

Biology A AS Paper 1

Question Number	Acceptable Answer	Additional guidance	Mark
1(a)	A		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
1(b)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
1(c)	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> • B is a channel protein (1) • which allows the movement of {large / charged / polar} molecules (1) • by diffusion from high concentration to low concentration / down concentration gradient (1) 		(3)

(Total for Question 1 = 5 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
2(a)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • male 3 had same heart rate in both conditions so suggests no effect (1) • standard deviations overlap so difference may be chance (1) • caffeine concentration unknown / sample size small so may be unrepresentative (1) 		(3)

Question Number	Acceptable Answer	Additional guidance	Mark
2(b)	<p>A description that makes reference to three of the following:</p> <ul style="list-style-type: none"> • take into account resting heart rate (1) • include females in the sample (1) • have a range of ages in the sample (1) • take into account previous coffee drinking habits (1) • as heart rate is affected by exercise, need to take this into account (1) 		(3)

(Total for Question 2 = 6 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
3(a)(i)	$8.5 \times 8.5 = 72.25$ $72.25 \times \pi = 226.98 \text{ (mm}^2\text{)} \text{ (1)}$ $226.98 - 72.22 = 154.76 \text{ (mm}^2\text{)} \text{ (1)}$	Allow rounded values of π (e.g. 3.142) Correct answer gains full marks, no working	(2)

Question Number	Acceptable Answer	Additional guidance	Mark
3(a)(ii)	Answer that makes reference to the following: <ul style="list-style-type: none"> Need to withstand higher pressure from the left ventricle / need to have more elastic tissue to create pressure to move blood against gravity 		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
3(b)(i)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
3(b)(ii)	A		(1)

(Total for Question 3 = 5 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
4(a)(i)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
4(a)(ii)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
4(a)(iii)	one cycle = 0.72 s (1) 60 ÷ 0.72 = 83.3 (1)	Allow ± 0.02 s for the duration of the cycle Allow full marks for the correct answer, no working	(2)

Question Number	Acceptable Answer	Additional guidance	Mark
4(b)(i)	0.19 s / 0.91 s (1)	Allow ± 0.01 s	(1)

Question Number	Acceptable Answer	Additional guidance	Mark
4(b)(ii)	An explanation that makes reference to the following: <ul style="list-style-type: none"> ventricle needs to contract and force blood into the {aorta / pulmonary artery / arteries} (1) so valves need to close to prevent backflow into the atria on contraction (1) 		(2)


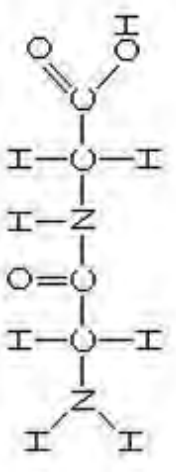
(Total for Question 4 = 7 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
5(a)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • as body mass increases, the rate of oxygen consumption decreases (1) • because bigger shrews have smaller surface area to {volume / mass} ratio (1) • so less respiration needed to replace lost heat (1) 		(3)
Question Number	Acceptable Answer	Additional guidance	Mark
5(b)(i)	<p>$10.8 \times 2.5 = 27$ (1)</p> <p>$27 \times 24 = 648 \text{ cm}^3$ (1)</p>	Allow full marks for correct answer, no working	(2)
Question Number	Acceptable Answer	Additional guidance	Mark
5(b)(ii)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • idea that {mass of respiring cells / time} affects oxygen consumption (1) • so a valid comparison could be made (1) 		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
5(c)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • there is a large surface area due to {many alveoli / many capillaries} (1) • there is a short diffusion distance due to {alveoli / capillaries} being one cell thick(1) • there is a good blood supply due to many capillaries (1) 		(3)

(Total for Question 5 = 10 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(i)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(ii)	<p>water molecule indicated (1)</p>  <p>correct dipeptide shown (1)</p> 		(2)

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(iii)	C		(1)

