Pearson Edexcel

Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE In Human Biology (4HB1) Paper 01R

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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)	• atria; • lungs; • vena cava; • ventricles; • body; • muscle; • systolic; • 120;		8
(b)	6.1 ÷ 68; = 0.0897 dm^3; = 89.7 (cm^3);	ACCEPT 90 (cm^3) Allow 1 mark for incorrect dm^3 in MP2 to correct conversion to cm^3	3
			Total = 11

Question number	Answer	Notes	Marks
2 (a) (i)	• lens in correct position; • attached both ends to suspensory ligaments;	MP1- accept lens between ciliary muscles/diameter more than width of ciliary muscle MP2- accept suspensory ligament attached to ciliary muscle	2
(ii)	A = cornea; B = retina; C = optic nerve;		3
(b)	• ciliary muscles relax; • suspensory ligaments tighten/taut; • they pull on lens/lens stretched; • lens is thin(er)/flat(er/less convex); • less refraction/bending of (light)	Mp2- ignore suspensory ligament contract MP5= do not accept less light refracted	4
			Total = 9

Question number	Answer	Notes	Marks
3 (a) (i)	molar/pre-molar;		1
(ii)	A = enamel; B = dentine; C = pulp (cavity); D = nerve;	D- accept sensory neurone	4
(iii)	• ridged/crevices/uneven surface/large surface/eq.; • food/sugar/plaque/eq. becomes stuck/trapped/build up/stays longer on the molar; • bacteria able to act on (trapped) food/sugar/plaque; • acid produced:		3
(b)	• contains calcium; • phosphate; • strengthens enamel; • resistant to decay;	accept fluoride for mp1 or mp2	4
(c)	• regular brushing; • flossing; • (regular) visits to dentist/check-up at dentist; • use fluoride toothpaste/add fluoride to drinking water; • reduce consumption of sugar		3
			Total = 15

Question number	Answer	Notes	Marks
4 (a) (i)	• linear scale/plotted on half of grid; • correct way round; • axes labelled with units; • all points plotted correctly;	mp4- half-square tolerance	4
(ii)	draw curve of best fit;	Ignore beyond the 2 extremes when line is drawn. 2 straight lines=0 Slight curve at 4 is enough for 1 mark	1
(b) (i)	• pepsin digests/breaks down protein; • (to)amino acid/peptides; • (which is)soluble/dissolves; • black silver salts removed /fall away/no longer present;	Mp1- accept hydrolyse MP4- accept silver salts broken down	3
(ii)	• 1//2/1 to 2; • **optimum** pH for pepsin;		2
(iii)	• temperature; • area of film/size/length/width/thickness/; • volume of (pepsin) solution; • type of photographic film/amount of protein in film; • pH;	Mp3-ignore amount	3
(c)	• adding more enzyme/pepsin has no effect on reaction/ maximum rate of reaction at 4%; • all protein/substrate digested/ substrate is a limiting factor/not enough protein to digest; • enzyme no longer a limiting factor/ active sites empty;	MP1- accept Vmax not enough/no more substrate/protein to bind to active sites= 2 marks	2
			Total = 15

Question number	Answer	Notes	Marks
5 (a) (i)	• flows from artery; • where blood is at high pressure; • into vein; • because blood is at a low pressure;	mp1- accept in context of artery leaving heart mp3- accept in context vein of returning to the heart If comparative answer given for pressure score marking point 2 and 4	4
(ii)	glomerulus;		1
(iii)	• large (surface) area; • for diffusion / molecules/ named molecules to pass out(of blood);	More area for diffusion = 2 marks	2
(iv)	more urea;		1
(b)	• no/less gradient between liquid X and blood (glucose)/blood and X have same concentration/eq; • glucose does not pass out/ glucose is not lost: • by diffusion • needed for respiration; • minimises osmotic effect;		3
(c)	• protein digested/broken down into <u>amino acids</u>; • (excess) **<u>amino acids</u>** broken down/deaminated; • urea; • less protein means less urea produced; • less urea means less to be filtered/removed ; • high concentration of urea/nitrogenous waste can be toxic;	MP3– accept urea from protein breakdown	4
			Total =15

Question number	Answer	Notes	Marks
6 (a) (i)	2500 males; $\frac{2500 \times 0.8}{100}$; = 20;	ecf if use 5000 as starting figure 40 scores 2 marks any number×0.8=1	3
(ii)	small number/ not enough tested;		1
(iii)	• many more males than females with condition; • show that it is sex-linked; • to X chromosome; • females are XX /males one X chromosome/XY • females can be carriers(so fewer)/males cannot be carriers(so more); • (relatively) small number (in whole population)/small chance of being colour blind; • indicates that it is recessive;		5
(b)	parents X^BY × X^BX^b; gametes X^B Y X^B X^b; offspring genotypes X^BX^B X^BX^b X^BY X^bY; offspring phenotypes normal carrier/ disease female normal female male red-green male;	If parents are incorrect ecf for mp 2,3 and 4 If X and Y are not used- max of 1 mark	4
			Total = 13

<table>
<tr><th colspan="3">Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>7</td><td>(a)</td><td></td><td>
<table>
<tr><th>Part</th><th>Name of part</th><th>Function of part</th></tr>
<tr><td>X</td><td>cell membrane;</td><td>controls what enters/leaves cell;</td></tr>
<tr><td>Y</td><td>nucleus;</td><td>controls cell/stores genetic information;</td></tr>
<tr><td>Z</td><td>cytoplasm;</td><td>site of chemical reactions;</td></tr>
</table>
</td><td>If they get any wrong in the part column, they can score marks for the correct function.</td><td>6</td></tr>
<tr><td></td><td>(b)</td><td></td><td>• scrape inside of cheek/cotton bud to remove cheek cells/eq.;
• place (scraping) on <u>slide;</u>
• smear/spread thinly;
• add stain/ methylene blue;
• place <u>coverslip</u> on top;
• remove excess stain;
• sterile/disinfect cotton bud;</td><td></td><td>4
(</td></tr>
<tr><td></td><td>(c)</td><td></td><td>• ribosomes;
• mitochondria;</td><td>accept any suitable structures such as ER,golgi,RER

ignore chromosomes</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Total = 12</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">PAPER TOTAL - 90 MARKS</td></tr>
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