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Mark Scheme (Results)

January 2017

Pearson Edexcel International GCSE in Human
Biology (4HB0) 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.

Question number	Answer	Accept	Reject	Marks
1	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><u>Description of Process</u></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">removal of faeces</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">removal of urine</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Removal of water onto skin surface</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">removal of carbon dioxide during expiration</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Conversion of glucose produced during digestion into glycogen in the liver</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Conversion of proteins into polypeptides in the stomach</div> <div style="border: 1px solid black; padding: 5px;">Passage of insulin into the blood from the pancreas</div> </div> <div style="text-align: center;"> <p><u>Name of Process</u></p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">sweating</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">egestion</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">excretion</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">digestion</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">assimilation</div> <div style="border: 1px solid black; padding: 5px;">secretion</div> </div> </div>	Removal of water on to skin surface can be excretion as an alternative to sweating		7
				Total 7

Question number	Answer	Accept	Reject	Marks														
2 (a)	<table border="1"> <thead> <tr> <th>Description</th> <th>Part</th> </tr> </thead> <tbody> <tr> <td>prevents internal reflection</td> <td>choroid;</td> </tr> <tr> <td>light sensitive layer</td> <td>retina;</td> </tr> <tr> <td>a transparent layer that bends light as it enters the eye</td> <td>cornea;</td> </tr> <tr> <td>carries impulses to the brain</td> <td>optic nerve;</td> </tr> <tr> <td>contains muscles which helps to focus images</td> <td>ciliary body;</td> </tr> <tr> <td>watery fluid at the front of the eye</td> <td>aqueous humor;</td> </tr> </tbody> </table>		Description	Part	prevents internal reflection	choroid;	light sensitive layer	retina;	a transparent layer that bends light as it enters the eye	cornea;	carries impulses to the brain	optic nerve;	contains muscles which helps to focus images	ciliary body;	watery fluid at the front of the eye	aqueous humor;		1 1 1 1 1 1
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(b) (i)	middle ear;			1
(ii)	bone;			1
(iii)	3 of <ul style="list-style-type: none"> • collect/pick up/transfer vibrations; • from eardrum; • across middle ear; • to oval window/cochlea; • amplify vibrations; 			3

Question number	Answer	Accept	Reject	Marks
2 (c)	3 of <ul style="list-style-type: none"> • (oxygen absorption) causes pressure in chamber to drop/pressure difference either side of eardrum; • eardrum curves (inwards)/presses against malleus; • vibration reduced/stopped; • hearing impaired/not as good; 			3 Total 14

Question number	Answer	Accept	Reject	Marks
3 (a) (i)	3 of <ul style="list-style-type: none"> • use a ruler/tape measure; • measure up one arm/from hand to head; • across the head; • to the second arm/hand; 			3
(ii)	1900 cm;			1
(iii)	1900 and 2.5; 1900 ÷ 2.5; 760;	Allow ecf from 3a(ii) 1 mark for 1900 and 2.5 1 mark for correct sum (division) using figures above 1 mark for correct answer using above		3
(iv)	3 of <ul style="list-style-type: none"> • no repeats; • difficulty in measuring distance; • errors in starting/stopping timer; • possible anticipation by students/delay in student response; • delay caused by synapses; 	Allow full marks for correct final answer with no working		3

(b)	2 of <ul style="list-style-type: none">• alcohol is a depressant/sedative;• impulse speed/transmission (across the synapse) would be slower;• slows reactions;			2 Total 12
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Question number	Answer	Marks
4	<p>8 of</p> <ul style="list-style-type: none"> • cilia damaged/destroyed/paralysed; • accumulation/overproduction of mucus; • causes smoker's cough; • leads to lung infection/bronchitis; • lung cancer; • emphysema/COPD; • walls of alveoli break down/lose elasticity/enlargement of alveoli/surface area of alveoli reduced; • carbon monoxide combines with haemoglobin; • gas exchange/oxygen uptake reduced/less oxygen in blood/transported; • less respiration; • less ATP/energy released/tired/fatigued; 	8

Question number	Answer	Accept	Reject	Marks												
5 (a) (i)	<table border="1"> <thead> <tr> <th>Part</th> <th>Name of Part</th> <th>Function of Part</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>cell membrane</td> <td>controls substances entering/leaving cell;</td> </tr> <tr> <td>Y</td> <td>nucleus</td> <td>controls activity/contains genes/DNA/chromosomes;</td> </tr> <tr> <td>Z</td> <td>cytoplasm</td> <td>(chemical) reactions occur;</td> </tr> </tbody> </table>	Part	Name of Part	Function of Part	X	cell membrane	controls substances entering/leaving cell;	Y	nucleus	controls activity/contains genes/DNA/chromosomes;	Z	cytoplasm	(chemical) reactions occur;			3
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(ii)	<ul style="list-style-type: none"> mitochondria; ribosomes; endoplasmic reticulum; 	Golgi apparatus / chromosomes	3													
(b) (i)	<ul style="list-style-type: none"> two oblong shaped cells with cilia; <p>Three of:</p> <ul style="list-style-type: none"> nucleus, (cell) membrane, cytoplasm, cilia labelled; 			2												
(ii)	<ul style="list-style-type: none"> moves mucus; out of trachea/to the throat/away from the lungs; <p>OR</p> <ul style="list-style-type: none"> moves ovum/egg; along oviduct/towards uterus; 	Ignore produces /secretes mucus		2												
				Total 10												

Question number	Answer	Accept	Reject	Marks
6 (a) (i)	<ul style="list-style-type: none"> • mitosis/cell division; • chromosomes only visible at this time / chromosomes condense; 			2
(ii)	2 of <ul style="list-style-type: none"> • respiration; • to release energy/to make ATP; • for cell division/mitosis; 			2
(iii)	<ul style="list-style-type: none"> • so chromosomes can be seen more clearly; 			1
(b) (i)	<ul style="list-style-type: none"> • 47; 			1
(ii)	<ul style="list-style-type: none"> • both chromosomes are X/it is XX/if it were male would be XY/no Y chromosome; 			1
(iii)	<ul style="list-style-type: none"> • chromosomes unable to pair up; • can't form haploid cell/cell with 23 chromosomes / unequal distribution of chromosomes; • during meiosis; 			2
				Total 9

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