



Mark Scheme (Results)

Summer 2021

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

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Summer 2021

Question Paper Log Number 66433

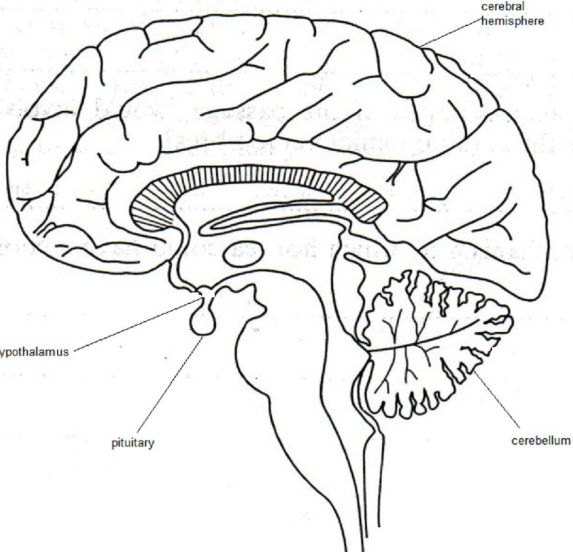
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General Marking Guidance

- 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>correct labels ;;;;</p> | | 4 | | | | | | | | | | |
| (b) | <table border="1" data-bbox="416 1077 1078 1384"> <thead> <tr> <th data-bbox="416 1077 815 1137">Function</th> <th data-bbox="815 1077 1078 1137">Structure</th> </tr> </thead> <tbody> <tr> <td data-bbox="416 1137 815 1227">control of muscle tone and posture</td> <td data-bbox="815 1137 1078 1227">cerebellum</td> </tr> <tr> <td data-bbox="416 1227 815 1279">intelligence and thought</td> <td data-bbox="815 1227 1078 1279">cerebral hemisphere</td> </tr> <tr> <td data-bbox="416 1279 815 1330">monitoring of body temperature</td> <td data-bbox="815 1279 1078 1330">hypothalamus</td> </tr> <tr> <td data-bbox="416 1330 815 1384">release of ADH</td> <td data-bbox="815 1330 1078 1384">Pituitary</td> </tr> </tbody> </table> | Function | Structure | control of muscle tone and posture | cerebellum | intelligence and thought | cerebral hemisphere | monitoring of body temperature | hypothalamus | release of ADH | Pituitary | | 4 |
| Function | Structure | | | | | | | | | | | | |
| control of muscle tone and posture | cerebellum | | | | | | | | | | | | |
| intelligence and thought | cerebral hemisphere | | | | | | | | | | | | |
| monitoring of body temperature | hypothalamus | | | | | | | | | | | | |
| release of ADH | Pituitary | | | | | | | | | | | | |

Total 8 marks

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 2 (a) | <ul style="list-style-type: none"> oxygen; glucose; | in any order | 2 |
| | <ul style="list-style-type: none"> water; carbon dioxide; | in any order | 2 |
| (b) (i) | <ul style="list-style-type: none"> A to B = 60 seconds; 10 breaths during that period = 10 per minute; | Allow 60 anywhere in response | 2 |
| (ii) | <ul style="list-style-type: none"> 19.5 - 13.5 squares of movement = 6 squares; 1dm³ = 4 squares; 6/4 = 1.5dm³; | | 3 |
| (c) | <ul style="list-style-type: none"> peaks/troughs higher/lower; closer together; | Allow increase in amplitude Allow increase in frequency Answers must relate to peaks/waves/curves Ignore details relating to scientific details such as number or depth of breaths. | 2 |

