GREENBURY SECONDARY SCHOOL

DEPARTMENT OF MATHEMATICS AND SCIENCES

FINAL EXAMINATION -2015

LIFE SCIENCE P1 – GRADE 11

EXAMINER : C. JUGDHAW **MAX MARKS : 150**

MODERATOR : K. GOVENDER /S. SINGH **TIME : 2.5 hrs**

NAME OF LEARNER.....

.....

INSTRUCTIONS TO LEARNERS :

1. Answer all questions .
2. Write neatly and legibly
3. Draw diagrams in pencil and label in ink
4. This paper consists of ....**11**..... pages

SECTION A

QUESTION ONE

1.1 In each of the following questions, four possible answers are given. Choose the most appropriate answer and then write **only the letter** corresponding to it, next to the question number.

Questions 1.1.1 and 1.1.2 are based on the following information :

A biologists caught and marked 10 crabs on the first day . The next day he caught 15 crabs in the same area . Of these 5 had markings.

1.1.1 What would be the estimate of the number of crabs in the river ?

A. 15
B. 30
C. 5
D. 75

1.1.2 Which one of the following would improve the reliability of the estimated number of crabs ?

A. A different part of the river should be sampled

B. The crabs should not be allowed to mix with each after marking

C. Several samples should be taken and the average calculated

D. A special bait should be used to attract the crabs.

1.1.3 If all plants were to be removed from the surface of the earth, which of the following substances usually forming the atmosphere, will most likely disappear first.

A. carbon dioxide
B. nitrogen
C. water vapour
D. oxygen

1.1.4 The average daily intake of different food types by two healthy persons is shown in the following table .

Food	Person A	Person B
Fat	100g	100g
Carbohydrate	350g	250g
Proteins	150g	250g

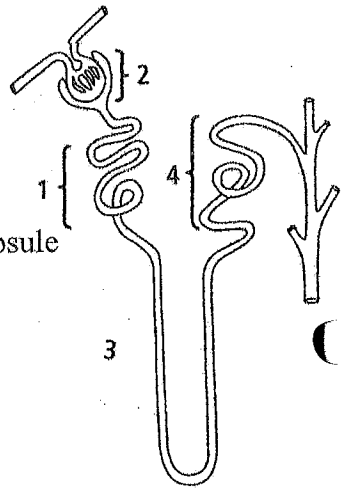
The urine of person A will be different from that of person B. It is likely to have ....

A. more glucose
B. less glucose
C. more urea
D. less urea

1.1.5 If the pH of blood becomes too low, which substance will the cells of the renal tubule extract from the blood and pass into the filtrate to correct this imbalance ?

A. Potassium ions
B. Hydrogen ions
C. carbonate ions
D. sodium ions

Question 1.1.6 and 1.1.7 refer to the accompanying diagram.



1.1.6 This diagram represent a.....

A. Malpighian body
B. nephron
C. nephridium
D. Bowmans' capsule

1.1.7 Name the part where the sodium pump mechanism occurs.

A. 1
B. 2
C. 3
D. 4

1.1.8 During light reaction of photosynthesis

A. oxygen is released and glucose is formed

B. carbon dioxide is absorbed and water is formed

C. oxygen is released and hydrogen atoms are formed

D. carbon dioxide is released and hydrogen atoms are formed

PTO 1.1.9...

1.1.9 Listed below are steps in a test for starch in green leaves .

V – boil leaves in alcohol until they are colourless

W – boil leaves in water for two minutes

X – immerse leaves in iodine solution

Y – heat alcohol in water bath

Z – rinse leaves in water

In what sequence are these steps carried out ?

