



# Mark Scheme (Results)

November 2023

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

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.edexcel.com](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

November 2023

Question Paper Log Number P74491A

Publications Code 4HB1\_01\_MS\_2311

All the material in this publication is copyright

© Pearson Education Ltd 2023

## 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)	<table border="1" data-bbox="384 286 981 501"> <thead> <tr> <th data-bbox="384 286 501 309">Feature</th> <th data-bbox="504 286 592 309">red b c</th> <th data-bbox="595 286 692 309">phagocyte</th> <th data-bbox="695 286 805 309">lymphocyte</th> <th data-bbox="809 286 896 309">platelet</th> <th data-bbox="900 286 981 309">plasma</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 311 501 344">transports oxygen</td> <td data-bbox="504 311 592 344">✓;</td> <td data-bbox="595 311 692 344"></td> <td data-bbox="695 311 805 344"></td> <td data-bbox="809 311 896 344"></td> <td data-bbox="900 311 981 344"></td> </tr> <tr> <td data-bbox="384 347 501 380">contains haemoglobin</td> <td data-bbox="504 347 592 380">✓;</td> <td data-bbox="595 347 692 380"></td> <td data-bbox="695 347 805 380"></td> <td data-bbox="809 347 896 380"></td> <td data-bbox="900 347 981 380"></td> </tr> <tr> <td data-bbox="384 383 501 416">is a fluid</td> <td data-bbox="504 383 592 416"></td> <td data-bbox="595 383 692 416"></td> <td data-bbox="695 383 805 416"></td> <td data-bbox="809 383 896 416"></td> <td data-bbox="900 383 981 416">✓;</td> </tr> <tr> <td data-bbox="384 418 501 452">produces antibodies</td> <td data-bbox="504 418 592 452"></td> <td data-bbox="595 418 692 452"></td> <td data-bbox="695 418 805 452">✓;</td> <td data-bbox="809 418 896 452"></td> <td data-bbox="900 418 981 452"></td> </tr> <tr> <td data-bbox="384 454 501 501">engulfs pathogen</td> <td data-bbox="504 454 592 501"></td> <td data-bbox="595 454 692 501">✓;</td> <td data-bbox="695 454 805 501"></td> <td data-bbox="809 454 896 501"></td> <td data-bbox="900 454 981 501"></td> </tr> </tbody> </table>	Feature	red b c	phagocyte	lymphocyte	platelet	plasma	transports oxygen	✓;					contains haemoglobin	✓;					is a fluid					✓;	produces antibodies			✓;			engulfs pathogen		✓;				if more than required ticks no marks	5
Feature	red b c	phagocyte	lymphocyte	platelet	plasma																																		
transports oxygen	✓;																																						
contains haemoglobin	✓;																																						
is a fluid					✓;																																		
produces antibodies			✓;																																				
engulfs pathogen		✓;																																					
(b)	<p data-bbox="437 607 603 636">any four from</p> <ul data-bbox="432 669 927 860" style="list-style-type: none"> <li data-bbox="432 669 715 698">• forms a plug/mesh;</li> <li data-bbox="432 701 879 730">• to prevent loss of (excess) blood;</li> <li data-bbox="432 732 927 797">• prevents entry of bacteria/pathogens/microorganisms;</li> <li data-bbox="432 799 810 828">• prevents infection/disease;</li> <li data-bbox="432 831 815 860">• protects skin whilst healing;</li> </ul>	R scab	4																																				

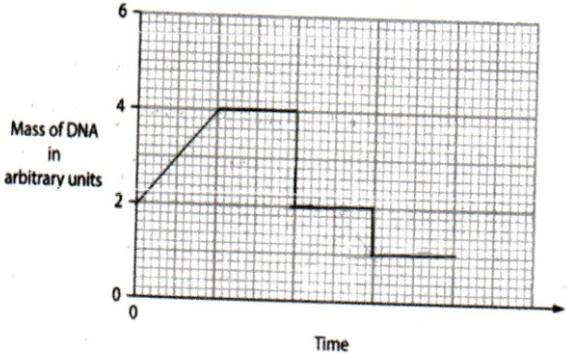
Total 9 marks

Question number	Answer	Notes	Marks
2 (a) (i)	<ul style="list-style-type: none"> <li>axes labelled with units;</li> <li>axes correct way round and suitable scale;</li> <li>points plotted correctly;;</li> <li>straight lines joined;</li> <li>lines identified;</li> </ul>	time without with 0 65 110 30 120 215 60 130 230 90 95 200 120 80 190 150 65 180 180 65 170  don't include in published version	6
(ii)	<ul style="list-style-type: none"> <li>without = 65 mg per 100cm<sup>3</sup>;</li> <li>with = 120 mg per 100cm<sup>3</sup>;</li> </ul>		2
(iii)	any three from <ul style="list-style-type: none"> <li>without, level starts lower/level lower throughout;</li> <li>smaller difference between highest and lowest values;</li> <li>rises to lower levels/rise less quickly;</li> <li>returns to normal (quicker)/same level 150-180;</li> </ul>	ORA for person with diabetes	3
(b)	<ul style="list-style-type: none"> <li>sample in a test/boiling tube;</li> <li>add Benedict's reagent/solution;</li> <li>heat in a water bath;</li> <li>wear goggles;</li> <li>brick red colour if glucose present;</li> </ul> if candidate uses glucose testing sticks <ul style="list-style-type: none"> <li>sample in a test/boiling tube;</li> <li>use of testing stick;</li> <li>dip into urine;</li> <li>compare colour with chart;</li> <li>use of goggles;</li> </ul>	Accept yellow/green/orange	5