Question Number	Acceptable Answer	Additional guidance	Mark
6 (b) (i)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> idea that {raw food / food cooked for as little time as possible} contains most vitamin C because it has not had time to {diffuse into water / be destroyed by heat} / the longer the cooking time the less the vitamin C content because more time to {diffuse into water / be destroyed by heat} (1) greatest reduction is in first 5 minutes of cooking for all except cabbage because this is when concentration gradient is greatest / no further loss of vitamin C in kontomire between 10 and 20 minutes because concentration equal in vegetable and cooking water (1) correct manipulation of figures to support argumenteg the percentage loss (from 0 to 20 minutes) of vitamin C in the vegetables ranged from 42% to 85% / okro had least percentage loss of vitamin C content (42 %) / cabbage (48 %) / kontomire (52 %) / abeduru (70 %) / ayoyo with the highest percentage loss (85 %) (1) 		(3)

Question Number	Acceptable Answer	Additional guidance	Mark
6 (b) (ii)	<p>An answer that makes reference to the following:</p> <ul style="list-style-type: none"> • cabbage because it contains the most vitamin C to start off with (1) • and retains the highest concentration of vitamin C during cooking times (1) 		(2)

(Total for Question 6 = 9 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
7 (a)	<p>An answer that makes reference to the following:</p> <ul style="list-style-type: none"> • fetal cells obtained from amniotic fluid in amniocentesis, fetal cells obtained from placental cells in cvs (1) • use of needle in both amniocentesis and cvs (1) • amniocentesis via abdomen and cvs either via abdomen or vagina (1) 		(3)

Question Number	Acceptable Answer	Additional guidance	Mark
7 (b)	<p>An explanation that makes reference to four of the following:</p> <ul style="list-style-type: none"> • cvs can be performed earlier / amniocentesis is later (1) • cvs allows {earlier decision to abort / termination less physically traumatic} / with amniocentesis {later decision to abort / termination more physically traumatic} (1) • first cvs results available sooner / amniocentesis results not available until 2-3 weeks after test (1) • with cvs there is {greater risk / risk is between 1-2% of miscarriage} / with amniocentesis there is a {lower risk / 1% risk of miscarriage} (1) • cvs cannot detect gene problems on X chromosomes (because they are inactivated in fetal placental cells) (1) 	<ul style="list-style-type: none"> • First cvs results after 2-3 days, full results after 2 weeks 	(4)

(Total for Question 7 = 7 marks)

Question Number	Indicative content
8(a)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <ul style="list-style-type: none"> cholesterol remains in {blood / plasma} / cholesterol not taken into cells by endocytosis dominant allele expressed making different protein {primary structure / folding / shape} fewer normal LDL receptor proteins increases plaque formation leading to narrowing of {arteries / coronary artery} less oxygen to muscle cells greater risk of {heart disease / CVD / CHD / cardiac arrest}
Level	<p>Descriptor</p> <p>0 No awardable content</p>
Level 1	<p>Demonstrates isolated elements of biological knowledge and understanding to the given context with generalised comments made.</p> <p>The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.</p>
Level 2	<p>Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts/concepts to provide the explanation being presented.</p> <p>Lines of argument occasionally supported through the application of relevant evidence (scientific ideas, processes, techniques and procedures).</p> <p>The explanation shows some linkages and lines of reasoning with some structure.</p>

Level	Mark	Descriptor
Level 3	5-6	<p>Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of biological facts/concepts to provide the explanation being presented.</p> <p>Line(s) of argument supported throughout by sustained application of relevant evidence (scientific ideas, processes, techniques and procedures).</p> <p>The explanation shows a well-developed and sustained line of reasoning which is clear, coherent and logically structured.</p>

Question Number	Acceptable Answer	Additional guidance	Mark
8(b)(i)	$60\,000\,000 \div 500$ $= 120\,000$ (1) $120\,000 \div 2 = 60\,000$ women in population 30% of $60\,000 = 18\,000$ (1)	Allow full marks for correct answer, no working	(2)

(Total for Question 8 = 8 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
9(a)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> antibiotic to kill bacteria (1) because more prone to bacterial infection (1) <p>Or</p> <ul style="list-style-type: none"> physiotherapy dislodges mucus (1) therefore more efficient gas exchange (1) 	<ul style="list-style-type: none"> Gene therapy to produce normal CFTR protein (1) Therefore mucus will be less sticky (1) 	(2)

