



Mark Scheme (Final)

January 2020

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.

Question number	Answer	Notes	Marks
1 (a)	<p><b>The only correct answer is C</b> to slow down the growth of bacteria</p> <p><i>A is incorrect because taste is personal preference</i></p> <p><i>B is incorrect because it does not kill the bacteria</i></p> <p><i>D is incorrect because the appearance is not affected</i></p>		1
(b) (i)	protein		1
(ii)	<p><b>The only correct answer is D</b> it does not contain energy from fat</p> <p><i>A is incorrect because vitamins have no effect on body mass</i></p> <p><i>B is incorrect because cholesterol has no effect on body mass</i></p> <p><i>C is incorrect because it does contain energy from carbohydrates</i></p>		1
(c)	<ul style="list-style-type: none"> <li>• add Benedict's solution (to a sample of yogurt) (1)</li> <li>• heat gently (1)</li> <li>• brick red colour indicates the presence of sugar (1)</li> </ul>	<p>R if adding to glucose/reducing sugar</p> <p>Allow yellow, green, orange</p>	3

**Total for Question 1 = 6 marks**

Question number	Answer	Notes	Marks
2 (a) (i)	<b>The only correct answer is A</b> <i>B is incorrect because it is the cervix</i> <i>C is incorrect because it is the oviduct</i> <i>D is incorrect because it is the uterus wall</i>		1
(ii)	<b>The only correct answer is D</b> <i>A is incorrect because it is the vagina</i> <i>B is incorrect because it is the cervix</i> <i>C is incorrect because it is the oviduct</i>		1
(iii)	<ul style="list-style-type: none"> <li>• oestrogen (1)</li> <li>• lining (1)</li> <li>• ovulation (1)</li> </ul>		3
(b)	needed for the growth of bones (1)		1
(c)	ref antibodies (passed to baby)/contains the correct balance of nutrients/reduced risk of diabetes/allergies/obesity later in life/reference to bonding between mother and baby (1)		1
(d) (i)	more breastfed babies in 2010 compared with 1940 (1)	Allow reverse argument A 78% vs 42% difference of 36%	1
(ii)	<ul style="list-style-type: none"> <li>• life expectancy shows a constant increase (1)</li> <li>• despite number of babies breastfed increasing and decreasing (1)</li> </ul>		2

**Total for Question 2 = 10 marks**

Question number	Answer	Notes	Marks												
3 (a) (i)	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 50%;">Structure</th> <th style="text-align: left; width: 50%;">Function</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">cell membrane</td> <td style="border: 1px solid black; padding: 5px;">protection against pathogens</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">ribosomes</td> <td style="border: 1px solid black; padding: 5px;">helps the cell to move</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">flagellum</td> <td style="border: 1px solid black; padding: 5px;">make proteins</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">holds the genetic code</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">controls which substances enter and exit the cell</td> </tr> </tbody> </table> <p>(ii) Any two from:</p> <ul style="list-style-type: none"> <li>• (bacterial cell) has a cell wall (1)</li> <li>• (bacterial cell) does not have a nucleus (1)</li> <li>• (bacterial cell) has a plasmid (1)</li> </ul>	Structure	Function	cell membrane	protection against pathogens	ribosomes	helps the cell to move	flagellum	make proteins		holds the genetic code		controls which substances enter and exit the cell	<p>Reject more than one line from each structure</p> <p>One mark for each correct line</p>	<p style="text-align: center;">3</p> <p style="text-align: center;">2</p>
Structure	Function														
cell membrane	protection against pathogens														
ribosomes	helps the cell to move														
flagellum	make proteins														
	holds the genetic code														
	controls which substances enter and exit the cell														
(b) (i)	<p><b>The only correct answer is B diffusion</b></p> <p><i>A is incorrect because it is down a diffusion gradient</i></p> <p><i>C is incorrect because it is not removal from the bacterium</i></p> <p><i>D is incorrect because osmosis only involves movement of water</i></p>		1												
(ii)	<ul style="list-style-type: none"> <li>• glucose (1)</li> <li>• carbon dioxide (1)</li> </ul>	<p>Answers must be in the correct order Allow correct chemical formulae</p>	2												
(iii)	<p>Any two from:</p> <ul style="list-style-type: none"> <li>• to provide energy (1)</li> <li>• for movement (1)</li> <li>• for growth/reproduction/divide/mitosis (1)</li> <li>• for chemical reactions/producing organelles/named organelle (1)</li> </ul>		2												

