



# **Mark Scheme (Results)**

Summer 2018

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

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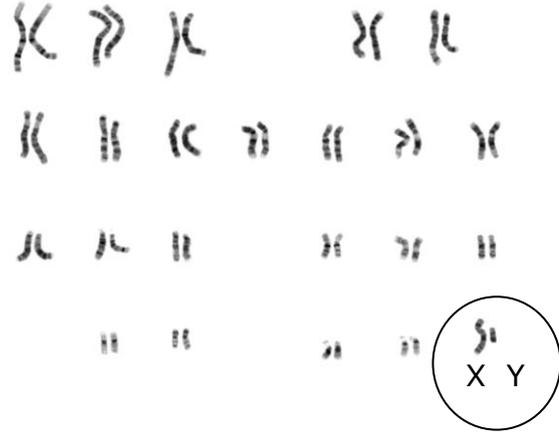
### **General Marking Guidance**

- 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 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------|
| c (i)           | (cases of skin cancer) increase;                                                                                                                                            |                                                           | 1     |
|                 | (ii) <ul style="list-style-type: none"> <li>• a line continuing upwards from 2005 to 2015;</li> <li>• number of people per 100 000 according to line drawn;</li> </ul>      | allow answer from graph +/- ½ square                      | 2     |
|                 | (iii) 630 x 14;<br>8 820;                                                                                                                                                   | correct final answer = 2 marks<br>allow 8 800 for 2 marks | 2     |
|                 | (iv) <ul style="list-style-type: none"> <li>• greater exposure to sunlight/ionising/ultraviolet radiation/increase in travel to sunnier countries/use of sunbeds</li> </ul> | allow answers referring to lack of protection from Sun    | 1     |

**Total for Question 1 = 15 marks**

| Question number | Answer                                                                                                                                                                                                                                                                                         | Notes                                                                                                                        | Marks |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------|
| 2 a             | T;<br>C;<br>G;<br>A;                                                                                                                                                                                                                                                                           | 2 marks for 4 or 3 correct<br>1 mark for 1 or 2 correct                                                                      | Max 2 |
| b (i)           |                                                                                                                                                                                                             |                                                                                                                              | 1     |
| b (ii)          | parent genotypes      XX and XY;<br>gametes                    X and X    X and Y;<br>offspring genotypes      XX XY XX XY;<br>offspring phenotypes<br>female, male, female, male;                                                                                                             | allow full marks for a Punnett square only if all components shown<br><br>phenotypes must link to correct genotypes for mark | 4     |
| c               | Any three from: <ul style="list-style-type: none"> <li>• fertilisation occurs/sperm DNA mixes with egg DNA;</li> <li>• zygote formed;</li> <li>• (zygote/cell carrying mutation) divides to form an embryo;</li> <li>• by mitosis;</li> <li>• genetically identical cells produced;</li> </ul> |                                                                                                                              | Max 3 |

**Total for Question 2 = 10 marks**

| Question number             | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Notes                                                                                                                               | Mark            |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|-----------|----------------|---------------------------------------------------------------------------------------------------|-------------|------|--------------------------------------|-----------|------------|--------------------------------|--|---|
| 3 a                         | <table border="1"> <thead> <tr> <th data-bbox="392 338 667 450">Gland producing the hormone</th> <th data-bbox="671 338 922 450">Name of hormone</th> <th data-bbox="927 338 1353 450">Function of hormone</th> </tr> </thead> <tbody> <tr> <td data-bbox="392 456 667 591">(ovaries)</td> <td data-bbox="671 456 922 591">(progesterone)</td> <td data-bbox="927 456 1353 591">helps to build up lining of uterus/maintenance of lining (during pregnancy)/inhibition of FSH/LH;</td> </tr> <tr> <td data-bbox="392 598 667 732">(pituitary)</td> <td data-bbox="671 598 922 732">FSH;</td> <td data-bbox="927 598 1353 732">(development of a Graafian follicle)</td> </tr> <tr> <td data-bbox="392 739 667 851">(ovaries)</td> <td data-bbox="671 739 922 851">oestrogen;</td> <td data-bbox="927 739 1353 851">(stimulates the release of LH)</td> </tr> </tbody> </table> | Gland producing the hormone                                                                                                         | Name of hormone | Function of hormone | (ovaries) | (progesterone) | helps to build up lining of uterus/maintenance of lining (during pregnancy)/inhibition of FSH/LH; | (pituitary) | FSH; | (development of a Graafian follicle) | (ovaries) | oestrogen; | (stimulates the release of LH) |  | 3 |
| Gland producing the hormone | Name of hormone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Function of hormone                                                                                                                 |                 |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
| (ovaries)                   | (progesterone)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | helps to build up lining of uterus/maintenance of lining (during pregnancy)/inhibition of FSH/LH;                                   |                 |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
| (pituitary)                 | FSH;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (development of a Graafian follicle)                                                                                                |                 |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
| (ovaries)                   | oestrogen;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (stimulates the release of LH)                                                                                                      |                 |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
| b (i)                       | <p>any two from:</p> <p>(umbilical artery)</p> <ul style="list-style-type: none"> <li>• (more) carbon dioxide/deoxygenated blood (from respiration by fetus);</li> <li>• urea from fetus;</li> <li>• for excretion by mother;</li> </ul> <p>(umbilical vein)</p> <ul style="list-style-type: none"> <li>• oxygen/oxygenated blood travels to the fetus (for respiration);</li> <li>• nutrients from the mother to the fetus;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>two marks must come from artery and the other two from vein</p> <p>allow nitrogenous waste</p> <p>allow named micronutrients</p> | Max 4           |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |
| (ii)                        | <ul style="list-style-type: none"> <li>• mother may have a different blood type/antigens to fetus;</li> <li>• mother produces antibodies;</li> <li>• causing agglutination/clumping of fetal blood;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                     | Max 2           |                     |           |                |                                                                                                   |             |      |                                      |           |            |                                |  |   |

