



Pearson
Edexcel

Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE

In Human Biology (4HB0) Paper 1

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Publications Code 4HB0_01_1901_MS

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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)	A; (increased sweat production and decreased urine production)		1
(b)	A; (lymphocytes)		1
(c)	D; (the number of guanine and cytosine bases are equal)		1
(d)	B;		1
(e)	D; (enzymes catalyse one type of reaction)		1
(f)	B; (2 3 1 4)		1
(g)	A; (balance)		1
(h)	C; (respiration of glucose by bacteria dissolves tooth enamel)		1
(i)	B; (enzyme)		1
(j)	B; (motor)		1
			Total 10 marks

Question number	Answer	Notes	Marks																		
2 (a)	<table border="1" data-bbox="384 378 935 797"> <thead> <tr> <th data-bbox="384 378 762 409">Description</th> <th data-bbox="762 378 935 409">Letter</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 409 762 441">light sensitive layer</td> <td data-bbox="762 409 935 441">G;</td> </tr> <tr> <td data-bbox="384 441 762 499">muscles that change the shape of the lens</td> <td data-bbox="762 441 935 499">A;</td> </tr> <tr> <td data-bbox="384 499 762 530">contains nerve fibres</td> <td data-bbox="762 499 935 530">J;</td> </tr> <tr> <td data-bbox="384 530 762 589">protects the eye from dust and particles</td> <td data-bbox="762 530 935 589">E;</td> </tr> <tr> <td data-bbox="384 589 762 647">where most refraction of light occurs</td> <td data-bbox="762 589 935 647">D;</td> </tr> <tr> <td data-bbox="384 647 762 705">controls the amount of light entering the eye</td> <td data-bbox="762 647 935 705">B;</td> </tr> <tr> <td data-bbox="384 705 762 736">part that detects colour</td> <td data-bbox="762 705 935 736">G;</td> </tr> <tr> <td data-bbox="384 736 762 795">area of the retina that has no light sensitive cells</td> <td data-bbox="762 736 935 795">I;</td> </tr> </tbody> </table>	Description	Letter	light sensitive layer	G;	muscles that change the shape of the lens	A;	contains nerve fibres	J;	protects the eye from dust and particles	E;	where most refraction of light occurs	D;	controls the amount of light entering the eye	B;	part that detects colour	G;	area of the retina that has no light sensitive cells	I;		8
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(b) (i)	<ul style="list-style-type: none"> • stereoscopic/3D/binocular vision; • judge distances/speed better/depth perception; 		2																		
(ii)	<p>5 of</p> <ul style="list-style-type: none"> • two students, one to throw and one to catch; • ball thrown 10 times for student to catch/repeat throw and catch; • same distance away each time/distance away stated; • count number of time ball is caught/dropped; • repeat with one eye covered; • compare results; 		5																		
			Total 15 marks																		

Question number	Answer	Notes	Marks
3 (a) (i)	<ul style="list-style-type: none"> photosynthesis; 		1
(ii)	water; + carbon dioxide, \longrightarrow (glucose) + oxygen;	Do not accept formulae	3
(b) (i)	<ul style="list-style-type: none"> goes up and down (every day)/fluctuates; less difference/lower rise days 3/4-5/6; 		2
(ii)	4 of <ul style="list-style-type: none"> glucose produced/level increases during day; (more) light available (for photosynthesis); decreased/used up at night, because no light/stored as starch/used in respiration; days 3/4-5/6 cloudy/overcast/less light; so less photosynthesis; 	Allow lower temperature	4
(c) (i)	<ul style="list-style-type: none"> grind leaf (with water); place leaf in Benedict's solution and heat in a water bath; forms brick red colour 		3
(ii)	<ul style="list-style-type: none"> leaf/chlorophyll green/coloured; mask/difficult to detect colour change; difficult for reagents to penetrate cuticle. 		2
			Total 15 marks

