Paper 2 (4BI1/2B)

Question number	Answer	Mark
1(a)	An explanation that makes reference to the following two points: • ice caps melt/flooding/rise of sea levels/climate change/ extreme weather (1) • therefore loss of habitat/extinction/effect on food webs/ effect on crop growth (1)	2

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

Question number	Answer	Mark
1(c)	An explanation that makes reference to the following points: • evaporation of water (1) • therefore reduces body temperature/heat loss/equivalent (1) • enzymes not denatured (1)	2

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

Question number	Answer	Additional guidance	Mark
1(e)	• (100 × 20) ÷ 995 (1) • 2.01% (1)	award full marks for correct numerical answer without working	2

Question number	Answer	Mark
1(f)	An explanation that makes reference to two of the following points: • less blood/(oxy) haemoglobin/oxygen (1) • narrowing of blood vessels (1) • vasoconstriction (1)	2

Question number	Answer	Mark
1(g)	An explanation that makes reference to three of the following points: • sheep injected with dead/attenuated/harmless virus/antigens (1) • (sheep produces) memory cells (1) • (sheep produces) antibodies (1) • faster/greater/quicker response (1)	**3**

Question number	Answer	Mark
1(h)	An explanation that makes reference to the following points: • midges cannot bite/feed (1) • reduce spread of virus (1)	**2**

Total for Question 1 = 15 marks

Question number	Answer	Mark
2	A description that makes reference to four of the following points: • mammoth cell nucleus put into enucleated (elephant) egg cell (1) • electric shock/equivalent (1) • cell division/mitosis (1) • embryo (1) • uterus/womb (1) • surrogate mother (elephant) (1)	**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)	An explanation that makes reference to the following points: • less dry mass (with herbicide) so less growth (1) • less carbon dioxide absorbed (1) • less photosynthesis (1) • less carbohydrate synthesised/equivalent (1) • less water loss/transpiration (1) • stomata close (1) • less supply of mineral ions/named mineral ion (1) • nitrate needed for amino acids/protein; phosphate needed for ATP/DNA; magnesium needed for chlorophyll/ chloroplasts (1)	ignore nutrients	6

Question number	Answer	Additional guidance	Mark
3(b)(ii)	Subtraction • 0.97 − 0.85 = 0.12 (1) Multiplication • 60 × 24 × 7 = • 10080 × 1209.6 = 1200 to two sig fig (1)	award full marks for correct numerical answer without working allow 1209.6	2

Question number	Answer	Additional guidance	Mark
3(b)(iii)	Subtraction • 33.3 – 19.5 = 13.8 (1) Percentage • (13.8 ÷ 33.3) × 100 = 41.4% to three significant figures (1)	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: • potometer (1) • stopwatch/reference to time (1) • measure distance moved by bubble/measure mass loss/equivalent (1) • repeat readings/find mean (1) • control of named environmental factor (1) • same size plant/divide by leaf surface area/equivalent (1)	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 : • osmoregulation (1) • excretion (1)	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: • protein stays in plasma/not in filtrate or in urine (1) • protein molecules too large to pass out of glomerulus/into Bowman's capsule (1) • glucose in plasma and filtrate/none in urine (1) • small enough to pass out of glomerulus/into Bowman's capsule (1) • all glucose reabsorbed by active transport in proximal convoluted tubule (1)	4

Question number	Answer	Mark
4(b)(iii)	A description that makes reference to four of the following points: • Benedict's/equivalent (1) • heat (1) • red in high concentration of glucose (1) • orange/yellow-green in low concentration of glucose (1) • control volume of sample/time heated/temperature/ volume of Benedict's/equivalent (1)	4

Question number	Answer	Mark
4(c)	An explanation that makes reference to three of the following points: • less volume (1) • more concentrated (1) • as more water lost in sweat (1) • more ADH released (1)	3

Total for Question 4 = 14 marks

Question number	Answer	Mark
5(a)	A description that makes reference to three of the following points: • helix (1) • double stranded (1) • paired bases (1) • A with T and C with G (1)	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: • change in the order of bases/equivalent (1) • leads to different codon (1) • different amino acid in protein (1) • different-shaped enzyme/change to active site/enzyme not made/equivalent (1)	3

Question number	Answer	Mark
5(c)(ii)	An explanation that makes reference to two of the following points: • change in base may code for same amino acid (1) • amino acid may not be involved in active site (1) • enzyme still made/still functions/equivalent (1) • could be recessive allele (1) • so not expressed in phenotype (1)	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
6(a)	One mark for each of the following: **A** nitrogen fixation (1) **B** decomposition (1) **C** nitrification (1)	3

Question number	Answer	Mark
6(b)(i)	A description that makes reference to two of the following points: • nitrate values and BOD decrease (1) • BOD decreases at a faster rate (1) • nitrate rises in some years/fluctuates (1)	2

Question number	Answer	Mark
6(b)(ii)	An explanation that makes reference to four of the following points: • lower nitrate levels means less plant growth/equivalent (1) • less eutrophication (1) • less plant death (1) • less decomposition/fewer decomposers/fewer bacteria/equivalent (1) • less respiration (1) • named other factor that could affect BOD (1)	4

Total for Question 6 = 9 marks

TOTAL FOR PAPER = 70 MARKS