**Total for Question 3 = 9 marks**

| Question number | Answer                                                                                           | Notes                                                                             | Marks |
|-----------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|
| 4               | sense/sensory;<br>retina;<br>light;<br>sensory;<br>synapse;<br>relay;<br><br>motor;<br>effector; | accept receptor<br><br>synaptic cleft/gap<br>allow connector /<br>interneurone/eq | 8     |

**Total for Question 4 = 8 marks**

| Question number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Notes                                                                             | Marks |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------|
| 5 a (i)         | <ul style="list-style-type: none"> <li>• fat digested/broken down to fatty acids (and glycerol);</li> <li>• fatty acids lower pH of the solution;</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                   | 2     |
| (ii)            | <ul style="list-style-type: none"> <li>• time taken (for fat to be digested);</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                   | 1     |
| (iii)           | <ul style="list-style-type: none"> <li>• temperature;</li> <li>• as this increases (kinetic) energy of reactants so they collide more often/faster reaction (at higher temperature)/(at high temperatures) enzymes denature/become inactive;</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• volume of milk/lipase;</li> <li>• (greater volume) more reactants which increases collisions / faster reaction;</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• type of milk;</li> <li>• as fat content may vary;</li> </ul> | <p>allow reverse argument for lower temperature</p> <p>allow reverse argument</p> | 2     |
| (iv)            | <p>any two from:</p> <ul style="list-style-type: none"> <li>• use universal indicator;</li> <li>• colour change/example of colour change</li> <li>• reference to use of pH/colour chart;</li> </ul>                                                                                                                                                                                                                                                                                                                                                   | ignore any other named indicator                                                  | Max 2 |
| b               | <p>any three from:</p> <ul style="list-style-type: none"> <li>• digestion by lipase faster/faster rate of reaction/fatty acids produced more quickly;</li> <li>• bile emulsifies fats/increases surface area of fat;</li> <li>• pH will drop faster (than in previous investigation);</li> </ul>                                                                                                                                                                                                                                                      |                                                                                   | Max 3 |

**Total for Question 5 = 10 marks**

| Question number | Answer                                                                                                                                                                                                                                                                | Notes                                                          | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------|
| 6 a (i)         | any four from: <ul style="list-style-type: none"> <li>• blood glucose level low;</li> <li>• (glucagon) released from <u>pancreas</u>;</li> <li>• reference to the liver;</li> <li>• glycogen converted to glucose;</li> <li>• to raise blood sugar levels;</li> </ul> |                                                                | Max 4 |
| (ii)            | any two from: <ul style="list-style-type: none"> <li>• (when insulin levels increase/peak), glucagon levels fall;</li> <li>• negative feedback;</li> <li>• (insulin) inhibits the release of glucagon (from the pancreas);</li> </ul>                                 |                                                                | Max 2 |
| b               | <ul style="list-style-type: none"> <li>• reduce intake of carbohydrates/sugar/glucose in diet;</li> <li>• increase the amount of exercise carried out;</li> </ul>                                                                                                     | allow references to eating sugary food if blood glucose is low | 2     |

**Total for Question 6 = 8 marks**