A. W Y V X Z
B. V W X Y Z
C. W Y V Z X
D. Z W V X Y

1.1.10 During strenuous exercise , tiredness of the muscle results from the accumulation of ...

( ) A. alcohol

B. carbon dioxide

C. lactic acid

D. glucose **(10x2) 20**

( )

1.2 Give the correct biological term for each of the following descriptions . Write only the term next to the question number. (1.2.1 to 1.2.6)

1.2.1 Elongated chlorophyll – containing cells arranged at right angles to the upper epidermis of leaves .

1.2.2 A protective membrane surrounding the lungs .

1.2.3 The product , other than carbon dioxide , of fermentation in plants.

1.2.4 The process of filtering the accumulated waste products of metabolism from the blood of a patient whose kidneys are not functioning properly.

1.2.5 A chronic medical disorder of the lungs in which the air sacs are dilated or enlarged and lack flexibility.

1.2.6 Tube connecting the bladder to the exterior . (6x1)

1.3 State whether each of the statement in COLUMN I , applies **to A only, B only , both A and B or none** of the items in COLUMN II .
Write **A only , B only , Both A and B or None** next to the question number.

COLUMN I	COLUMN II
1.3.1 Excessive weight loss which could lead to death	A . scurvy B . Kwashiorkor
1.3.2 Eating too much carbohydrate and fats resulting in excessive accumulation of adipose tissue	A . Obesity B . Marasmus
1.3.3 Breathing muscles	A . intercostal muscle B . diaphragm muscle
1.3.4 C- shaped cartilaginous rings	A . trachea B . oesophagus
1.3.5 Relationship where an animal captures and kills another animal for its food	A . predation B . prey
1.3.6 Direct technique used to find out population size	A. census B. aerial photography
1.3.7 Used in the manufacture of beer	A . aerobic respiration B . anaerobic respiration (2x7)14

1.4 Choose a term from the list below that matches each of the following example of social behaviour.
Write only the letter (A to E) next to the question number.

A. Commensalism B. Intraspecific competition C. Parasitism

D. Resource partitioning E. Mutualism

1.4.1 Sea anemone attached to hermit crab and carried along when crab move in search of food.

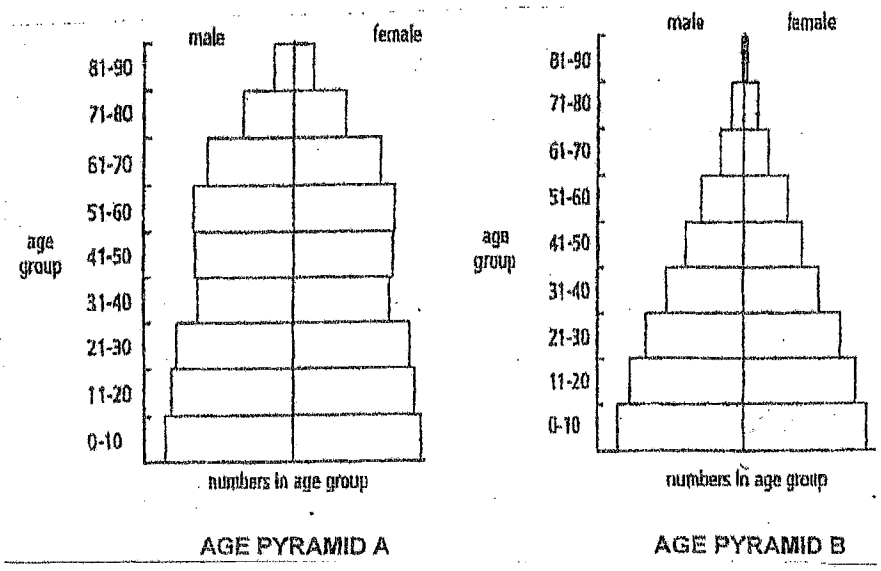
1.4.2 A tapeworm lives and feeds on the food in the small intestine of man.

1.4.3 Barnacles may be found attached to the skin of whales .

1.4.4 White rhinos competing for water during drought.

1.4.5 Different animals feed on different types of vegetation like grass , shrubs and trees . (5)

1.5 Study the population pyramids shown below and answer the questions that follow.



1.5.1 Which population pyramid (A or B) :

a) shows a birth rate and death rate that is more or less the same ?

b) shows a lower life expectancy ?

c) represents a death rate that is higher ?

d) is more representative of a developed country ?

e) will more likely be that of Brazil ?

