



Mark Scheme (Results)

January 2018

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

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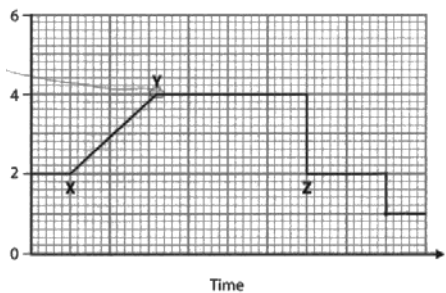
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General Marking Guidance

- 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) | <p>(i)</p> <table border="1" data-bbox="395 300 1027 524"> <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> <p>(ii) 3 of</p> <ul style="list-style-type: none"> • less/no insulin produced; • more glucose in blood/blood glucose not controlled/not converted to/stored as glycogen; • less (glucose) reabsorbed; • glucose in urine; | | Blood | Filtrate | Urine | Protein | √ | X | X ; | Urea | √ | √ | √ ; | Glucose | √ | √ | X ; | Water | √ | √ | √ ; | Salts | √ | √ | √ ; | <p>One mark for each correct row. Allow blanks to count as crosses</p> | <p>5</p> <p>3</p> |
| | Blood | Filtrate | Urine | | | | | | | | | | | | | | | | | | | | | | | | |
| Protein | √ | X | X ; | | | | | | | | | | | | | | | | | | | | | | | | |
| Urea | √ | √ | √ ; | | | | | | | | | | | | | | | | | | | | | | | | |
| Glucose | √ | √ | X ; | | | | | | | | | | | | | | | | | | | | | | | | |
| Water | √ | √ | √ ; | | | | | | | | | | | | | | | | | | | | | | | | |
| Salts | √ | √ | √ ; | | | | | | | | | | | | | | | | | | | | | | | | |
| (b) | <p>3 of</p> <table border="1" data-bbox="395 1021 1027 1317"> <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 | <p>One mark for each correct row.</p> | <p>3</p> | | | | | | | | | | | | |
| 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) | <p>(i) arrow up in vein;</p> <p>(ii)</p> <ul style="list-style-type: none"> • vein has valve/artery no valve; • vein has large(er) lumen/artery small(er) lumen; • vein has less muscle/elastic tissue/artery has more muscle/elastic tissue; | <p>Allow artery has thick(er) walls/vein has thin(ner) walls</p> | <p>1</p> <p>3</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 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 • sperm duct/vas deferens cut; | Allow clear description of location | 3 |
| (iii) | • ends tied; • sperms cannot pass out/pass to female; • fertilisation not possible/ovum can't meet sperm; | | 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"> • DNA replicating; • (in preparation for) mitosis; • twice as much DNA/chromosomes/DNA doubles/92 chromosomes; | 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"> • cell has divided/two cells are formed; • chromosomes/DNA equally distributed; • diploid/chromosome number restored/46 chromosomes; | | |
| (iii) | <ul style="list-style-type: none"> • existing line decreases; • to 1; • then levels; | Ignore lines drawn before end of existing line | 3 |
| |  | | |

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

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

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

