



# Mark Scheme (Results)

January 2018

Pearson Edexcel International GCSE  
In Human Biology (4HB0) Paper 02



## **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)

January 2018

Publications Code 4HB0\_02\_1801\_MS

All the material in this publication is copyright

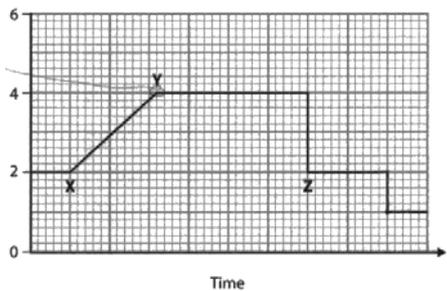
© Pearson Education Ltd 2018

## 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"> <thead> <tr> <th></th> <th>Blood</th> <th>Filtrate</th> <th>Urine</th> </tr> </thead> <tbody> <tr> <td>Protein</td> <td>√</td> <td>X</td> <td>X ;</td> </tr> <tr> <td>Urea</td> <td>√</td> <td>√</td> <td>√ ;</td> </tr> <tr> <td>Glucose</td> <td>√</td> <td>√</td> <td>X ;</td> </tr> <tr> <td>Water</td> <td>√</td> <td>√</td> <td>√ ;</td> </tr> <tr> <td>Salts</td> <td>√</td> <td>√</td> <td>√ ;</td> </tr> </tbody> </table>		Blood	Filtrate	Urine	Protein	√	X	X ;	Urea	√	√	√ ;	Glucose	√	√	X ;	Water	√	√	√ ;	Salts	√	√	√ ;	One mark for each correct row. Allow blanks to count as crosses	5
	Blood	Filtrate	Urine																								
Protein	√	X	X ;																								
Urea	√	√	√ ;																								
Glucose	√	√	X ;																								
Water	√	√	√ ;																								
Salts	√	√	√ ;																								
(i)	3 of <ul style="list-style-type: none"> <li>• less/no insulin produced;</li> <li>• more glucose in blood/blood glucose not controlled/not converted to/stored as glycogen;</li> <li>• less (glucose) reabsorbed;</li> <li>• glucose in urine;</li> </ul>		3																								
(b)	3 of <table border="1"> <thead> <tr> <th>Renal vein</th> <th>Renal artery</th> </tr> </thead> <tbody> <tr> <td>deoxygenated/less oxygen;</td> <td>oxygenated/more oxygen</td> </tr> <tr> <td>more carbon dioxide;</td> <td>less carbon dioxide</td> </tr> <tr> <td>less urea;</td> <td>more urea</td> </tr> <tr> <td>less glucose;</td> <td>more glucose</td> </tr> <tr> <td>less ions/salts</td> <td>more ions/salts</td> </tr> </tbody> </table>	Renal vein	Renal artery	deoxygenated/less oxygen;	oxygenated/more oxygen	more carbon dioxide;	less carbon dioxide	less urea;	more urea	less glucose;	more glucose	less ions/salts	more ions/salts	One mark for each correct row.	3												
Renal vein	Renal artery																										
deoxygenated/less oxygen;	oxygenated/more oxygen																										
more carbon dioxide;	less carbon dioxide																										
less urea;	more urea																										
less glucose;	more glucose																										
less ions/salts	more ions/salts																										
(c) (i)	arrow up in vein;		1																								
(ii)	<ul style="list-style-type: none"> <li>• vein has valve/artery no valve;</li> <li>• vein has large(er) lumen/artery small(er) lumen;</li> <li>• vein has less muscle/elastic tissue/artery has more muscle/elastic tissue;</li> </ul>	Allow artery has thick(er) walls/vein has thin(ner) walls	3																								
			Total 15																								

Question number	Answer	Notes	Marks
2			
(a) (i)	A = urethra; B = bladder; C = colon/rectum;	Reject ureter  Ignore anus	3
(ii)	P arrow to vagina; Q arrow to oviduct; R arrow to ovary;		3
(b) (i)	'S' on testis;		1
(ii)	3 of <ul style="list-style-type: none"> <li>sperm duct/vas deferens cut;</li> <li>ends tied;</li> <li>sperms cannot pass out/pass to female;</li> <li>fertilisation not possible/ovum can't meet sperm;</li> </ul>	Allow clear description of location	3
(iii)	<ul style="list-style-type: none"> <li>transmitted in body fluid;</li> <li>idea that it can still be transferred from male/to female;</li> </ul>		2
			Total 12

Question number	Answer	Notes	Marks
3			
(a)			
(i)	nucleus/chromosome;	Ignore DNA/nucleolus	1
(ii)	DNA/deoxyribonucleic acid;	Allow chromosome	1
(b)			
(i)	2 from:	Allow genetic material/chromosomes for DNA throughout	
	<ul style="list-style-type: none"> <li>• DNA replicating;</li> <li>• (in preparation for) mitosis;</li> <li>• twice as much DNA/chromosomes/DNA doubles/92 chromosomes;</li> </ul>	Allow increases from 2 to 4 arbitrary units	2
(ii)	3 from:	Ignore DNA/chromosomes / genetic material halves	3
	<ul style="list-style-type: none"> <li>• cell has divided/two cells are formed;</li> <li>• chromosomes/DNA equally distributed;</li> <li>• diploid/chromosome number restored/46 chromosomes;</li> </ul>		
(iii)	<ul style="list-style-type: none"> <li>• existing line decreases;</li> <li>• to 1;</li> <li>• then levels;</li> </ul>	Ignore lines drawn before end of existing line	3
			

(iv)	2 of: <ul style="list-style-type: none"> <li>• meiosis;</li> <li>• half/haploid number of chromosomes/haploid cells /23 chromosomes;</li> <li>• four cells produced;</li> </ul>		2
			Total 12

Question number	Answer	Notes	Marks
4			
(a) (i)	stomach;		1
(ii)	provide optimum pH/to simulate conditions in stomach;	Allow pepsin works best in acidic conditions/pH2	1
(iii)	<ul style="list-style-type: none"> <li>• pepsin digests/breaks down protein/egg white/substrate;</li> <li>• into amino acids;</li> <li>• smaller surface area of protein in A/larger in B;</li> <li>• so process more rapid in tube B/slower in A;</li> <li>• for enzyme to act on;</li> </ul>		4
(iv)	2 from: <ul style="list-style-type: none"> <li>• pepsin/enzyme still present;</li> <li>• pepsin is a protein/enzymes are proteins;</li> <li>• not enough time for complete digestion (of protein/egg white)</li> </ul>	Allow incomplete digestion	2
(b) (i)	<ul style="list-style-type: none"> <li>• no (visible) change/protein/egg white still present/egg white not broken down;</li> <li>• no pepsin/enzyme present;</li> </ul>		2
(ii)	<ul style="list-style-type: none"> <li>• control;</li> <li>• to prove that pepsin is responsible for the action/that HCl is not responsible/has an effect;</li> </ul>		2
			Total 12

Question number	Answer	Notes	Marks
5	mitochondria; water/H <sub>2</sub> O; carbon dioxide/CO <sub>2</sub> ;  adenosine diphosphate/ADP; adenosine triphosphate/ATP; thermal/heat; anaerobic; liver; oxygen debt;	accept carbon dioxide/CO <sub>2</sub> accept water/ H <sub>2</sub> O	
			Total 9

Pearson Education Limited. Registered company number 872828  
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom