

Mark Scheme (Results)

January 2016

Pearson Edexcel International GCSE  
in Human Biology (4HB0) Paper 01

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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)	<b>D double-stranded with the base pairs AT and CG</b>		(1)
(b)	<b>B</b>		(1)
(c)	<b>C sulphur dioxide</b>		(1)
(d)	<b>B 800 ml</b>		(1)
(e)	<b>D water and urea</b>		(1)
(f)	<b>A poliomyelitis</b>		(1)
(g)	<b>B Biuret reagent</b>		(1)
(h)	<b>A against a concentration gradient using energy</b>		(1)
(i)	<b>C</b>		(1)
(j)	<b>A energy</b>		(1)

**Total for Question 1 = 10 marks**

Question Number	Answer	Notes	Marks										
2(a)	<table border="1"> <thead> <tr> <th>Task</th> <th>Letter of apparatus</th> </tr> </thead> <tbody> <tr> <td>Measuring the temperature of the water</td> <td>R</td> </tr> <tr> <td>Measuring the mass of sugar</td> <td>V</td> </tr> <tr> <td>Adding biuret reagent to a food mixture</td> <td>Q</td> </tr> <tr> <td>Measuring 17 cm<sup>3</sup> of an enzyme solution</td> <td>P</td> </tr> </tbody> </table>	Task	Letter of apparatus	Measuring the temperature of the water	R	Measuring the mass of sugar	V	Adding biuret reagent to a food mixture	Q	Measuring 17 cm <sup>3</sup> of an enzyme solution	P		(4)
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Question Number	Answer	Notes	Marks
2(b)(i)	limewater;	Allow bicarbonate indicator/ solution	(1)

Question Number	Answer	Notes	Marks
2(b)(ii)	<p>A description including four from the following:</p> <ul style="list-style-type: none"> <li>• inhale/exhale through mouthpiece/middle tube / T-tube;</li> <li>• (limewater) bubbles in tube B when exhaling/exhaled air goes into tube B;</li> <li>• air drawn in from atmosphere into tube A/bubbles in tube A;</li> <li>• limewater in B goes cloudy / exhaled air/with CO<sub>2</sub>;</li> <li>• more carbon dioxide in exhaled air;</li> </ul>	Allow bicarbonate indicator/ solution	(4)

Question Number	Answer	Notes	Marks
2(c)(i)	In the following order: <ul style="list-style-type: none"> <li>• 78;</li> <li>• 16 / 17 / 18;</li> </ul>	Allow intermediate decimals	(2)

Question Number	Answer	Notes	Marks
2(c)(ii)	An explanation including four from the following: <ul style="list-style-type: none"> <li>• less oxygen in exhaled air;</li> <li>• oxygen used in cells for (aerobic) respiration;</li> <li>• more carbon dioxide in exhaled air;</li> <li>• (aerobic) respiration produces carbon dioxide;</li> <li>• atmospheric nitrogen not used in body/unreactive;</li> </ul>	ORA  ORA	(4)

**Total for Question 2= 15 marks**

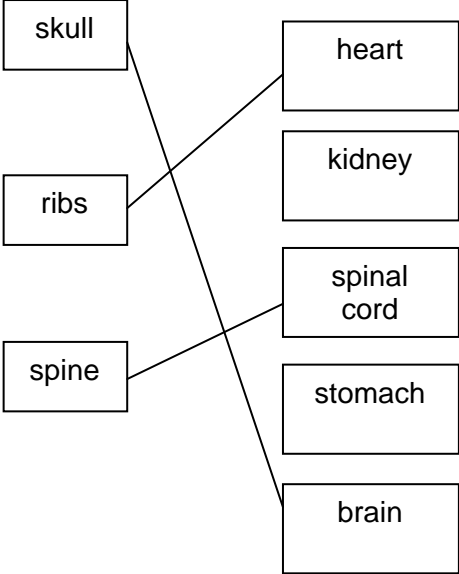
Question Number	Answer	Notes	Marks
3(a)	In the following order: <ul style="list-style-type: none"> <li>uterus;</li> <li>ovary;</li> <li>oviduct;</li> </ul>	Allow: <ul style="list-style-type: none"> <li>womb</li> <li>ovaries</li> <li>fallopian tube</li> </ul>	(3)

Question Number	Answer	Notes	Marks
3 (b)(i)	A description including two of the following: <ul style="list-style-type: none"> <li>inserted into uterus/womb;</li> <li>prevents fertilisation/ sperm/egg surviving in uterus/fallopian tube/prevents sperm reaching oviduct/ovum;</li> <li>prevent embryo implanting;</li> <li>some release hormones/named contraceptive hormone;</li> </ul>		(2)