Total 16 marks

Question number	Answer	Notes	Marks
3 (a) (i)	250:750; 1:3;	full marks for correct answer with no working	2
(ii)	17 500 - 5600 = 11900; $\frac{11\,900 \times 100}{5\,600}$ = 210%;	full marks for correct answer with no working 213/212.5 = two marks	3
(iii)	<ul style="list-style-type: none"> <li>• other parts of the body/organs;</li> <li>• liver/kidney/lungs/arteries/veins;</li> <li>• needs some blood supplied/blood flows to these organs;</li> </ul>		3
(b) (i)	<ul style="list-style-type: none"> <li>• large/big/huge increase in total flow;</li> <li>• large/big/huge increase in flow skeletal muscles/skin;</li> <li>• decrease for gut;</li> </ul>		3
(ii)	<ul style="list-style-type: none"> <li>• heat generated(body) temperature increases during exercise;</li> <li>• from respiration;</li> <li>• carried by blood/more blood to skin;</li> <li>• (heat) lost through skin/by radiation;</li> </ul>		4

Total 15 marks

Question number	Answer	Notes	Marks												
4 (a) (i)	<p><b>A; (chromosomes)</b></p> <p>B/C/D do not contain DNA</p>		1												
(ii)	RNA/mRNA/tRNA;		1												
(iii)	<table border="1" data-bbox="376 506 1011 696"> <thead> <tr> <th>Differences</th> <th>DNA</th> <th>Named nucleic acid</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>double stranded</td> <td>single stranded</td> </tr> <tr> <td>2</td> <td>contains deoxyribose</td> <td>contains ribose</td> </tr> <tr> <td>3</td> <td>contains thymine</td> <td>contains uracil</td> </tr> </tbody> </table>	Differences	DNA	Named nucleic acid	1	double stranded	single stranded	2	contains deoxyribose	contains ribose	3	contains thymine	contains uracil		3
Differences	DNA	Named nucleic acid													
1	double stranded	single stranded													
2	contains deoxyribose	contains ribose													
3	contains thymine	contains uracil													
(b) (i)	<ul style="list-style-type: none"> <li>• replication;</li> <li>• formation of a new strand (of DNA);</li> <li>• by complementary base pairing;</li> <li>• double the original mass of DNA;</li> </ul>		4												
(ii)	<ul style="list-style-type: none"> <li>• cell dividing;</li> <li>• cytokinesis;</li> </ul>		2												
(iii)	<ul style="list-style-type: none"> <li>• line starting at two;</li> <li>• increases to four;</li> <li>• ends at one;</li> </ul>		3												
															

Total 14 marks

Question number	Answer	Notes	Marks
5 (a)	$4^3$ ; = 64;	Full marks for correct answer	2
(b) (i)	<ul style="list-style-type: none"> <li>change in order/sequence;</li> <li>of bases;</li> <li>different protein may be formed;</li> </ul>	accept any suitable example	3
(ii)	uv light/ $\lambda$ rays/ionising radiation/X-rays;		1
(iii)	<ul style="list-style-type: none"> <li>can't catalyse reaction/slows reaction/activity;</li> <li>because can't form E-S complexes/substrate can't bind with active site/active site not complementary;</li> </ul>		2
(iv)	doesn't affect working of enzyme/mutation does not change amino acid/doesn't affect structure/shape of enzyme/different coding for same amino acid;		1

Total 9 marks

Question number	Answer	Notes	Marks
6 (a)	L = Bowman's capsule; M = glomerulus; N = collecting duct; O = loop of Henlé ;		4
(b) (i)	<ul style="list-style-type: none"> <li>• ultrafiltration;</li> <li>• high blood pressure in B/glomerulus;</li> <li>• forces fluid/water into L/Bowman's capsule/out;</li> </ul>		3
(ii)	<ul style="list-style-type: none"> <li>• blood cells/named;</li> <li>• proteins;</li> </ul>		2
(iii)	line labelled G pointing to proximal convoluted tubule;		1
(c)	<p>any five from</p> <ul style="list-style-type: none"> <li>• more sweat;</li> <li>• hypothalamus detects decreased water potential of blood;</li> <li>• ADH secreted;</li> <li>• increases permeability of collecting duct;</li> <li>• causes more reabsorption of water;</li> <li>• volume of <u>filtrate</u> reduced;</li> <li>• concentration of filtrate/urine increased;</li> </ul>		5

Total 15 marks

Question number	Answer	Notes	Marks
7 (a)	pulmonary artery;		1
(b)	<ul style="list-style-type: none"> <li>• Y is thicker;</li> <li>• blood pumped into aorta;</li> <li>• takes/distributes blood to organs/tissues/whole body;</li> <li>• requires high pressure</li> <li>• thicker wall means more muscle for stronger contraction;</li> </ul>	ORA for each point	5
(c)	any three of <ul style="list-style-type: none"> <li>• heart muscle deprived of oxygen;</li> <li>• insufficient energy for muscle contraction/less aerobic respiration/(more) anaerobic respiration;</li> <li>• heart stops pumping blood/pumps less blood;</li> <li>• heart attack;</li> </ul>		3
(d)	<ul style="list-style-type: none"> <li>• transfers CO<sub>2</sub> (from muscle cells) to blood capillary;</li> <li>• transfers oxygen from blood/capillary (to muscle cells);</li> <li>• transfers glucose from blood/capillary (to muscle cells);</li> </ul>		3

Total 12 marks