SECTION A –TOTAL 50

PTO ....SECTION B..

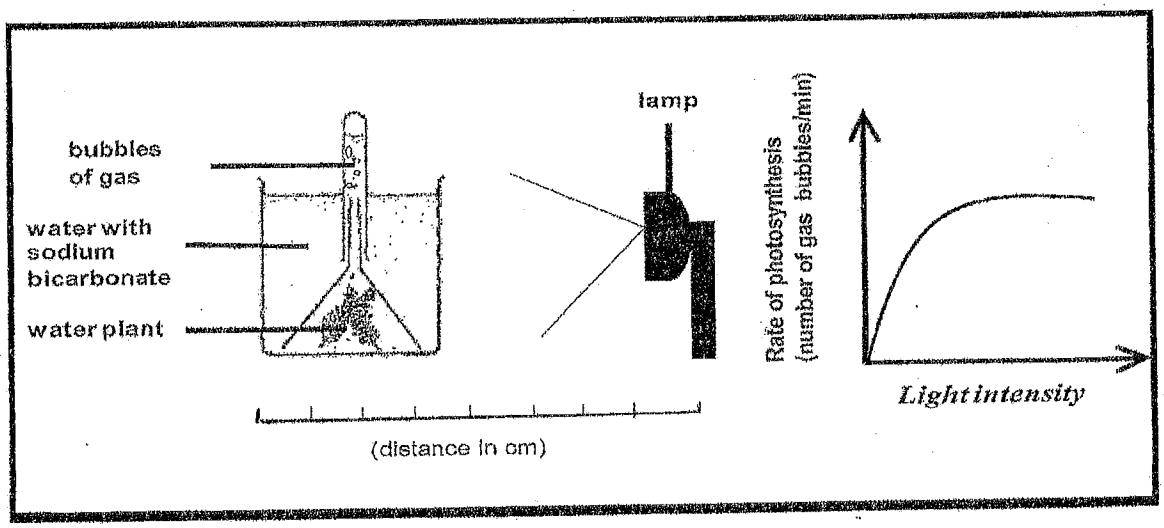
SECTION B

QUESTION TWO

2.1 Tom and Jerry , both grade 11 learners knew that light is one of the factors that is required for photosynthesis. They therefore wanted to investigate the relationship between the light intensity and the photosynthetic rate (number of bubbles per minute .) They set up the apparatus as shown below.

They increased the light intensity at regular intervals and then recorded the number of gas bubbles released per minute . The gas collected causes a glowing splinter to burst into flames .

Study the diagram and answer the questions that follow.



2.1.1 Identify the following in the investigation.

(i) The dependent variable (1)

(ii) The independent variable (1)

2.1.2 Name the gas that is released into the test tube. (1)

2.1.3 Name TWO other environmental factors apart from light , which can influence the rate at which the gas bubbles are produced. (2)