Question Number	Answer	Notes	Marks
3(b)(ii)	<p>A description including one from an advantage and one from a disadvantage:</p> <p>advantage</p> <ul style="list-style-type: none"> <li>• do not need to remember to take pills/could forget to take the pill;</li> <li>• lasts for up to 10 years/more convenient justified e.g. do not have to get repeat prescriptions;</li> <li>• not affected by other medicines/less side effects than the pill;</li> <li>• can be used during breastfeeding;</li> <li>• works straight away after insertion;</li> </ul> <p>disadvantages</p> <ul style="list-style-type: none"> <li>• can cause abdominal pain/cramps/heavy periods;</li> <li>• periods last longer which can be inconvenient;</li> <li>• can cause infections just after being fitted;</li> <li>• could lead to ectopic pregnancy;</li> </ul>		(2)

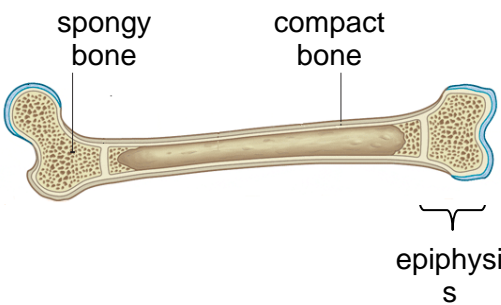
**Total for Question 3 = 7 marks**



Question Number	Answer	Notes	Mark
4(a)		<p>More than one line from left hand boxes invalidates mark</p>	(3)

Question Number	Answer	Notes	Marks
4(b)(i)	<p>A description including three from the following:</p> <ul style="list-style-type: none"> <li>• joints in pelvis/sacroiliac joint fused/fixed/no movement;</li> <li>• ball and socket/synovial joint/fluid found between femur and pelvis;</li> <li>• 360° movement/3 planes;</li> <li>• (between femur and pelvis) cartilage is present;</li> <li>• (between femur and pelvis) ligaments present;</li> </ul>	<p>Allow reverse argument for sacroiliac joint for marking points 2,3,4,5</p>	(3)

Question Number	Answer	Notes	Marks
4(b)(ii)	<ul style="list-style-type: none"> <li>• scapula;</li> <li>• clavicle;</li> </ul>	Accept any named bone that forms part of the appendicular skeleton <ul style="list-style-type: none"> <li>• shoulder blade</li> <li>• collar bone</li> </ul>	(2)

Question Number	Answer	Notes	Marks
4(b)(iii)	Diagram similar to the one shown; Labelled correctly with ; ; ;  <p>The diagram shows a cross-section of a long bone. The ends are labeled 'spongy bone' and the shaft is labeled 'compact bone'. A bracket at the rounded end is labeled 'epiphysis'.</p>	Allow diagram mark for cross section showing 3 layers  Allow a label for the epiphysis anywhere on the outer edge of the rounded end of the bone	4

**Total for Question 4 = 12 marks**

Question Number	Answer	Notes	Mark
5	In the following order: <ul style="list-style-type: none"><li>• bread;</li><li>• glucose</li><li>• energy;</li><li>• glycogen;</li><li>• growth;</li><li>• nitrogen;</li><li>• liver;</li></ul>		(7)

**Total for Question 5 = 7 marks**

Question Number	Answer	Notes	Mark
6(a) (i)	<p>An explanation including two from the following:</p> <ul style="list-style-type: none"> <li>• increase/decrease in mass of food linked to different temperature increase;</li> <li>• increase/decrease in volume of water linked to time taken to heat up;</li> <li>• to ensure results are valid;</li> </ul>		(2)

Question Number	Answer	Notes	Mark
6(a) (ii)	<p>Food Y (29 – 20 =) 9 °C;</p>		(1)

Question Number	Answer	Notes	Mark
6(a) (iii)	<p>A suggestion including two from the following:</p> <ul style="list-style-type: none"> <li>• burns for longer/greater mass of food;</li> <li>• contains more fat/sugar / carbohydrate/energy;</li> <li>• more heat directed onto food;</li> <li>• food closer to the heat source;</li> </ul>		(2)

Question Number	Answer	Notes	Mark
6(b) (i)	<p>An explanation including two from the following:</p> <ul style="list-style-type: none"> <li>• grind food;</li> <li>• add Benedict's solution;</li> <li>• heat;</li> <li>• (brick) red colour/colour change indicates presence of glucose;</li> </ul>	Allow green/orange	(3)

