Pearson Edexcel

Mark Scheme (Results)

November 2021

Pearson Edexcel International GCSE

In Human Biology (4HB1) Paper 01

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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)	<table><tr><th>Conditions</th><th>Result/no/scale of bubbles</th></tr><tr><td>Room temperature</td><td>5</td></tr><tr><td>Alkali added</td><td>3</td></tr><tr><td>Acid added</td><td>2</td></tr><tr><td>3°C</td><td>1</td></tr><tr><td>70°C</td><td>0</td></tr><tr><td>no hydrogen peroxide added</td><td>0</td></tr></table> • two column table; • headings; • correct order of results (high to low/ORA);		3 marks
(ii)	• no repeats/only done once;		1 mark
(iii)	• results based on judgement/subjective/qualitative;		1 mark
(iv)	• repeats; • measure volume of oxygen; • using gas syringe/other suitable apparatus;		3 marks
(b) (i)	untreated/room temperature;		1 mark
(ii)	control;		1 mark
(iii)	• reduced/low enzyme activity; • not at <u>optimum</u> pH; • active site changed; • fewer enzyme substrate complexes/substrate won't fit;		4 marks

Total 14 marks

Question number	Answer	Notes	Marks
2 (a)	• movement of molecules; • from high to low concentration/down a diffusion/concentration gradient;		2marks
(b)	any three of • movement of molecules against a concentration gradient/low to high concentration; • using energy; • in the form of ATP; • ref protein channels;		3marks
(c)	any two of • movement of water; • from high to low water potential/down a water potential gradient; • across a partially/selectively/semi permeable membrane;	ignore ref to high/low conc of water	2marks

Total 7 marks

Question number	Answer	Notes	Marks
3 (a)	<table><tr><th>Component</th><th>Name</th><th>Function</th></tr><tr><td>A</td><td>red blood cell/erythrocyte</td><td>carry/transport oxygen</td></tr><tr><td>B</td><td>white blood cell/phagocyte;</td><td>engulf bacteria;</td></tr><tr><td>C</td><td>platelets;</td><td>clotting;</td></tr></table>		4 marks
(b) (i)	any five of • enzyme/thromboplastin/thrombokinase; • released from (damaged) platelets; • prothombin to thrombin; • fibrinogen to fibrin; • meshwork formed; • trapped rbc form clot; • ref. to Ca^{2+};	reject secrete	5 marks
(ii)	• prevents loss of too much blood; • prevents entry of pathogens/bacteria; • which would cause infection/prevents infection;		3 marks

Total 12 marks

Question number			Answer	Notes	Marks
4	(a)	(i)	line labelled X to mouth;		1mark
		(ii)	line labelled Y to stomach;		1mark
		(iii)	line labelled Z to pancreas;		1mark
	(b)		any 4 of • reduced surface area; • so unable to absorb calcium; • required for bones/compact bone; • calcium passes from bone; • causes them to weaken/soften/lose density;		4marks
	(c)		• large intestine absorbs water; • not enough absorbed;		2marks

Total 9 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>5 (a) (i)</td><td>any four of

• exhale through tube A;
• time how long for limewater to go cloudy;
• replace limewater;
• inhale through tube B;
• compare time to go cloudy;</td><td></td><td>4 marks</td></tr>
<tr><td>(ii)</td><td>• more carbon dioxide in exhaled air;
• quicker/less time to go cloudy with exhaled air;
• produced by respiration;</td><td></td><td>3 marks</td></tr>
<tr><td>(b) (i)</td><td><table><tr><th>Lung volume</th><th>Letter</th><th>Volume in dm^3</th></tr><tr><td>tidal volume</td><td>W;</td><td>0.4;</td></tr><tr><td>vital capacity</td><td>Z;</td><td>2.25;</td></tr></table></td><td></td><td>4 marks</td></tr>
<tr><td>(ii)</td><td>• deep/maximum inhale;
• followed by maximum/forcefully exhale;</td><td>must be in correct order</td><td>2 marks</td></tr>
</table>

Total 13 marks

Question number	Answer	Notes	Marks
6 (a) (i)	• both increase; • males more than females; • fluctuations; accept any two from;		3 marks
(ii)	• layer of actively dividing cells; • can become uncontrolled; • when exposed to ultraviolet/sun light;		2 marks
(b) (i)	17 - 48; = 31 per 100 000; $\frac{31}{25}$ = 1.2/1.24 per 100 000;	allow 16.7 - 17 and 47.8 - 48 then ECF	3 marks
(ii)	20 per 100 000; $\frac{20 \times 7\,000\,000;}{100\,000}$ = 1400;	ECF	3 marks

Total 11 marks

Question number	Answer	Notes	Marks
7 (a) (i)	• prophase, metaphase, anaphase and telophase;;	minus 1 for each error	2 marks
(ii)	• chromosomes lined up; • equator shown/aligned at equator; • one member of each bivalent above, the other below;		3 marks
(b) (i)	A (DNA); B not part of DNA C not part of DNA D found only in RNA not DNA		1 mark
(ii)	length = 20 mm; $\frac{20}{750}$ = 0.026 mm; = 26.0/26.7 µm;	allow 20 -22 ECF	3 marks
(c)	• two genetically identical cells; • diploid/2n;		2 marks

Total 11 marks

Question number	Answer	Notes	Marks
8 (a) (i)	• arrow heads showing direction of light rays; • bent at cornea; • bent at lens; • cross over in eyeball; • inverted image on retina;		5 marks
(ii)	transmits/carries impulses from the retina/rod and cones; to the brain;		2 marks
(b) (i)	behind the retina/fovea;		1 mark
(ii)	eyeball too short / eye lens not powerful enough/too flat/not convex enough;		1 mark
(iii)	use a convex / converging lens; to converge/refract/bend rays of light;		2 mark
(c)	• infection; • rejection;		2 marks

Total 13 marks

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