Paper 1 (4BI1/1B and 4SD0/1B)

Question number	Answer	Mark
1(a)	A description that makes reference to the following three points: • *Lactobacillus* (1) • lactose (1) • lactate/lactic acid (1)	**3**

Question number	Answer	Mark
1(b)	An answer that makes reference to the following points: • fruit provides vitamin C to prevent scurvy (1) • roughage/fibre to help peristalsis (1)	**2**

Total for Question 1 = 5 marks

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

Question number	Answer	Mark
2(a)(ii)	C	1

Question number	Answer	Additional guidance	Mark
2(b)	Division • 25 000 ÷ 4 = 6250 days (1) Division • 6250 ÷ 365 = 17.1 years (1) Addition • 2017 + 17.1 years = 2034 (1)	award full marks for correct numerical answer without working	3

Question number	Answer	Mark
2(c)(i)	An explanation that makes reference to the following two points: • heart rate increases (1) • because adrenaline is released (1)	2

Question Number	Answer	Mark
2(c)(ii)	A description that makes reference to the following two points: • one area where rhino are monitored and one area where they are not/monitored and unmonitored rhinos in same area (1) • count/compare the number of deaths (1)	2

Total for Question 2 = 9 marks

Question number	Answer	Mark
3(a)(i)	An explanation that makes reference to the following five points: • training improves performance by increasing the number of capillaries (1) • better supply of oxygen/aerobic (1) • better supply of glucose (1) • respiration/energy/ATP (1) • muscle contraction (1) • better removal of lactic acid/carbon dioxide (1) • can run for longer/equivalent (1)	**5**

Question number	Answer	Mark
3(a)(ii)	An answer that makes reference to two of the following points: • use more people (1) • extend training period (1) • compare different ages/genders (1)	**2**

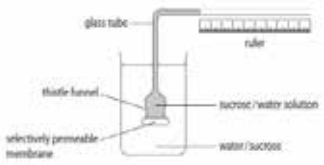
Question number	Answer	Additional guidance	Mark
3(b)(i)	Multiplication • 0.008 (1) Division • 25 ÷ 0.008 = 3125 = 3100 (1)	award full marks for correct numerical answer without working accept 3125 the final answer should reflect the precision of the least precise data (in this case two sig figs)	**2**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference to two of the following points: • wall contains muscle/elastic tissue (1) • blood is under high pressure from the left ventricle (1) • aorta needs to expand (1) • need to transport more blood (1)	allow converse	**2**

Total for Question 3 = 11 marks

Question number	Answer	Mark
4(a)(i)	D	1

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

Question number	Answer	Additional guidance	Mark
4(b)	An answer that makes reference to the following four points: • beaker containing water/sucrose/thistle funnel containing sucrose/water (1) • selectively permeable membrane separating sucrose from water (1) • ruler by tube of thistle funnel (1) • level of liquid shown in the tube (1)		4

Question number	Answer	Additional guidance	Mark
4(c)	Identification • 42 (1) Division • 42 ÷ 60 = 0.70 (1)	award full marks for correct numerical answer without working	2

Total for Question 4 = 8 marks

Question number	Answer	Mark
5(a)(i)	Circle around dendrites/cell body and dendrites	1

Question number	Answer	Additional guidance	Mark
5(a)(ii)	Multiplication • 1.20 × 102 = 120 (1) Multiplication • 1.3 ÷ 120 = 0.0108/1.08 × 10^{-2} (1)	award full marks for correct numerical answer without working	2

Question number	Answer	Mark
5(a)(iii)	Mitochondria	1

Question number	Answer	Additional guidance	Mark
5(b)(i)	An answer that makes reference to the following points: • chromosome (1) • plasmid (1)	allow nucleoid	2

Question number	Answer	Mark
5(b)(ii)	Stage Q	1

Question number	Answer	Mark
5(b)(iii)	Stage R	1

Total for Question 5 = 8 marks

Question number	Answer	Mark
6(a)	An explanation that makes reference to the following two points: • attaches to haemoglobin (1) • therefore less oxygen transport (1)	**2**

Question number	Answer	Mark
6(b)	A	**1**

Question number	Answer	Mark
6(c)	An answer that makes reference to the following six points: • plus and minus sulphur dioxide (1) • same species of seed/equivalent (1) • more than one seed per treatment/equivalent (1) • number of seeds germinated/calculate percentage germination (1) • air tight container used (1) • same time period (1) • same water/same temperature/equivalent (1)	**6**

Total for Question 6 = 9 marks

Question number	Answer	Mark
7(a)	A description that makes reference to two of the following points: • softened by saliva/bolus (1) • muscle contraction in oesophagus (1) • peristalsis (1)	**2**

Question number	Answer	Mark
7(b)	An explanation that makes reference to four of the following points: • churning/equivalent (1) • digested/broken down (1) • protease/pepsin (1) • amino acids (1) • hydrochloric acid/low pH/optimum pH (1)	**4**

