



# Mark Scheme (Provisional)

Summer 2021

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

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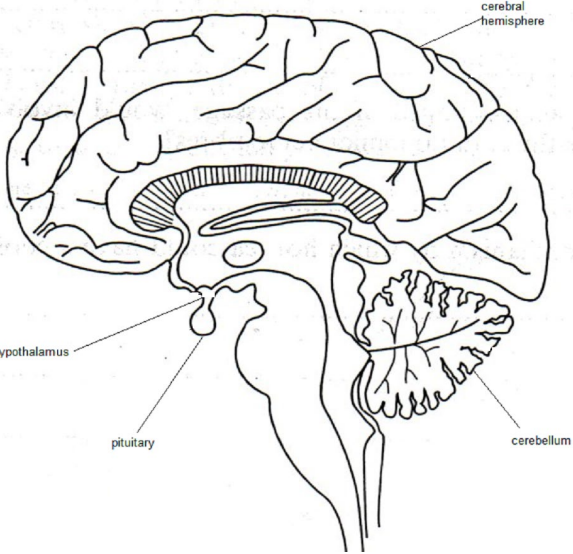
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## **General Marking Guidance**

- 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>correct labels ;;;;</p>		4										
(b)	<table border="1"> <thead> <tr> <th>Function</th> <th>Structure</th> </tr> </thead> <tbody> <tr> <td>control of muscle tone and posture</td> <td>cerebellum</td> </tr> <tr> <td>intelligence and thought</td> <td>cerebral hemisphere</td> </tr> <tr> <td>monitoring of body temperature</td> <td>hypothalamus</td> </tr> <tr> <td>release of ADH</td> <td>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"> <li>oxygen;</li> <li>glucose;</li> </ul>	in any order	2
	<ul style="list-style-type: none"> <li>water;</li> <li>carbon dioxide;</li> </ul>	in any order	2
(b) (i)	<ul style="list-style-type: none"> <li>A to B = 60 seconds;</li> <li>10 breaths during that period = 10 per minute;</li> </ul>		2
	<ul style="list-style-type: none"> <li>19.5 - 13.5 squares of movement = 6 squares;</li> <li>1dm<sup>3</sup> = 4 squares;</li> <li>6/4 = 1.5dm<sup>3</sup>;</li> </ul>		3
(c)	<ul style="list-style-type: none"> <li>peaks/troughs higher/lower;</li> <li>closer together;</li> </ul>		2

Total 11 marks

Question number	Answer	Notes	Marks
3 (a) (i)	water;		1
(ii)	<ul style="list-style-type: none"> <li>allows urea to pass;</li> <li>prevents other larger molecules from passing;</li> </ul>		2
(iii)	<ul style="list-style-type: none"> <li>breaks down urea;</li> <li>to produce ammonium ions;</li> <li>to react with/stimulate sensor;</li> </ul>		3
(b)	<ul style="list-style-type: none"> <li>temperature affects enzyme;</li> <li>higher temperature, higher rate of reaction;</li> <li>more ammonium ions produced;</li> <li>higher reading;</li> </ul>	ORA for lower temperature	4
(c)	<p>any two from</p> <ul style="list-style-type: none"> <li>can be reused;</li> <li>products not contaminated;</li> <li>enzymes more stable;</li> </ul>		2

Total 12 marks

Question number	Answer	Notes	Marks
4 (a)	(i) <ul style="list-style-type: none"> <li>eat too much;</li> <li>too little exercise;</li> <li>increased fat storage;</li> </ul>		3
	(ii) <ul style="list-style-type: none"> <li>heart disease/attacks/strokes;</li> <li>causes joints in legs to develop arthritis;</li> </ul>		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) $26378 - 22092 = 4286$ ;  $\frac{4286 \times 100}{22092}$ $= 19.4\%$ ;		3
	(ii) $0.9 \times 3.8 = 3.4(2)$ million;		1
(d)	any three from <ul style="list-style-type: none"> <li>less blood flows;</li> <li>death of tissues;</li> <li>increased risk of infection;</li> <li>less white blood cells to deal with infection;</li> </ul>		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"> <li>• prophase, metaphase, anaphase and telophase;</li> <li>• (prophase) chromosomes become thicker/visible;</li> <li>• (metaphase) chromatids line up at equator;</li> <li>• (anaphase) chromatids separate and migrate to poles;</li> <li>• (telophase) chromosomes become thinner and form a nucleus;</li> </ul>		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"> <li>• light becomes less/becomes darker;</li> <li>• reference to dim light detected by retina;</li> <li>• radial muscles in iris contract;</li> <li>• circular muscles relax;</li> <li>• widen/increase diameter of pupil;</li> <li>• to keep a constant amount of light entering the eye</li> </ul>	allow more light entering the eye	5
(ii)	<ul style="list-style-type: none"> <li>• occurs when bright light is shone into eye;</li> <li>• too much light could damage retina;</li> <li>• occurs quickly to protect eye/prevent too much light entering;</li> </ul>		3

Total 9 marks

Question number	Answer	Notes	Marks
7 (a) (i)	<ul style="list-style-type: none"> <li>temperature of incubation;</li> <li>volume of milk;</li> <li>composition of nutrients in agar/type of agar;</li> </ul>		3
(ii)	size of bacterial growth;		1
(b) (i)	$\frac{7.1}{5} = 1.42;$ $\frac{36.5}{5} = 7.3;$		2
(ii)	<ul style="list-style-type: none"> <li>more bacteria in B;</li> <li>at start of investigation;</li> <li>because extra added to tube;</li> <li>some bacteria in A/milk which grew;</li> </ul>		4
(c)	<ul style="list-style-type: none"> <li>transfer loop sterilised/heated in flame;</li> <li>transfer performed quickly;</li> </ul>		2
(d)	<ul style="list-style-type: none"> <li>repeat investigation;</li> <li>using other organisms;</li> </ul>		2

Total 14 marks

Question number	Answer	Notes	Marks
8 (a) (i)	absorbs uv light; reduces/prevents risk of skin cancer;		2
(ii)	eye/ retina/ choroid/ red blood cell/ haemoglobin ;		1
(b) (i)	<p style="text-align: center;">mother      x      father Hh                      hh;</p> <p>gametes      H   h                      h;</p> <p>fertilisation      Hh                      hh;</p> <p>phenotype      white forelock      normal;</p>		4
(ii)	<p>chance of producing a boy is 0.5/1/2;</p> <p>chance of producing offspring with condition 0.5/1/2;</p> <p>chance of producing boy with condition is 1/2 x 1/2 = 1/4;</p>		3
(c)	<p>Any 4 from</p> <p>different (genetic) code produced;</p> <p>different order of amino acids;</p> <p>codes for different proteins/enzymes;</p> <p>enzyme substrate complex not formed;</p> <p>causes change in pigment;</p>		4

Total 14 marks