**Total for Question 3 = 10 marks**

Question number	Answer	Notes	Marks
4 (a)	<ul style="list-style-type: none"> <li>• C (left) atrium( 1)</li> <li>• D (left) ventricle (1)</li> </ul>	Maximum of one mark if right atrium/ventricle given	2
(b)	<p>Any four from the following:</p> <ul style="list-style-type: none"> <li>• (blood vessels) A and F are arteries (1)</li> <li>• A is the aorta/F is the pulmonary artery (1)</li> <li>• arteries carry blood away from the heart (1)</li> <li>• blood vessels B and E are veins (1)</li> <li>• B is the vena cava/E is the pulmonary vein (1)</li> <li>• veins carry blood towards the heart (1)</li> </ul>		4
(c)	the heart pumps blood around the body/liver detoxifies the blood/involved in digestion / homeostasis/liver not muscular/liver has no chambers (1)		1
(d)	(capillaries) exchange of materials( between the blood and body tissues/cells)/allows diffusion (1) named substance (1)		2

**Total for Question 4 = 9 marks**

Question number	Answer	Notes	Marks
5 (a) (i)	12 x 50 = 600 (1) 600 ÷ 1000 = 0.6 (1)	Allow 600 without working out. Allow full marks for correct final answer.	2
	(ii) provides insulation/prevents nerve impulse dispersing/speeds up nerve impulse (1)		1
(b) (i)	<ul style="list-style-type: none"> <li>hormones are transported in blood (1)</li> <li>speed of blood flow is determined by heart rate/hormones can only travel at the speed blood is moving/blood flow slower (1)</li> </ul>	Allow reverse argument for both marking points	2
	<ul style="list-style-type: none"> <li>recognition of distance divided by time (1)</li> <li><math>1.0 \div 1.2 \times 10^2 / 1.0 \times 10^6 \div 1.2 \times 10^8</math> (1)</li> <li><math>0.0083(3) / 8.3 \times 10^{-3}</math> (s) (1)</li> </ul>		3

**Total for Question 5 = 8 marks**



Question number	Answer	Notes	Marks
6 (a)	bronchus/bronchi (1)		1
(b) (i)	<ul style="list-style-type: none"> <li>• inhale and exhale/breathe in an out (1)</li> <li>• through mouthpiece (1)</li> <li>• floating air chamber rises/falls (1)</li> <li>• pen records a trace on (the rotating) graph paper/drum (1)</li> </ul>		4
(ii)	Do not share the mouthpiece with another person/disinfect mouthpiece before use by another person/after use (1)		1
(iii)	Any two from: <ul style="list-style-type: none"> <li>• airways /bronchi/bronchus constricted/obstructed/reduced diameter (1)</li> <li>• less/reduced airflow (1)</li> <li>• per unit time (1)</li> </ul>		2
(c) (i)	cannot be transmitted from one person to another/not contagious/not caused by a pathogen/bacteria/virus/microorganism (1)		1
(ii)	$9.5 - 7 = 2.5(1)$ $2.5 \div 7 \times 100(1)$ 36%(1)	Full marks for correct final answer Allow 35.7 for final answer	3
(iii)	people taking less exercise/ consuming too much fat/sugar/ taking in more energy than is being used/ increase in the number of people smoking/drinking more alcohol/obesity (1)	Allow other valid lifestyle factor	1

