TIME: 2 ½ HOURS P A P E R I I MARKS: 150

1.1.1 B

1.1.2 C

1.1.3 A

1.1.4 C

1.1.5 B

1.1.6 D

1.1.7 D

1.1.8 D

1.1.9 B

1.1.10 C (✓✓) /20/

1.2.1 Resource partitioning

1.2.2 DNA polymerase

1.2.3 Eutrophication

1.2.4 Meissner's corpuscle

1.2.5 Oxytocin

1.2.6 Ecological Niche

1.2.7 Hypothalamus

1.2.8 Unstable population

1.2.9 Eusocial

1.2.10 Exotic species/alien species (✓) /10/

1.3.1 A

1.3.2 None

1.3.3 A

1.3.4 None

1.3.5 B (✓✓) /10/

1.4.1 ANY ONE:

- Low birth rate/Low population growth (✓)
- Low death rates (✓)
- Longer life expectancy (✓) (1)

1.4.2 2 million + 2 million (✓) = 4 million (✓) (2)

1.4.3 TABLE SHOWING THE VISIBLE DIFFERENCES BETWEEN POPULATION GRAPHS A AND B

PYRAMID A	PYRAMID B
lower numbers in the 0-4 range Higher numbers in the 80+ range People live to older ages Larger number of people in 20–29 range Lower birth rate Any logical info in pyramid	Higher number in the 0-4 range Lower numbers in the 80+ range People live to younger ages Lower number of people in 20–29 range Higher birth rate Any logical info in pyramid

Table (✓)
Info (✓✓✓✓) (5)

1.4.4
- Improved education (✓)
- Better medical facilities (✓)
- Improved medicine (✓)
- Improved housing (✓)
- Better sanitation (✓)
- Any logical answer (✓) (2)

/10/

[50]

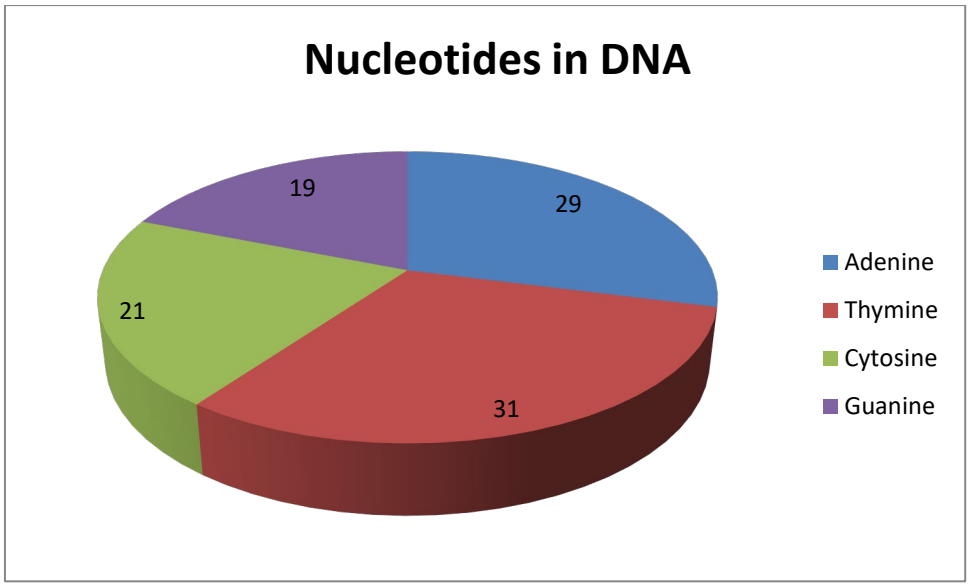
2.1.1 Improves reliability/accuracy (✓) (1)

2.1.2 90:90 or 30:30 or 1:1 (✓) (1)

2.1.3 Adenine and thymine are complementary base pairs (✓) or

They always exist in the same relative percentages or ratios as they are complementary (✓) (1)

2.1.4



Working (✓)
Plotting (✓✓✓✓)
Heading (✓) (6)

/9/

2.2.1 Helix (✓) (1)

2.2.2 Yes / NO (✓) – valid, logical answer based on table (✓) (2)

2.2.3 No (✓), should have acknowledged her input (✓) /

Yes (✓), part of scientific development where scientists build on knowledge of others (✓) (2)

/5/

2.3.1 a) Adrenal gland (✓)
b) Aldosterone (✓)
c) Kidney tubules/Distal tubule/collecting duct (✓) (3)

2.3.2 Kidney tubules/Distal tubule/collecting duct become more permeable to salt (✓) causes more salt to be absorbed out of kidney tubules into blood (✓) (2)

2.3.3 Urine will decrease (✓) or small amount of concentrated urine (✓) (1)

/6/

[20]

3.1.1 No title (✓) (1)

3.1.2 An increase in the level of chlorine (✓) leads to a decrease in the ozone concentration✓ (2)

3.1.3 Time (✓) (accept 'year') (1)

3.1.4 Chlorofluorocarbons/ CFCs (✓) (1)

3.1.5 CFCs might persist for a long time in the atmosphere (✓)

Other countries might have taken longer to implement the protocol (✓)

Households were still using the existing items with CFCs in them (✓) (2)

3.1.6 There would be increased (skin) cancers/sun burn/sun stroke (✓) because decreased ozone levels (✓) result in increased UV rays (✓) reaching the earth. (2)

/9/

3.2.1 59 million tons × 10% = 5,9 million tons (✓)

59 million – 5,9 = 53,1 million tons (✓) (2)

3.2.2 1% + 13% + 4% + 6% + 8% (✓) = 32% (✓) (2)

3.2.3
- Generate organic manure for farming (✓)
- Generate cheaper cooking gas (✓) (methane) for domestic purposes. (1)

3.2.4 Disease carrying animals/organisms use these sites as their homes (✓) because of a ready supply of food.

Dump sites release unpleasant smell causing air pollution (✓).

