

**Paper 2 (4BI1/2B)**

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>1(a)</b>	An explanation that makes reference to the following two points: <ul style="list-style-type: none"> <li>• ice caps melt/flooding/rise of sea levels/climate change/ extreme weather (1)</li> <li>• therefore loss of habitat/extinction/effect on food webs/ effect on crop growth (1)</li> </ul>	<b>2</b>

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>1(b)</b>	Transfers virus (from sheep to sheep)	<b>1</b>

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>1(c)</b>	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>• evaporation of water (1)</li> <li>• therefore reduces body temperature/heat loss/equivalent (1)</li> <li>• enzymes not denatured (1)</li> </ul>	<b>2</b>

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>1(d)</b>	Too cold for midge to move/survive/reproduce/equivalent	<b>1</b>

<b>Question number</b>	<b>Answer</b>	<b>Additional guidance</b>	<b>Mark</b>
<b>1(e)</b>	<ul style="list-style-type: none"> <li>• <math>(100 \times 20) \div 995</math> (1)</li> <li>• 2.01% (1)</li> </ul>	award full marks for correct numerical answer without working	<b>2</b>

<b>Question number</b>	<b>Answer</b>	<b>Mark</b>
<b>1(f)</b>	An explanation that makes reference to two of the following points: <ul style="list-style-type: none"> <li>• less blood/(oxy) haemoglobin/oxygen (1)</li> <li>• narrowing of blood vessels (1)</li> <li>• vasoconstriction (1)</li> </ul>	<b>2</b>

Question number	Answer	Mark
<b>1(g)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• sheep injected with dead/attenuated/harmless virus/antigens (1)</li> <li>• (sheep produces) memory cells (1)</li> <li>• (sheep produces) antibodies (1)</li> <li>• faster/greater/quicker response (1)</li> </ul>	<b>3</b>

Question number	Answer	Mark
<b>1(h)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• midges cannot bite/feed (1)</li> <li>• reduce spread of virus (1)</li> </ul>	<b>2</b>

**Total for Question 1 = 15 marks**

Question number	Answer	Mark
2	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• mammoth cell nucleus put into enucleated (elephant) egg cell (1)</li> <li>• electric shock/equivalent (1)</li> <li>• cell division/mitosis (1)</li> <li>• embryo (1)</li> <li>• uterus/womb (1)</li> <li>• surrogate mother (elephant) (1)</li> </ul>	4

**Total for Question 2 = 4 marks**

Question number	Answer	Mark
3(a)(i)	B	1

Question number	Answer	Mark
3(a)(ii)	A	1

Question number	Answer	Additional guidance	Mark
3(b)(i)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• less dry mass (with herbicide) so less growth (1)</li> <li>• less carbon dioxide absorbed (1)</li> <li>• less photosynthesis (1)</li> <li>• less carbohydrate synthesised/equivalent (1)</li> <li>• less water loss/transpiration (1)</li> <li>• stomata close (1)</li> <li>• less supply of mineral ions/named mineral ion (1)</li> <li>• nitrate needed for amino acids/protein; phosphate needed for ATP/DNA; magnesium needed for chlorophyll/ chloroplasts (1)</li> </ul>	ignore nutrients	6

Question number	Answer	Additional guidance	Mark
3(b)(ii)	<p>Subtraction</p> <ul style="list-style-type: none"> <li>• <math>0.97 - 0.85 = 0.12</math> (1)</li> </ul> <p>Multiplication</p> <ul style="list-style-type: none"> <li>• <math>60 \times 24 \times 7 =</math></li> <li>• <math>10080 \times 1209.6 = 1200</math> to two sig fig (1)</li> </ul>	<p>award full marks for correct numerical answer without working</p> <p>allow 1209.6</p>	2

Question number	Answer	Additional guidance	Mark
3(b)(iii)	Subtraction <ul style="list-style-type: none"> <li>• <math>33.3 - 19.5 = 13.8</math> (1)</li> </ul> Percentage <ul style="list-style-type: none"> <li>• <math>(13.8 \div 33.3) \times 100 = 41.4\%</math> to three significant figures (1)</li> </ul>	award full marks for correct numerical answer without working  allow 41%	2

Question number	Answer	Additional guidance	Mark
3(c)	A description that makes reference to five of the following points: <ul style="list-style-type: none"> <li>• potometer (1)</li> <li>• stopwatch/reference to time (1)</li> <li>• measure distance moved by bubble/measure mass loss/equivalent (1)</li> <li>• repeat readings/find mean (1)</li> <li>• control of named environmental factor (1)</li> <li>• same size plant/divide by leaf surface area/equivalent (1)</li> </ul>	allow credit for description of weight or mass potometer	5

