

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

Question number	Answer	Mark
1(a)	A description that makes reference to the following three points: <ul style="list-style-type: none">• <i>Lactobacillus</i> (1)• lactose (1)• lactate/lactic acid (1)	3

Question number	Answer	Mark
1(b)	An answer that makes reference to the following points: <ul style="list-style-type: none">• 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 • $25\,000 \div 4 = 6250$ days (1) Division • $6250 \div 365 = 17.1$ 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)	<p>An explanation that makes reference to the following five points:</p> <ul style="list-style-type: none"> • 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)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • use more people (1) • extend training period (1) • compare different ages/genders (1) 	2

Question number	Answer	Additional guidance	Mark
3(b)(i)	<p>Multiplication</p> <ul style="list-style-type: none"> • 0.008 (1) <p>Division</p> <ul style="list-style-type: none"> • $25 \div 0.008 = 3125 = 3100$ (1) 	<p>award full marks for correct numerical answer without working accept 3125</p> <p>the final answer should reflect the precision of the least precise data (in this case two sig figs)</p>	2

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference to two of the following points: <ul style="list-style-type: none"> • 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)	<p>An answer that makes reference to the following four points:</p> <ul style="list-style-type: none"> • 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)	<p>Identification</p> <ul style="list-style-type: none"> • 42 (1) <p>Division</p> <ul style="list-style-type: none"> • $42 \div 60 = 0.70$ (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 • $1.20 \times 10^2 = 120$ (1) Multiplication • $1.3 \div 120 = 0.0108/1.08 \times 10^{-2}$ (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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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	<p>An evaluation that makes reference to the following points:</p> <ul style="list-style-type: none"> • 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) 	<p>e.g. age, diet, smoking, drugs</p>	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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>A drawing showing the following:</p> <ul style="list-style-type: none"> • 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)	<p>A method that includes two of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>A graph showing:</p> <ul style="list-style-type: none"> • 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)	<p>Subtraction</p> $5.2 - 2.1 = 3.1$ (1)	1

Question number	Answer	Mark
11(a)(iii)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • 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)	<p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • 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