Question number	Answer	Mark
7(c)	An explanation that makes reference to four of the following points: • growth reduced (1) • lack of villi (1) • fewer capillaries/fewer lacteals/less surface area (1) • less absorption of named food molecule (1) • function of named food molecule linked to growth (1)	**4**

Total for Question 7 = 10 marks

Question number	Answer	Additional guidance	Mark
8	An evaluation that makes reference to the following points: • letrozole does improve male fertility (1) • sperm concentration increases/sperm motility increases (1) • letrozole increases testosterone levels/ decreases oestrogen levels (1) • letrozole causes side effects/equivalent (1) • need to know group size (1) • matched groups (1) • need to know other factors controlled (1)	e.g. age, diet, smoking, drugs	**6**

Total for Question 8 = 6 marks

Question number	Answer	Additional guidance	Mark
9(a)	An explanation that makes reference to two of the following points: • dominant allele always expressed (1) • dominant expressed in heterozygote (and homozygote)/recessive allele not expressed in heterozygote (1) • recessive allele only expressed in phenotype of homozygote/equivalent (1)	allow seen/visible	**2**

Question number	Answer	Mark
9(b)	An explanation that makes reference to three of the following points: • Karen and Brian unaffected (1) • they both are heterozygous/carriers/have a recessive allele (1) • Sam is albino (1) • Sam is aa/homozygous recessive (1)	**3**

Question number	Answer	Additional guidance	Mark
9(c)	A genetic diagram including: • parents Nn and Nn (1) • gametes N or n (1) • genotypes of offspring NN Nn Nn nn and phenotypes correctly assigned (1)	allow max 3 for transfer error allow all marks from Punnett square	**3**

Question number	Answer	Additional guidance	Mark
9(d)	An answer that makes reference to the following points: • Nn not affected/killed by malaria/survive (1) • reproduce (1) • so number of Nn individuals increase (1) • so number of nn individuals increases/frequency of (n) allele increases (1)	allow converse for NN	**4**

Total for Question 9 = 12 marks

Question number	Answer	Mark
10(a)(i)	C	1

Question number	Answer	Mark
10(a)(ii)	B	1

Question number	Answer	Mark
10(b)(i)	A description that makes reference to four of the following points: • place leaf in boiling water (1) • place leaf in boiling ethanol (1) • use water bath/safe heating/no naked flame (1) • place leaf in water (1) • place leaf in iodine solution (1) • blue/black indicates starch; orange/yellow indicates no starch (1)	4

Question number	Answer	Additional guidance	Mark
10(b)(ii)	A drawing showing the following: • white part labelled orange/yellow/no starch (1) • green part labelled blue/black/starch (1)	allow approximate shape	2

Question number	Answer	Mark
10(c)	A method that includes two of the following points: • trace around the leaf/use transparent paper/equivalent (1) • trace around the green part (1) • put onto squared paper (1) • count the number of squares (1) • reference to both sides of leaf being measured (1)	2

Total for Question 10 = 10 marks

Question number	Answer	Mark
11(a)(i)	A graph showing: • y-axis scale half grid and linear (1) • bars drawn with lines (1) • x-axis labelled age and y-axis labelled mean maximum, and x-axis units as years and y-axis units as dm^3 (1) • bars plotted correctly (1) • key males/females (1)	**5**

Question number	Answer	Mark
11(a)(ii)	Subtraction 5.2 − 2.1 = 3.1 (1)	**1**

Question number	Answer	Mark
11(a)(iii)	An explanation that makes reference to three of the following points: • mean maximum lung volume for males is greater than females for 16 and 25 (1) • males grow more than females (1) • greater difference from puberty/equivalent (1) • males continue to grow from 16 to 25 (1)	**3**

Question number	Answer	Mark
11(b)(i)	B	**1**

Question number	Answer	Mark
11(b)(ii)	An explanation that makes reference to two of the following points: • different body mass/size (1) • taking more exercise/equivalent (1) • smoking (1) • asthma/lung disease/equivalent (1) • genetics/inheritance (1)	**2**

Total for Question 11 = 12 marks

Question number	Answer	Mark
12(a)(i)	A description that makes reference to three of the following points: • use information about milk yield of daughters/mothers (1) • to select bulls as male parents (1) • mate with cows with high milk yield (1) • repeat over generations (1)	3

Question number	Answer	Mark
12(a)(ii)	An answer that makes reference to three of the following points: • cheaper/quicker to transport sperm than live bulls (1) • can use semen to mate with many cows (1) • can store semen after bull has died (1) • safer (for cows) (1)	3

Question number	Answer	Additional guidance	Mark
12(b)	A description that makes reference to four of the following points: • control light intensity/use artificial lighting (1) • use heaters to increase temperature (1) • provide additional carbon dioxide (1) • provide additional minerals (1) • control water supply (1) • reduce damage by pests/use biological control (1)	ignore nutrients	4

Total for Question 12 = 10 marks

TOTAL FOR PAPER = 110 MARKS