**Total for Question 3 = 17 marks**

Question number	Answer	Additional guidance	Mark
4(a)	One mark for each of the following : <ul style="list-style-type: none"> <li>osmoregulation (1)</li> <li>excretion (1)</li> </ul>	any order	2

Question number	Answer	Mark
4(b)(i)	$0.17 / (0.200 - 0.030)$	1

Question number	Answer	Mark
4(b)(ii)	An explanation that makes reference to four of the following points: <ul style="list-style-type: none"> <li>protein stays in plasma/not in filtrate or in urine (1)</li> <li>protein molecules too large to pass out of glomerulus/into Bowman's capsule (1)</li> <li>glucose in plasma and filtrate/none in urine (1)</li> <li>small enough to pass out of glomerulus/into Bowman's capsule (1)</li> <li>all glucose reabsorbed by active transport in proximal convoluted tubule (1)</li> </ul>	4

Question number	Answer	Mark
4(b)(iii)	A description that makes reference to four of the following points: <ul style="list-style-type: none"> <li>Benedict's/equivalent (1)</li> <li>heat (1)</li> <li>red in high concentration of glucose (1)</li> <li>orange/yellow-green in low concentration of glucose (1)</li> <li>control volume of sample/time heated/temperature/ volume of Benedict's/equivalent (1)</li> </ul>	4

Question number	Answer	Mark
4(c)	An explanation that makes reference to three of the following points: <ul style="list-style-type: none"> <li>less volume (1)</li> <li>more concentrated (1)</li> <li>as more water lost in sweat (1)</li> <li>more ADH released (1)</li> </ul>	3

**Total for Question 4 = 14 marks**

Question number	Answer	Mark
5(a)	A description that makes reference to three of the following points: <ul style="list-style-type: none"> <li>• helix (1)</li> <li>• double stranded (1)</li> <li>• paired bases (1)</li> <li>• A with T and C with G (1)</li> </ul>	3

Question number	Answer	Mark
5(b)(i)	A	1

Question number	Answer	Mark
5(b)(ii)	$4^3 = 64$	1

Question number	Answer	Mark
5(c)(i)	A description that makes reference to three of the following points: <ul style="list-style-type: none"> <li>• change in the order of bases/equivalent (1)</li> <li>• leads to different codon (1)</li> <li>• different amino acid in protein (1)</li> <li>• different-shaped enzyme/change to active site/enzyme not made/equivalent (1)</li> </ul>	3

Question number	Answer	Mark
5(c)(ii)	An explanation that makes reference to two of the following points: <ul style="list-style-type: none"> <li>• change in base may code for same amino acid (1)</li> <li>• amino acid may not be involved in active site (1)</li> <li>• enzyme still made/still functions/equivalent (1)</li> <li>• could be recessive allele (1)</li> <li>• so not expressed in phenotype (1)</li> </ul>	2

Question number	Answer	Mark
5(c)(iii)	An answer that makes reference to x-rays/ultraviolet radiation/gamma radiation/tar/ carcinogens/equivalent	1

**Total for Question 5 = 11 marks**

Question number	Answer	Mark
<b>6(a)</b>	One mark for each of the following:  <b>A</b> nitrogen fixation (1)  <b>B</b> decomposition (1)  <b>C</b> nitrification (1)	<b>3</b>

Question number	Answer	Mark
<b>6(b)(i)</b>	A description that makes reference to two of the following points:  <ul style="list-style-type: none"> <li>• nitrate values and BOD decrease (1)</li> <li>• BOD decreases at a faster rate (1)</li> <li>• nitrate rises in some years/fluctuates (1)</li> </ul>	<b>2</b>

Question number	Answer	Mark
<b>6(b)(ii)</b>	An explanation that makes reference to four of the following points:  <ul style="list-style-type: none"> <li>• lower nitrate levels means less plant growth/equivalent (1)</li> <li>• less eutrophication (1)</li> <li>• less plant death (1)</li> <li>• less decomposition/fewer decomposers/fewer bacteria/equivalent (1)</li> <li>• less respiration (1)</li> <li>• named other factor that could affect BOD (1)</li> </ul>	<b>4</b>

**Total for Question 6 = 9 marks**

**TOTAL FOR PAPER = 70 MARKS**