Decomposition of pollutants may release toxic (✓) substances into the air and water causing health problems (✓)/may cause fires (✓). (2)

/7/

3.3.1 A (✓) (1)

3.3.2
- Moose population numbers are higher wolf population (✓)/Prey peaks before predator
- Wolf population increases and not long after Moose population
- increase (✓)
- Wolf population decreases and not long after Moose population

- decreases (✓)/As wolf numbers decrease, moose numbers increase (✓)
- Wolf population always lags behind moose population (✓)
- When the moose numbers change the wold numbers change (✓)
- Any ONE logical answer

(1)

3.3.3 After a slight delay the wolf population will also increase (✓) as there is more food available (✓) so numbers can increase as they become physically fitter (2)

/4/
[20]

4.1.1 Protein synthesis (✓) (1)

4.1.2 a) Transcription (✓) – mRNA being written from a section of DNA (gene) (✓) (2)

b) Translation (✓) – tRNA anticodons are "meeting" with mRNA codons (✓) (2)

c) Translation (✓) – tRNA molecule leaves amino acid behind (✓) , joined to another amino acid by a peptide bond (✓) and goes to pick up the same amino acid in the cytoplasm (✓) (2)

/7/

4.2.1 6 – GGA (✓)

8 – ACC (✓)

10 – GTG (✓) (3)

4.2.2 a) Peptide bond (✓) (1)

b) Ribosome (✓) (1)

4.2.3 7 – GAA – Leu (✓✓)

9 – CCU – Gly (✓✓) (4)

4.3.1 Interspecific Competition/competitive exclusion (✓) – Two different species fighting for one resource (✓) (2)

4.3.2 If species A is exposed to a relative humidity above 25% they will die (✓✓) or

If species b is exposed to a relative humidity below 60 % they will all die (✓✓) or

They can say if exposed to exact humidity they survive (✓✓) (2)

4.3.3 Relative humidity (✓) (1)

4.3.4
- Amount of flour
- Type of flour
- Species of beetle
- Size of the beetle
- Size of the jar
- Type of jar

- Amount of water available
- Any TWO logical answer not already mentioned (✓✓) (2)

4.3.5 Increases the reliability/accuracy of the study (✓) Or

Too see if males and females react differently to the conditions (✓) (1)

4.3.6 Species B (✓) (1)

4.3.7 Both would die (✓) – neither beetle would be able to adapt to the decrease in humidity (✓) nor would are able to survive in such low relative humidity and would die (✓). (2)

/11/

[25]

5.1.1 A – Endotherm (✓); B – Ectotherm (✓) (2)

5.1.2 Any TWO:

Radiation – Lying directly in sun gaining heat via radiation (✓)
Convection – Lying in the wind (losing or gaining heat from wind) (✓)
Conduction – Lying against a hot/cold object (gaining or losing heat from touch) (✓) (2)

5.1.3
- Increased body temperature picked up by hypothalamus/ruffini (✓)
- Messages end to medulla oblongata causing effectors to respond (✓)
- Increased activity in sweat glands (✓) → producing more sweat (✓) → sweat evaporated from body cooling body down (✓)
- Vasodliation to the skin (✓) → more blood carried to skin (✓) → increased heat loss via radiation (✓)
- Blood temperature lowered (✓) (6)

/10/

5.2
- When the level of carbon dioxide in the body rises above normal levels:
- The level of bicarbonate ions in the blood/plasma rises (✓)
- Blood becomes more acidic/pH of blood drops (✓)
- This is picked by receptor cells (✓)
- In the medulla oblongata (✓)
- and carotid artery/aorta (✓)
- Breathing centre (✓) (in medulla oblongata)
- Sends impulses(✓)
- To diaphragm (✓)
- And Intercostal muscles (✓)
- To cause faster deeper breathing(✓)
- Increased heart rate (✓)
- Increased blood flow to lungs (✓)
- More carbon dioxide is breathed out/ excreted (✓)
- Carbon dioxide levels in blood return to normal (✓) /5/

[15]

6. Genetic Modification:
A plasmid extracted from its bacteria (✓)
Restriction enzymes (✓) are used to remove a segment of the plasmid DNA (✓).
A healthy pancreas cell (✓) is removed from a non-diabetic person (✓)
The insulin secreting gene isolated (✓) and removed (✓) using restriction enzymes (✓)
The insulin secreting gene in inserted into the plasmid (✓) attaching the stick ends (✓) using ligase (✓)
Plasmid inserted back into bacteria (✓)
Bacteria placed into incubator (✓) and grown until liquid insulin (✓) is produced (8)

Glucose levels increase above normal:

- Glucose levels in blood increase (✓)
- Insulin injected into body (✓)
- Insulin causes an increased uptake of glucose by cells for energy (✓) (respiration)
- Insulin converts glucose into glycogen (✓) and stores it in the liver (✓)
- Glucose converted into fat (✓)
- Glucose levels return to “normal” more regulated level (✓) (4)

Glucose levels drop below normal

- Glucose levels drop after period of no food (✓)
- Pancreas (✓) secretes glucagon (✓) from alpha cells of islets of langerhans
- Glucagon converts glycogen (✓) in the liver (✓) into glucose in the blood (✓)
- Glucose levels return to normal (✓)
- Negative feedback stops the glucose increasing process in the body (✓) (5)

/17/

/3/

[20]