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Mark Scheme (Results)

January 2016

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	Notes	Marks
1(a)(i)	Genotypes 1. $X^H X^H$ 2. $X^H Y$ 3. $X^H X^h$ 4. $X^h Y$ Phenotypes • female, normal blood clotting • male, normal blood clotting • female, non-haemophiliac/carrier • male, haemophiliac	Accept a different order depending on linkage in diagram 2 marks for 4 correct, 1 mark for 2 or 3 correct Credit any order if it matches with the genotypes 2 marks for 4 correct, 1 mark for 2 or 3 correct 1 mark lost for omitting gender	(2) (2)

Question Number	Answer	Notes	Marks
1(a)(ii)	50%/ ½ /half/1 in 2/1:1/0.5		(1)

Question Number	Answer	Notes	Marks
1(a)(iii)	An explanation including two from: • males inherit Y chromosome from father; • recessive allele is carried on the X chromosome/not carried on Y chromosome;		(2)

Question Number	Answer	Notes	Marks
1(b)	D 2 cells, haploid cells;		(1)

Question Number	Answer	Notes	Marks
1(c)(i)	• contains genes/genetic material/holds genetic code; • codes for/ which give instructions to make proteins/enzymes; • controls cell activities / determines characteristics;	Do not allow any answer referring to structure e.g. it is genetic material	(2)

Question Number	Answer	Notes	Marks
1(c) (ii)	In the following order: • 22.8; • 18.2;		(2)

Question Number	Answer	Notes	Marks
1(d)	A description including one of the following random change in DNA/causes mutation/order of bases changed/example of a mutation e.g. substitution;		(1)

Total for Question 1 = 13 Marks

Question Number	Answer	Notes	Marks
2(a)(i)	• minnows/frogs;		(1)

Question Number	Answer	Notes	Mark
2(a)(ii)	In the following order: • water; • glucose;	Do not accept formulae as alternatives	(2)

Question Number	Answer	Notes	Marks
2(aiii)	• add iodine solution; • blue-black colour indicates starch is present;		(2)

Question Number	Answer	Notes	Marks
2(b)	1790 ÷ 18500 x 100; 9.7 %;	Allow full marks for correct bald answer Allow 9.68% for full marks	(2)

Question Number	Answer	Notes	Marks
2(c) (i)	• bacteria/fungi/mould/ microorganisms;		(1)

Question Number	Answer	Notes	Marks
2(c) (ii)	• reduce movement/fence off crops that are eaten/keep indoors;	Accept any valid scientific explanation	(1)

Total for Question 2 = 9 marks

Question Number	Answer	Notes	Mark
3(a) (i)	• increases; • from 11.2 to 13.8/13.9 per 100 000 people; • correct manipulation of data e.g.increases by 2.6/2.7 per 100 000 people; • idea of fluctuations;	Accept it goes up and down	(2)

Question Number	Answer	Notes	Mark
3(a) (ii)	• 630 x 13.8 ; • 8694;	Allow full marks for correct bald answer	(2)

Question Number	Answer	Notes	Mark
3(a)(iii)	A suggestion including two from the following: • TB (bacterium) transmitted by droplet infection; • more people in urban areas/overcrowded/dense population; • higher number of immigrants (from less-developed countries);	Allow transmitted by sneezing/coughing/through the air	(2)

Question Number	Answer	Notes	Mark
3(b)	bacterium;	Accept bacterial/bacteria Accept Mycobacterium tuberculosis	(1)

Question Number	Answer	Notes	Mark
3(c)	A description including two from the following: • apply medication/example of medication e.g. anti-fungal cream/powder; • wash feet often/keep feet clean; • dry feet thoroughly after washing; • change socks/shoes often; • wash towels regularly/do not share towels/footwear; • wear protective shoes in swimming pools/changing rooms/don't walk bare foot;		(2)

Question Number	Answer	Notes	Mark
3(d)	An explanation linking four of the following: • antigen/attenuated virus injected; • white blood cells / lymphocytes; • produce antibodies; • memory cells produced; • rapid response to re-infection; • reduction in number of cases of disease reduces transmission;	Allow weakened form of bacteria/virus	(4)

Total for Question 3 = 13 marks

Question Number	Answer	Notes	Mark
4(a)	• two sets of bars clearly displayed to compare two sets of data; • key to show at rest/heavy exercise/bars labelled;	Size of bars must be correct Must refer to correct bars	(2)

Question Number	Answer	Notes	Mark
4(b)	An explanation including three of the following: • more blood flow to muscles during exercise; • to remove carbon dioxide; • more oxygen needed by muscles; • to release energy; • from (aerobic) respiration;	Accept reverse argument for all marking points Accept manipulation of data	(3)

Question Number	Answer	Notes	Mark
4(c)	A explanation including three from: • more heat generated (by muscles/aerobic respiration); • vasodilation; • greater blood flow nearer skin's surface; • heat lost from blood/radiated from skin's surface; • body temperature decreases/cooling effect;	Allow manipulated data	(3)

Total for Question 4 = 8 Marks

Question Number	Answer	Notes	Mark
5(a)	An explanation including four of the following: • enzyme is amylase; • (enzyme) breaks down starch • to maltose/glucose/sugar; • glucose/sugar diffuses/passes into water; • through partially permeable membrane/visking tubing; • from a high concentration to a low concentration;		(4)

Question Number	Answer	Notes	Mark
5(b)	An explanation including three of the following: • reference to optimum temperature of enzyme; • enzymes denature (if temperature is too high); • change in shape/active site; • no longer binds to substrate/shapes no longer complementary;	Allow enzyme inactive/ slower / no reaction takes place	(3)

Question Number	Answer	Notes	Mark
5(c)	An explanation linking two from: For concentration of starch solution • (higher concentration of starch) more collisions/enzyme-substrate complexes formed; • faster reaction; • more sugar produced/ greater concentration of sugar solution; • *more sugar diffuses/diffusion of sugar quicker; For size of the visking tubing • larger surface area; • *more sugar diffuses/diffusion of sugar quicker;	2 marks for each explanation Accept reverse argument for lower concentration of starch Accept reverse argument for decrease in surface area *Award only once	(4)

Question Number	Answer	Notes	Mark
5(d)	• pancreas/salivary gland		(1)

Total for Question 5 = 12 marks

Question Number	Answer	Notes	Mark
6	An explanation including five points from the following • FSH causes development of follicle/egg to mature; • Oestrogen released; • Oestrogen causes thickening of uterus lining; • Oestrogen inhibits release of FSH; • LH released; • LH causes ovulation; • progesterone released; • progesterone inhibits FSH/LH production/maintains thickness of uterus lining; • decrease in oestrogen / progesterone causes menstruation;		(5)

Total for question 6 = 5 marks

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