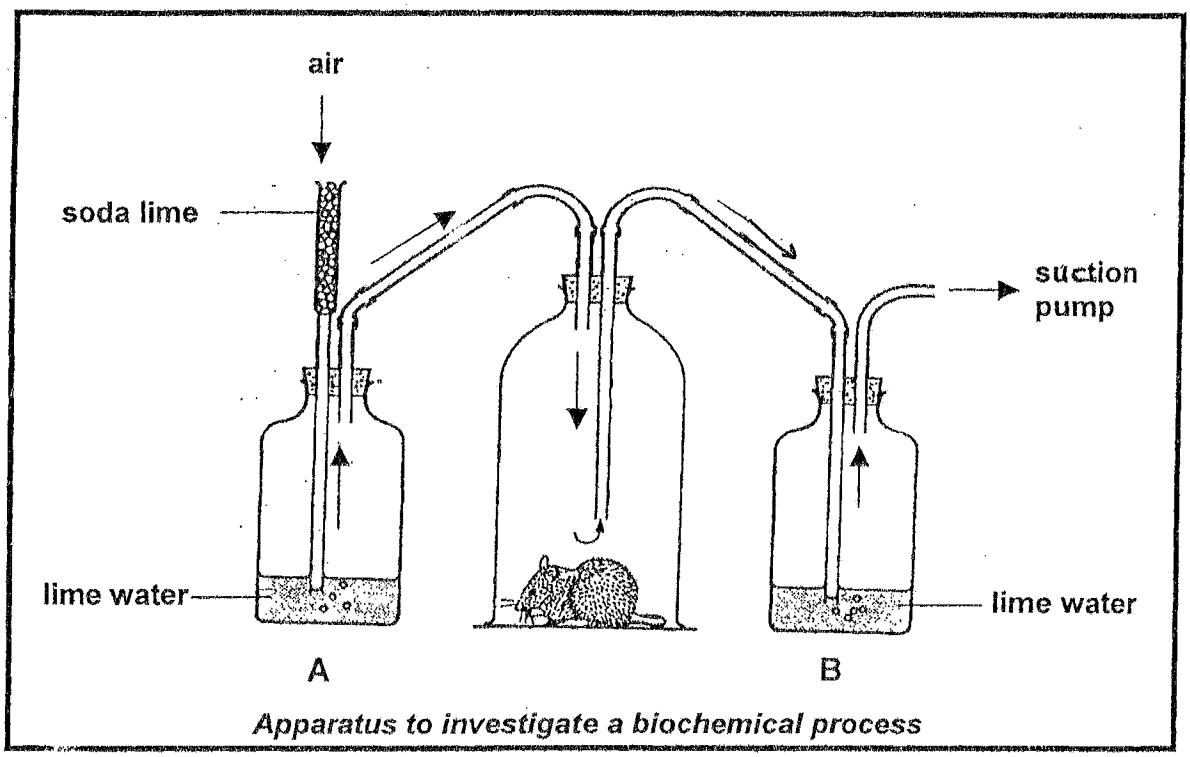
2.1.4 Why was sodium bicarbonate added to the water ? (1)

2.1.5 State TWO reasons why the process of photosynthesis is biologically important. (2)

2.1.6 Draw a labelled diagram of the organelle in which photosynthesis takes place . (5) (13)

PTO 2.2.....

2.2 Study the diagram below and then answer the question which follow.



Apparatus to investigate a biochemical process

2.2.1 Suggest an aim for the above investigation . (1)

2.2.2. State the function of the soda lime . (1)

2.2.3 Explain the difference in the purpose of the lime water in flask A and in B. (2)

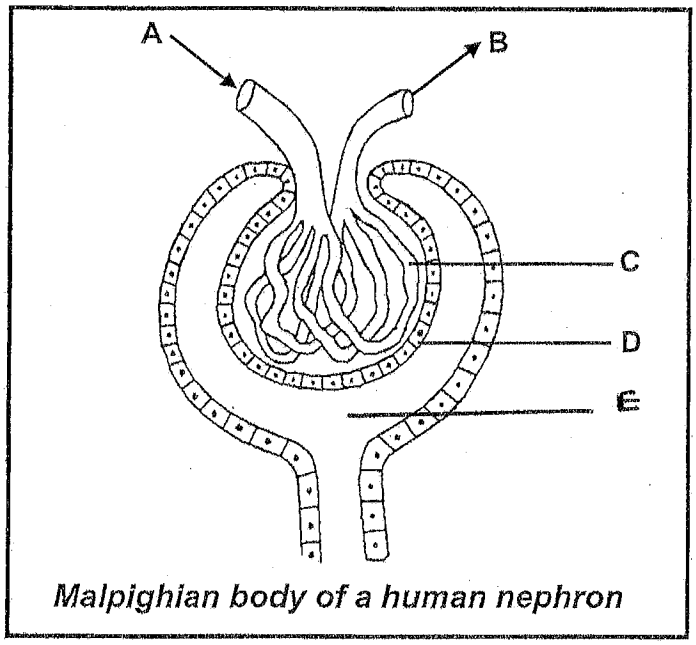
2.2.4 State the expected results in the above investigation . (2)