Question Number	Answer	Notes	Mark
6(b) (ii)	<p>Any two from the following:</p> <ul style="list-style-type: none"> <li>• wear (safety) goggles;</li> <li>• wash hands after use;</li> <li>• do not touch hot equipment / use tongs;</li> <li>• use a water bath to heat mixture;</li> <li>• avoid contact with Benedict's solution;</li> </ul>	Do not accept use of gloves	(2)

**Total for Question 6 = 10 marks**

Question Number	Answer	Notes	Mark
7(a) (i)	<ul style="list-style-type: none"> <li>• space in table for four people;</li> <li>• space to record pulse at rest and each minute of exercise;</li> <li>• pulse rate in bpm;</li> <li>• table structured in logical manner;</li> </ul>		(4)

Question Number	Answer	Notes	Mark
7(a)(ii)	<p>A suggestion including one from the following:</p> <ul style="list-style-type: none"> <li>• make sure people are healthy/example/wear correct sports clothing/correct trainers/make sure that there are no slippery surfaces</li> </ul>	Accept other suitable suggestion	(1)

Question Number	Answer	Notes	Mark
7(a)(iii)	<p>A suggestion including three of the following:</p> <ul style="list-style-type: none"> <li>• lungs damaged/small lung capacity/less surface area for gas exchange/more CO in blood;</li> <li>• less oxygen into blood;</li> <li>• narrowed arteries due to fatty deposits;</li> <li>• heart beats faster/has to work harder;</li> <li>• to pump blood faster/more blood;</li> <li>• to provide enough oxygen to muscles</li> </ul>		(3)

<b>Question Number</b>	<b>Answer</b>	<b>Notes</b>	<b>Mark</b>
7(b)(i)	tar;		(1)

<b>Question Number</b>	<b>Answer</b>	<b>Notes</b>	<b>Mark</b>
7(b)(ii)	nicotine;		(1)

**Total for question 7 = 10 marks**

Question Number	Answer	Notes	Mark
8(a)(i)	W receptor / named receptor; X dendrite / dendron; Y cell body; Z (myelin/fatty) sheath;		(4)

Question Number	Answer	Notes	Mark
8(a)(ii)	<ul style="list-style-type: none"> <li>W detects a stimulus/changes in environment/skin / initiates an electrical impulse;</li> <li>X transmits impulses;</li> <li>Y controls cell activities;</li> <li>Z insulates neurone/reduces loss of impulse;</li> </ul>		(4)

Question Number	Answer	Notes	Mark									
8(b)	<table border="1"> <tr> <td>Sensory</td> <td>receptor s / sense organ / named organ;</td> <td></td> </tr> <tr> <td>Motor</td> <td></td> <td>effector/ muscle/ gland;</td> </tr> <tr> <td>Relay</td> <td></td> <td>motor;</td> </tr> </table>	Sensory	receptor s / sense organ / named organ;		Motor		effector/ muscle/ gland;	Relay		motor;		(3)
Sensory	receptor s / sense organ / named organ;											
Motor		effector/ muscle/ gland;										
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Question Number	Answer	Notes	Mark
8(c)(i)	<ul style="list-style-type: none"> <li>• synapse;</li> </ul>	Accept synaptic cleft/gap	(1)

Question Number	Answer	Notes	Mark
8(c)(ii)	<p>A description including two from the following:</p> <ul style="list-style-type: none"> <li>• neurotransmitters/chemicals;</li> <li>• diffuse;</li> <li>• across gap/synapse/cleft;</li> <li>• bind to receptors;</li> <li>• in postsynaptic membrane;</li> </ul>	Allow named neurotransmitter	(3)

**Total for Question 8 = 15 marks**

Question Number	Answer	Notes	Mark
9(a)(i)	<ul style="list-style-type: none"> <li>glucagon</li> </ul>	No alternative spellings	(1)

Question Number	Answer	Notes	Mark
9(a)(ii)	<ul style="list-style-type: none"> <li>plasma</li> </ul>		(1)

Question Number	Answer	Notes	Mark
9(a)(iii)	<p>A description including two of the following:</p> <p>(hormones)</p> <ul style="list-style-type: none"> <li>have a more widespread effect;</li> <li>take longer to reach target cells/organ;</li> <li>have longer term effect;</li> <li>effect is not immediate;</li> </ul>	Allow reverse argument for neurones	(2)