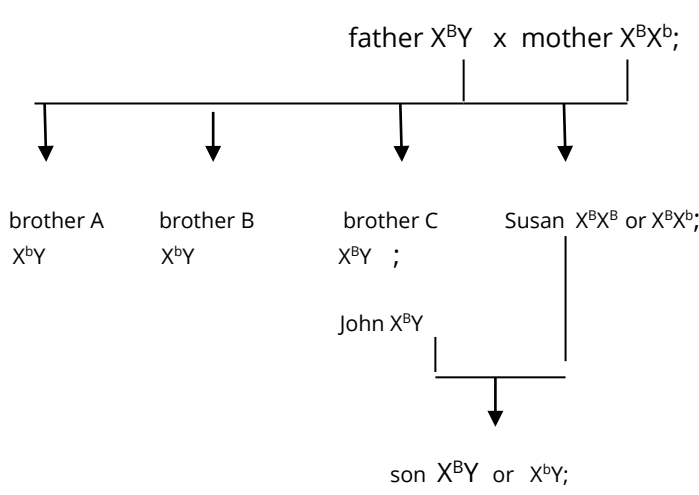
Question number	Answer	Notes	Marks												
4 (a) (i)	B = ureter;	Correct spelling only ALLOW testes	1												
	C = vas deferens/sperm duct;		1												
	D = testis;		1												
(ii)	<ul style="list-style-type: none"> • produces fluid/semen; • enables sperms to swim/travel/move; • contains nutrients/sperm activators/provides correct pH/alkaline conditions; 		3												
(iii)	<ul style="list-style-type: none"> • difficulty/pain in passing urine; • because swelling/pressure closes urethra/exit from bladder; • less fertile/infertile; • difficulty in passing sperm; 		2												
(b) (i)	<ul style="list-style-type: none"> • diagram to show head and tail; • tail/flagellum labelled; • head/nucleus labelled; 		3												
	(ii)	<ul style="list-style-type: none"> • acts as endocrine gland; • produces testosterone; • causes male secondary sexual characteristics/examples; 	3												
(c) (i)	3 of		3												
	<table border="1"> <thead> <tr> <th>Sperm</th> <th>Ovum</th> </tr> </thead> <tbody> <tr> <td>1. motile/moves</td> <td>stationary/can't move;</td> </tr> <tr> <td>2. small(er)</td> <td>larg(er);</td> </tr> <tr> <td>3. no stored nutrients</td> <td>stored nutrients;</td> </tr> <tr> <td>4. either X or Y chromosome</td> <td>only X chromosome;</td> </tr> <tr> <td>5. has tail/flagellum</td> <td>no tail/flagellum;</td> </tr> <tr> <td>6. acrosome present</td> <td>acrosome not present;</td> </tr> </tbody> </table>	Sperm		Ovum	1. motile/moves	stationary/can't move;	2. small(er)	larg(er);	3. no stored nutrients	stored nutrients;	4. either X or Y chromosome	only X chromosome;	5. has tail/flagellum	no tail/flagellum;	6. acrosome present
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6. acrosome present	acrosome not present;														
(ii)	haploid/23 chromosomes/ both could contain an X chromosome;		1												
			Total 18 marks												

Question number	Answer	Notes	Marks
5 (a) (i)	cilia;		1
	<ul style="list-style-type: none"> • beat/waft; • move mucus; • to (back of) throat/out of lungs/to mouth / to trachea; 		3
(b)	<ul style="list-style-type: none"> • trap bacteria/pathogens/dust/dirt; • prevent lung infections; 		2
(c)	<ul style="list-style-type: none"> • fewer/no cilia; • walls of alveoli burst/reduced surface area/aw; 		2
			Total 8 marks