2.2.5 Explain ONE way each in which the above experimental design could be improved to achieve : a) more valid results. (2)

b) reliable results. (2)

2.2.6 Name the organelle in which the Kreb's cycle takes place . (1) (11)

2.3 Study the diagram below and answer the questions that follow .



Malpighian body of a human nephron

2.3.1 In which region of the kidney would you find this structure . (1)

2.3.2 Name the process in urine formation that occurs in this structure . (1)

2.3.3 Identify part C . (1)

2.3. 4 Describe TWO structural adaptations of part C for the purpose mentioned in QUESTION 2.3.2 above . (4)

2.3.5 Name FOUR substances found in C which will enter the cavity labelled E (4)

2.3.6 Part **A** is wider than part **B** .What is the importance of this ? (1)

2.3.7 Name the hormone secreted when there is a shortage of water in **A** . (1)

2.3.8 Describe how the hormone named in QUESTION 2.3.7 plays its role under such conditions . (3) (16)

TOTAL 40

PTO Q3....

Question 3

3.1 Two males and four female warthogs (types of pigs) were introduced into a private game reserve . The warthog population was monitored over a few years and the results were recorded as shown in the table below.

Year	2000	2001	2002	2003	2004	2005
Number of warthogs	10	13	40	55	54	54

3.1.1 Draw a line graph to represent the data in the table . (7)

3.1.2 Identify the growth form indicated on your graph. (1)

3.1.3 Which year/s represent each of the following phases :

(a) lag phase (1)

(b) the geometric phase (1)

(c) the equilibrium phase (1)

3.1.4 Explain what is meant by the term " carrying capacity" . (2)

3.1.5 Using your graph , determine the carrying capacity of the warthog in the private reserve . (2)

3.1.6 List **TWO** climatic factors which would have a negative influence on the carrying capacity. (2)

3.1.7 Explain why food availability is considered a density dependent factor when calculating the carrying capacity of an area. (3)

(20)

PTO 3.2....

3.2 Study the table below showing the content of the air we inhale and the air we exhale and answer the questions .

Gas	Inhaled air	Exhaled air
Nitrogen	79%	79%
Oxygen	20%	16%
Carbon dioxide	0.04%	4%
Water vapour	A little	A lot

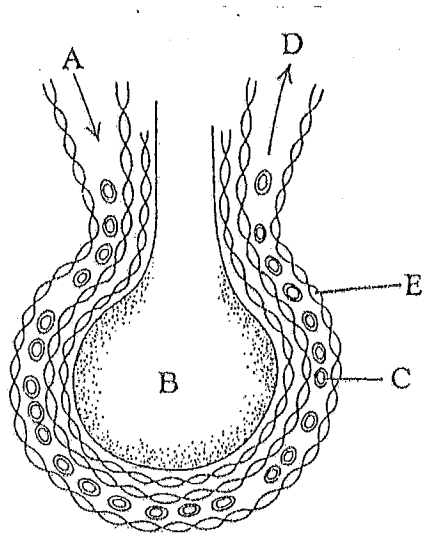
3.2.1 Account for the decrease in the oxygen content in the exhaled air. (3)

3.2.2 How many times more carbon dioxide is there in the exhaled air compared to the inhaled air ? (2)

3.2.3 Account for this increase in carbon dioxide concentration in the exhaled air . (3)

3.2.4 Explain why the nitrogen content of the inhaled and exhaled air remains unchanged. (2) (10)

3.3. The diagram below represents a section through an alveolus as well as the surrounding capillary network . The arrows indicate the direction of blood flow.



