

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 | An evaluation that makes reference to the following points: <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) | 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: <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) | A graph showing: <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) | 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: <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) | An explanation that makes reference to two of the following points: <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