Question number	Answer	Notes	Marks											
6 (a) (i)	<ul style="list-style-type: none"> the diagram is 4 times bigger/magnified 4 times; actual size (of artery)/real size; 	ALLOW ecf for incorrect measurement Full marks for correct final answer Allow reverse argument	2											
(ii)	<ul style="list-style-type: none"> 19-20 mm measured width; divided by 4 = 4.75/5.0 mm; 		2											
(iii)	(the diameter in a vein is) more than 4.75/5.0 mm / larger / wider;		1											
(iv)	3 of <table border="1" data-bbox="376 990 1011 1290"> <thead> <tr> <th data-bbox="376 990 695 1025">Artery</th> <th data-bbox="695 990 1011 1025">Vein</th> </tr> </thead> <tbody> <tr> <td data-bbox="376 1025 695 1061">1. thick(er) wall</td> <td data-bbox="695 1025 1011 1061">thin(ner) wall;</td> </tr> <tr> <td data-bbox="376 1061 695 1097">2. no valves</td> <td data-bbox="695 1061 1011 1097">valves</td> </tr> <tr> <td data-bbox="376 1097 695 1178">3. high pressure blood / pulsatile</td> <td data-bbox="695 1097 1011 1178">low pressure blood / non-pulsatile;</td> </tr> <tr> <td data-bbox="376 1178 695 1214">4. muscular/elastic</td> <td data-bbox="695 1178 1011 1214">less muscle elastic;</td> </tr> <tr> <td data-bbox="376 1214 695 1290">5. carries blood away from the heart</td> <td data-bbox="695 1214 1011 1290">carries blood to the heart;</td> </tr> </tbody> </table>		Artery	Vein	1. thick(er) wall	thin(ner) wall;	2. no valves	valves	3. high pressure blood / pulsatile	low pressure blood / non-pulsatile;	4. muscular/elastic	less muscle elastic;	5. carries blood away from the heart	carries blood to the heart;
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(b) (i)	<ul style="list-style-type: none"> urea ; carbon dioxide ; 		2											
(ii)	3 of <ul style="list-style-type: none"> narrow lumen; thin <u>walls/walls</u> one cell thick; slow blood flow/low (blood) pressure; pores; large surface area/large surface area to volume ratio; 		3											
			Total 13 marks											

Question number	Answer	Notes	Marks
7 (a)	<ul style="list-style-type: none"> • maintenance of a constant/steady; • internal environment; • despite internal/external changes; • correct reference to negative feedback; 		3
(b)	<p>(i)</p> <ul style="list-style-type: none"> • thermometer; • in mouth/ear; <p>(ii)</p> <ul style="list-style-type: none"> • 6.5°C, 21.5°C, 7.0°C; <p>(iii)</p> <ul style="list-style-type: none"> • Waterproofs/person/option C; • core temperature doesn't fall/remains constant; • skin temperature doesn't fall/constant/slight fall; • person B/no waterproofs, temperature drop in both; <p>(iv)</p> <ul style="list-style-type: none"> • repeat; • more people; • different clothing; <p>(v)</p> <ul style="list-style-type: none"> • shivering/increased metabolic activity; • to generate heat; • vasoconstriction; • less blood flow to skin; • reduced sweating; • to reduce heat loss; • hairs stand on end/erect; • increases layer of insulating air; 	accept under armpit or any other appropriate part	<p>2</p> <p>1</p> <p>4</p> <p>3</p> <p>5</p> <p>Total 18 marks</p>

Question number	Answer	Notes	Marks
8 (a) (i)	<ul style="list-style-type: none"> • butter; • 39 kJ/g; • 33 kJ/g more than liver and 14 kJ/g more than peanuts ORA; 	ALLOW liver is 6 kJ/g and peanuts are 25 kJ/g	3
(ii)	<ul style="list-style-type: none"> • bacon and cauliflower twice normal portions; • + 1470 + 672 + 168 + 399 + 294 + 273 + 84; • 3360(kJ); 	Allow full marks for correct final answer	3
(iii)	<ul style="list-style-type: none"> • not enough energy for person X or Y; • only provides a third of the energy for someone doing light work; • fatigue/tiredness 		3
(b)	<ul style="list-style-type: none"> • no/low carbohydrates; • no/low protein; • no/low fat; • few/limited vitamins/minerals; • insufficient energy; 	Allow correctly named vitamin / mineral	4 Total 13 marks

Question number	Answer	Notes	Marks
9 (a)	<p style="text-align: center;">father X^{BY} x mother X^BX^b;</p>  <p style="text-align: center;">brother A X^{bY} brother B X^{bY} brother C X^{BY} ; Susan X^BX^B or X^BX^b;</p> <p style="text-align: center;">John X^{BY}</p> <p style="text-align: center;">son X^{BY} or X^{bY};</p>		4
(b) (i)	<ul style="list-style-type: none"> • <u>allele</u> found on X chromosome; • not expressed/recessive/person not affected/red-green colour blind; • in heterozygote; 		3
(b) (ii)	<ul style="list-style-type: none"> • if Susan is X^BX^B/homozygous dominant no chance/0%; • if Susan is X^BX^b/carrier/heterozygote 50%/1 in 2/0.5; 		2
(c)	mutation;	ACCEPT description of mutation	1
			Total 10 marks

