Pearson Edexcel

Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE

In Human Biology (4HB0) Paper 1

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January 2019
Publications Code 4HB0_01_1901_MS

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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a)</td><td>
<table>
<tr><th>Description</th><th>Letter</th></tr>
<tr><td>light sensitive layer</td><td>G;</td></tr>
<tr><td>muscles that change the shape of the lens</td><td>A;</td></tr>
<tr><td>contains nerve fibres</td><td>J;</td></tr>
<tr><td>protects the eye from dust and particles</td><td>E;</td></tr>
<tr><td>where most refraction of light occurs</td><td>D;</td></tr>
<tr><td>controls the amount of light entering the eye</td><td>B;</td></tr>
<tr><td>part that detects colour</td><td>G;</td></tr>
<tr><td>area of the retina that has no light sensitive cells</td><td>I;</td></tr>
</table>
</td><td></td><td>8</td></tr>
<tr><td>(b) (i)</td><td>• stereoscopic/3D/binocular vision;
• judge distances/speed better/depth perception;</td><td></td><td>2</td></tr>
<tr><td>(ii)</td><td>5 of
• 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;</td><td></td><td>5

Total 15 marks</td></tr>
</table>

Question number	Answer	Notes	Marks
3 (a) (i)	• photosynthesis;		1
(ii)	water; + carbon dioxide; → (*glucose)* + oxygen;	Do not accept formulae	3
(b) (i)	• goes up and down (every day)/fluctuates; • less difference/lower rise days 3/4-5/6;		2
(ii)	4 of • 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)	• grind leaf (with water); • place leaf in Benedict's solution and heat in a water bath; • forms brick red colour		3
(ii)	• leaf/chlorophyll green/coloured; • mask/difficult to detect colour change; • difficult for reagents to penetrate cuticle.		2
			Total 15 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a) (i)</td><td>B = ureter;

C = vas deferens/sperm duct;
D = testis;</td><td>Correct spelling only

ALLOW testes</td><td>1

1
1</td></tr>
<tr><td>(ii)</td><td>• produces fluid/semen;
• enables sperms to swim/travel/move;
• contains nutrients/sperm activators/provides correct pH/alkaline conditions;</td><td></td><td>3</td></tr>
<tr><td>(iii)</td><td>• difficulty/pain in passing urine;
• because swelling/pressure closes urethra/exit from bladder;
• less fertile/infertile;
• difficulty in passing sperm;</td><td></td><td>2</td></tr>
<tr><td>(b) (i)</td><td>• diagram to show head and tail;
• tail/flagellum labelled;
• head/nucleus labelled;</td><td></td><td>3</td></tr>
<tr><td>(ii)</td><td>• acts as endocrine gland;
• produces testosterone;
• causes male secondary sexual characteristics/examples;</td><td></td><td>3</td></tr>
<tr><td>(c) (i)</td><td>3 of

<table><tr><th>Sperm</th><th>Ovum</th></tr><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></table></td><td></td><td>3</td></tr>
<tr><td>(ii)</td><td>haploid/23 chromosomes/
both could contain an X chromosome;</td><td></td><td>1

Total 18 marks</td></tr>
</table>

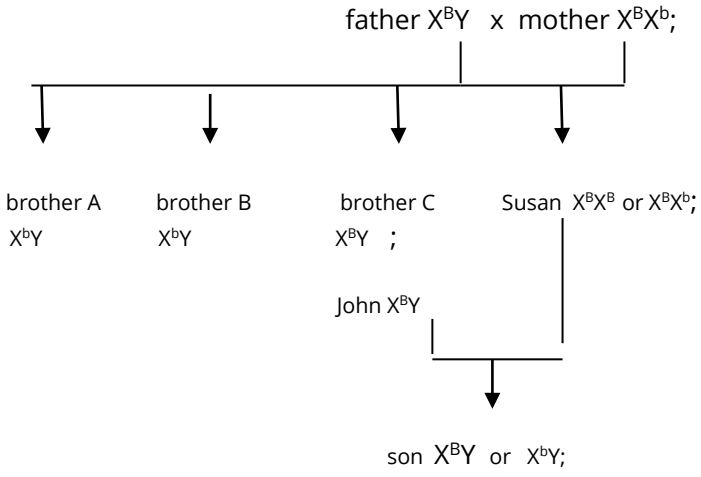
Question number	Answer	Notes	Marks
5 (a) (i)	cilia;		1
(ii)	• beat/waft; • move mucus; • to (back of) throat/out of lungs/to mouth / to trachea;		3
(b)	• trap bacteria/pathogens/dust/dirt; • prevent lung infections;		2
(c)	• fewer/no cilia; • walls of alveoli burst/reduced surface area/aw;		2 **Total 8 marks**

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6 (a) (i)</td><td>• the diagram is 4 times bigger/magnified 4 times;
• actual size (of artery)/real size;</td><td></td><td>2</td></tr>
<tr><td>(ii)</td><td>• 19-20 mm measured width;
• divided by 4 = 4.75/5.0 mm;</td><td>ALLOW ecf for incorrect measurement
Full marks for correct final answer</td><td>2</td></tr>
<tr><td>(iii)</td><td>(the diameter in a vein is) more than 4.75/5.0 mm / larger / wider;</td><td>Allow reverse argument</td><td>1</td></tr>
<tr><td>(iv)</td><td>3 of
<table><tr><th>Artery</th><th>Vein</th></tr><tr><td>1. thick(er) wall</td><td>thin(ner) wall;</td></tr><tr><td>2. no valves</td><td>valves</td></tr><tr><td>3. high pressure blood / pulsatile</td><td>low pressure blood / non-pulsatile;</td></tr><tr><td>4. muscular/elastic</td><td>less muscle elastic;</td></tr><tr><td>5. carries blood away from the heart</td><td>carries blood to the heart;</td></tr></table></td><td></td><td>3</td></tr>
<tr><td>(b) (i)</td><td>• urea ;
• carbon dioxide ;</td><td></td><td>2</td></tr>
<tr><td>(ii)</td><td>3 of
• narrow lumen;
• thin walls/walls one cell thick;
• slow blood flow/low (blood) pressure;
• pores;
• large surface area/large surface area to volume ratio;</td><td></td><td>3

Total 13 marks</td></tr>
</table>

Question number	Answer	Notes	Marks
7 (a)	• maintenance of a constant/steady; • internal environment; • despite internal/external changes; • correct reference to negative feedback;		3
(b) (i)	• thermometer; • in mouth/ear;	accept under armpit or any other appropriate part	2
(ii)	• 6.5°C, 21.5°C, 7.0°C;		1
(iii)	• 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;		4
(iv)	• repeat; • more people; • different clothing;		3
(v)	• 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;		5
			Total 18 marks

Question number	Answer	Notes	Marks
8 (a) (i)	• 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)	• bacon and cauliflower twice normal portions; • + 1470 + 672 + 168 + 399 + 294 + 273 + 84; • 3360(kJ);	Allow full marks for correct final answer	3
(iii)	• not enough energy for person X or Y; • only provides a third of the energy for someone doing light work; • fatigue/tiredness		3
(b)	• 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)			4
(b) (i)	• <u>allele</u> found on X chromosome; • not expressed/recessive/person not affected/red-green colour blind; • in heterozygote;		3
(ii)	• 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**

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