**Total for Question 6 = 13 marks**

Question number	Answer	Notes	Marks
7 (a) (i)	<ul style="list-style-type: none"> <li>• <math>67.5 \div 48.3</math> (1)</li> <li>• 1:1.4 (1)</li> </ul>	Full marks for correct final answer	2
(ii)	Any two from <ul style="list-style-type: none"> <li>• more males than females are overweight in all countries (1)</li> <li>• lowest percentage of people between the ages of 18-24 in all countries are overweight (1)</li> <li>• increased in all countries 18 - 64 (1)</li> </ul>		2
(iii)	sample size too small (1) not all overweight people identified/sample not representative (1)		2
(b) (i)	Any three from: <ul style="list-style-type: none"> <li>• pancreas (1)</li> <li>• releases insulin (1)</li> <li>• reference to the liver taking up glucose (1)</li> <li>• glucose converted to glycogen (1)</li> </ul>	R sugar R breaks down glucose	3
(ii)	Any two from: <ul style="list-style-type: none"> <li>• high blood glucose increases the concentration of the blood (1)</li> <li>• water moves out of cells (1)</li> <li>• by osmosis (1)</li> <li>• excess water in blood excreted in urine (1)</li> </ul>		2

**Total for Question 7 = 11 marks**

Question number	Answer	Notes	Marks
8 (a) (i)	X = urethra (1) Y = ureter (1)		2
(ii)	Any two from: <ul style="list-style-type: none"> <li>• transports oxygenated blood from the heart (1)</li> <li>• to the body/named organ (1)</li> <li>• maintains high blood pressure (1)</li> </ul>		2
(iii)	Any two from <ul style="list-style-type: none"> <li>• blood in A/renal artery contains more oxygen/oxygenated (1)</li> <li>• blood in A/renal artery contains more urea (1)</li> <li>• blood in A/renal artery contains more ions (1)</li> <li>• similar concentration of glucose/B renal vein has less glucose (1)</li> <li>• blood in A/renal artery contains less carbon dioxide (1)</li> </ul>	Allow reverse argument for B/renal vein	2
(b) (i)	Any four from: <ul style="list-style-type: none"> <li>• dialysis fluid/dialysate contains a low(er) concentration/no urea/waste products/ions (1)</li> <li>• urea/waste/ions diffuse from blood (1)</li> <li>• through dialysis membrane (1)</li> <li>• from high(er) concentration (in the blood) to a low(er) concentration (in the dialysate)/down a concentration gradient (1)</li> <li>• dialysis membrane is partially-permeable(1)</li> </ul>	ORA  allow selectively permeable membrane	4
(ii)	<ul style="list-style-type: none"> <li>• to prevent blood from clotting whilst in the machine (1)</li> <li>• (added as it enters the machine) to prevent clots from blocking the machine (as blood flows through) (1)</li> <li>• (not added at the end) as blood clotting properties need to return to normal before passing back into patient (1)</li> </ul>		3

Total for question 8 = 13 marks

Question number	Answer	Notes	Marks
9 (a) (i)	gives competitors an unfair advantage/form of cheating (1)		1
(ii)	Any four from <ul style="list-style-type: none"> <li>• increases heart rate (1)</li> <li>• for greater blood flow/increases blood pressure (1)</li> <li>• glycogen to glucose (in muscles/liver)(1)</li> <li>• causes dilation of air passages/increased rate/depth of breathing for increased oxygen uptake (1)</li> <li>• redirects blood flow to muscles/brain/heart/lungs (1)</li> <li>• increases <u>aerobic</u> respiration (1)</li> </ul>		4
(b) (i)	<ul style="list-style-type: none"> <li>• beta-blocker attaches to/binds with (adrenaline/norepinephrine/epinephrine) receptor sites (1)</li> <li>• binding of adrenaline/norepinephrine / epinephrine inhibited/prevented/reduced (1)</li> <li>• reduced response in cardiac muscle/tissue cells/named reduced response e.g. lower heart rate (1)</li> </ul>	ignore ref to active site	3
(ii)	Any two from: <ul style="list-style-type: none"> <li>• slower heart beat (1)</li> <li>• reduced blood flow/oxygen/glucose to skeletal muscles (1)</li> <li>• slower rate of <u>aerobic</u> respiration (1)</li> <li>• less energy (for activity) (1)</li> </ul>		2

Total for Question 9 = 10 marks