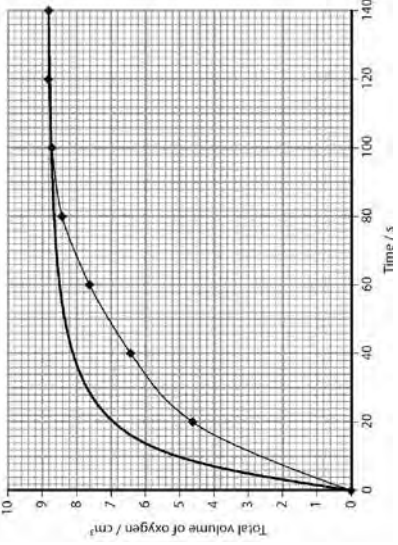
Question Number	Acceptable Answer	Additional guidance	Mark
9(b)(i)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> mutation causes a change in the {number / type / sequence} of {amino acids / R groups} (1) therefore {bonding / named bond} will be different (1) resulting in a change in {3D shape / tertiary structure} (1) therefore it cannot transport chloride ions (1) 		(3)

Question Number	Acceptable Answer	Additional guidance	Mark
9 (b)(ii)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> • fewer chloride ions transported across cell membranes (1) • therefore less water drawn out of mucus by osmosis (1) • this makes mucus more viscous (1) • cilia cannot remove mucus (1) • resulting in blockage of {airways / reproductive tracts / ducts} (1) 		(5)

(Total for Question 9 = 10 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
10(a)(i)	<p>suitable time interval chosen (in range 0 to 20 s, must be on straight line portion) (1)</p> <p>change calculated e.g. $4.6\text{cm}^3 \div 20\text{ seconds}$ (1)</p> <p>ans = $0.23\text{ cm}^3\text{ s}^{-1}$ (1)</p>	Allow full marks for correct answer, no working	(3)

Question Number	Acceptable Answer	Additional guidance	Mark
10(a)(ii)	<p>An explanation that makes reference to the following:</p> <ul style="list-style-type: none"> initial rate of reaction {is fast / shows positive correlation} because {substrate / hydrogen peroxide} is not limiting (1) therefore there are many {collisions between enzyme and substrate / enzyme substrate complexes} (1) between {20s and 100s} the total volume produced slows because there is {less substrate / fewer collisions / fewer enzyme substrate complexes} (1) no oxygen produced after 100s because reaction has stopped because {substrate used / substrate is limiting} (1) 		(4)

Question Number	Acceptable Answer	Additional guidance	Mark																											
10(a)(iii)	<p>Steeper initial gradient (1)</p> <p>Reaches a plateau faster (1)</p>  <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Time / s</th> <th>Total volume of oxygen / cm³ (Upper Curve)</th> <th>Total volume of oxygen / cm³ (Lower Curve)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td></tr> <tr><td>20</td><td>3.5</td><td>2.5</td></tr> <tr><td>40</td><td>6.5</td><td>4.5</td></tr> <tr><td>60</td><td>8.2</td><td>6.2</td></tr> <tr><td>80</td><td>8.8</td><td>7.8</td></tr> <tr><td>100</td><td>9.0</td><td>8.8</td></tr> <tr><td>120</td><td>9.0</td><td>9.0</td></tr> <tr><td>140</td><td>9.0</td><td>9.0</td></tr> </tbody> </table>	Time / s	Total volume of oxygen / cm³ (Upper Curve)	Total volume of oxygen / cm³ (Lower Curve)	0	0	0	20	3.5	2.5	40	6.5	4.5	60	8.2	6.2	80	8.8	7.8	100	9.0	8.8	120	9.0	9.0	140	9.0	9.0		(2)
Time / s	Total volume of oxygen / cm³ (Upper Curve)	Total volume of oxygen / cm³ (Lower Curve)																												
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40	6.5	4.5																												
60	8.2	6.2																												
80	8.8	7.8																												
100	9.0	8.8																												
120	9.0	9.0																												
140	9.0	9.0																												

Question Number	Acceptable Answer	Additional guidance	Mark
10(b)	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> • DNA {unzips / unwinds} and hydrogen bonds between complementary strands broken (1) • the {antisense / coding / template} strand used for mRNA synthesis (1) • RNA polymerase used to join RNA nucleotides (1) • complementary base pairing of A with U, not T (1) 		(4)

(Total for Question 10 = 13 marks)