Total 11 marks

| Question number | Answer | Notes | Marks |
|-----------------|--|--|-------|
| 3 (a) (i) | water; | | 1 |
| (ii) | <ul style="list-style-type: none"> allows urea to pass; prevents other larger molecules from passing; | Allow small molecules go through | 2 |
| (iii) | <ul style="list-style-type: none"> breaks down urea; to produce ammonium ions; to react with/stimulate sensor; | Allow ammonia Allow idea of being picked up/detected by sensor | 3 |
| (b) | <ul style="list-style-type: none"> enzyme activity increases/enzyme works faster/higher rate of reaction; at higher temperatures; more ammonium ions produced; higher reading; | Ignore details related to enzyme denaturing / collision theory/kinetic energy ORA for lower temperature | 4 |
| (c) | any two from <ul style="list-style-type: none"> can be reused; products not contaminated; enzymes more stable; cost effective justified; | Allow can withstand temperature/pH changes | 2 |

Total 12 marks

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| 4 (a) (i) | <ul style="list-style-type: none"> eat too much; too little exercise; increased fat storage; | | 3 |
| (ii) | <ul style="list-style-type: none"> heart disease/attacks/strokes; causes joints in legs to develop arthritis; | Allow high blood pressure/hypertension | 2 |
| (b) (i) | C (pancreas); A is for excretion B is site of insulin action D produces other hormones | | 1 |
| (ii) | B (liver); A is for excretion C is site of production D produces other hormones | | 1 |
| (c) (i) | 26378 - 22092 = 4286; | Allow $\frac{26378 - 22092}{22092}$ for 2 marks | |
| | $\frac{4286 \times 100}{22092}$ = 19.4%; | Ecf from first calculation max 2 marks | 3 |
| (ii) | 0.9 x 3.8 = 3.4(2) million; | | 1 |
| (d) | any three from <ul style="list-style-type: none"> less blood flows; death of tissues; increased risk of infection; less white blood cells to deal with infection; | | 3 |

Total 14 marks

| Question number | Answer | Notes | Marks |
|-----------------|---|--|-------|
| 5 (a) (i) | A (DNA); B/C/ and D are found in or associated with other structures. | | 1 |
| (ii) | correct circles of pair; | | 1 |
| (iii) | only two pairs of homologous chromosomes/ would be 23 in a human cell; | | 1 |
| (b) | <ul style="list-style-type: none"> • prophase, metaphase, anaphase and telophase; • (prophase) chromosomes become thicker/visible; • (metaphase) chromatids line up at equator; • (anaphase) chromatids separate and migrate to poles; • (telophase) nucleus/nuclear membrane reforms; | <p>Allow condense</p> <p>Allow chromosomes throughout</p> <p>Allow clear annotated diagrams showing stages</p> | 5 |

Total 8 marks

| Question number | Answer | Notes | Marks |
|-----------------|--|---|-------|
| 6 (a) | C (fovea); A/B /D have no light sensitive cells | | 1 |
| (b) (i) | Any 5 from <ul style="list-style-type: none"> • light becomes less/becomes darker; • reference to dim light detected by retina; • radial muscles in iris contract; • circular muscles relax; • widen/increase diameter of pupil; • to keep a constant amount of light entering the eye | Allow reference to B being in dimmer light allow more light entering the eye | 5 |
| (ii) | <ul style="list-style-type: none"> • occurs when bright light is shone into eye; • too much light could damage retina; • occurs quickly to protect eye/prevent too much light entering; | | 3 |

Total 9 marks

| Question number | Answer | Notes | Marks |
|-----------------|--|---|-------|
| 7 (a) (i) | <ul style="list-style-type: none"> temperature of incubation; volume of milk; composition of nutrients in agar/type of agar; | | 3 |
| (ii) | size of bacterial growth; | | 1 |
| (b) (i) | $\frac{7.1}{5} = 1.42;$ $\frac{36.5}{5} = 7.3;$ | One mark for each correct answer | 2 |
| (ii) | <ul style="list-style-type: none"> more bacteria in B; at start of investigation; because extra added to tube; some bacteria in A/milk which grew; | Allow more growth in B/growth increases more quickly in B Allow reference to contamination e.g. from air | 4 |
| (c) | <ul style="list-style-type: none"> transfer loop sterilised/heated in flame; transfer performed quickly; | Allow reference to sterilised in context / sterile technique / sterilise equipment / named equipment | 2 |
| (d) | <ul style="list-style-type: none"> repeat investigation; using other organisms; | | 2 |

Total 14 marks