Question Number	Answer	Notes	Mark
9(b)(i)	<ul style="list-style-type: none"> <li>as glucose levels rise so do insulin levels;</li> <li>insulin peaks just after glucose;</li> <li>when glucose levels drop, insulin drops (afterwards);</li> </ul>		(2)

Question Number	Answer	Notes	Mark
9(b)(ii)	120 mg per 100 cm <sup>3</sup>		(1)

Question Number	Answer	Notes	Mark
9(c)	<p>An explanation including two of the following:</p> <ul style="list-style-type: none"> <li>• fat builds up in liver;</li> <li>• chemical reactions from breakdown of alcohol;</li> <li>• damage/destroy liver;</li> <li>• reduced response to insulin;</li> <li>• less glucose taken in;</li> <li>• unable to convert glucose to glycogen;</li> </ul>	Accept cirrhosis to replace either marking point 1 or 2	(3)

**Total for question 9 = 10 marks**

Question Number	Answer	Notes	Mark
10(a)(i)	<ul style="list-style-type: none"> <li>• <b>left</b> ventricle</li> </ul>		(1)

Question Number	Answer	Notes	Mark
10(a)(ii)	<p>A description including three from the following:</p> <ul style="list-style-type: none"> <li>• blood transported through pulmonary artery;</li> <li>• to lungs;</li> <li>• oxygen diffuses;</li> <li>• from alveoli;</li> <li>• binds to/carried by haemoglobin;</li> <li>• in red blood cells;</li> </ul>		(3)

Question Number	Answer	Notes	Mark
10(a)(iii)	<p>A description including two from the following:</p> <ul style="list-style-type: none"> <li>• pulmonary vein;</li> <li>• thin walls containing some muscle/elastic tissue;</li> <li>• large lumen;</li> <li>• valves;</li> </ul>		(2)

Question Number	Answer	Notes	Mark
10(b)(i)	160 x 0.120; 19.2;	Allow full marks for correct bald answer	(2)

Question Number	Answer	Notes	Mark
10(b)(ii)	<p>Suggestion including two of the following:</p> <ul style="list-style-type: none"> <li>• (trained athlete) thicker / stronger ventricle / muscular wall;</li> <li>• more forceful/ stronger / harder contraction;</li> </ul>		(2)

**Total for question 10 = 10 marks**

Question Number	Answer	Notes	Mark
11(a)(i)	<b>B</b> capillary/high		(1)

Question Number	Answer	Notes	Mark
11(a)(ii)	Bowman's capsule	Accept renal capsule	(1)

Question Number	Answer	Notes	Mark
11(a)(iii)	An explanation including three of the following: <ul style="list-style-type: none"> <li>• ultrafiltration;</li> <li>• blood under high pressure;</li> <li>• as blood vessel/arteriole arriving at capsule is wider than the one leaving;</li> <li>• smaller molecules forced out of blood;</li> </ul>		(3)

Question Number	Answer	Notes	Mark
11(a)(iv)	<ul style="list-style-type: none"> <li>• too large;</li> </ul>		(1)

Question Number	Answer	Notes	Mark
11(b)	An explanation including at least one for glucose and at least one for urea: <ul style="list-style-type: none"> <li>• (glucose) is selectively reabsorbed/absorbed back;</li> <li>• into the blood;</li> <li>• (urea) not reabsorbed/passes to bladder;</li> <li>• forms urine;</li> </ul>		(3)

Question Number	Answer	Notes	Mark
11(c)(i)	<p>A conclusion including three from the following:</p> <ul style="list-style-type: none"> <li>• overall increase in both age groups;</li> <li>• greater percentage of people aged 65+ suffer from CKD/greater percentage increase in people aged 65+;</li> <li>• difference in percentage of people with CKD increases with time/from 2000 to 2008;</li> <li>• percentage people aged 65+ with CKD rises sharply after 2005;</li> <li>• percentage of people aged 20-64 with CKD remains fairly constant/less of a rise in the percentage of people aged 20-64 with CKD;</li> <li>• allow manipulated data e.g. percentage of people aged 20-64 increases by 0.25%/percentage of people aged 65+ increases by 2.45%</li> </ul>		(3)

Question Number	Answer	Notes	Mark
11(c)(ii)	<p>A description including two of the following:</p> <ul style="list-style-type: none"> <li>• shortage of donors/kidneys;</li> <li>• difficulty matching tissue type/rejection;</li> <li>• geographical location may make transport (of kidney/patient) difficult;</li> </ul>	Accept other valid suggestion e.g. regulations to follow regarding alcoholism	(2)

**Total for Question 11 = 14 Marks**



