 19500) (1) • 19500 ÷ 4000 (x 100)(1) • 488(%)	Allow full marks for correct final answer. Allow 487.5(%) Allow ecf if incorrect answer from mp1 – max 2 marks	3
(ii)	other lifestyle factors/genetic predisposition could have an influence/named lifestyle factor(1)	Allow gender/age	1
(b)	A diagram similar to:  	One mark for diagram. One mark for each correct label.	4
(c)	any four from • ultrafiltration does not take place(1) • in glomerulus(1) • less/no waste products/named waste product/water/glucose pass through to tubule(1) • greater volume of waste in blood/more water in blood(1) • glucose/ions not reabsorbed(1) • glucose found in urine(1) OR any four from • blood not filtered effectively/ultrafiltration ineffective(1) • in glomerulus (1)		4

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	• larger molecules/named larger molecules pass through to tubule/Bowmans capsule(1) • not all glucose/ions reabsorbed(1) • glucose/protein found in urine/urine more concentrated(1)		

Total for Question 9 = 12 marks

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