3.3.1 Name the type of epithelial tissue represented by E. (1)

3.3.2 As a result of inhalation, will the concentration of oxygen be higher at B or C ? (1)

3.3.3. Will oxygen move from B to C or from C to B ? (1)

3.3.4 By what process are gases exchanged between the air in B and the blood in C ? (1)

3.3.5 Name ONE form in which oxygen is transported in the blood ? (1)

3.3.6 Name THREE forms in which carbon dioxide is transported in the blood . (3)

3.3.7 Explain ONE way in which B is adapted to carry out its function . (2) (10)

TOTAL SECTION B : 80

SECTION C

QUESTION 4 -- ESSAY

4.1 Describe how the principle of negative feedback operates in controlling the glucose concentration in a normal healthy person . Also describe the causes , symptoms and management of the disease diabetes mellitus which results from an inability of the body to normalise the glucose concentration of the blood.

Content : (17)

Synthesis : (3)

NOTE : NO marks will be awarded for answers in the form of flowcharts or diagrams.

TOTAL 20

FINAL TOTAL 150

03/11/2015

QUESTION 1

1.1.1 B ✓✓
1.1.2 C ✓✓
1.1.3 D ✓✓
1.1.4 D ✓✓
1.1.5 B ✓✓
1.1.6 B ✓✓
1.1.7 D ✓✓
1.1.8 C ✓✓
1.1.9 C ✓✓
1.1.10 C ✓✓ (10 x 2)

1.2.1 Palisade ✓
1.2.2 Pleura ✓
1.2.3 Alcohol ✓
1.2.4 Dialysis ✓
1.2.5 Emphysema ✓
1.2.6 Urethra ✓
(6 x 1)

1.3.1 None ✓✓
1.3.2 A only ✓✓
1.3.3 Both A & B ✓✓
1.3.4 A ✓✓
1.3.5 A ✓✓
1.3.6 Both A & B ✓✓
1.3.7 B ✓✓
(7 x 2) 14

1.4.1 E ✓
1.4.2 C ✓
1.4.3 A ✓
1.4.4 B ✓
1.4.5 D ✓ (5)

1.5.1 A ✓
1.5.2 B ✓
1.5.3 B ✓
1.5.4 A ✓
1.5.5 B ✓ (5)

TOTAL : 50

SECTION B

QUESTION 2

2.1.1 (i) Rate of photosynthesis / no. of bubbles per minute ✓

(ii) Light intensity ✓

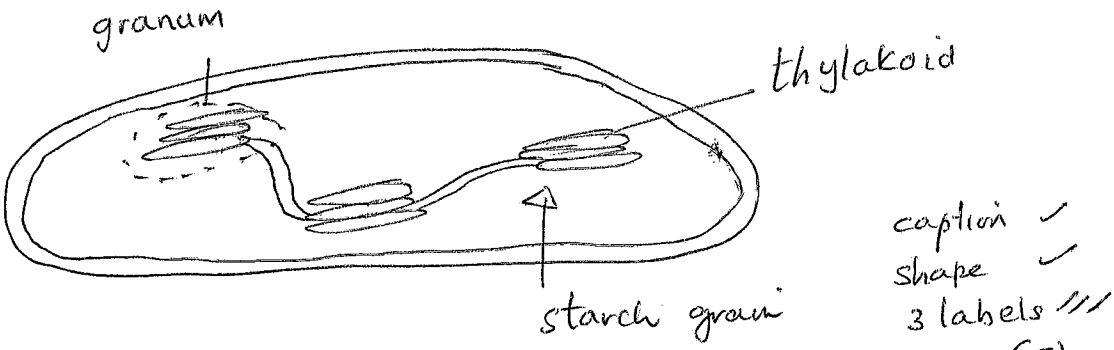
2.1.2 Oxygen ✓

2.1.3 Temp, Carbon dioxide / water ✓

2.1.4 To provide CO_2 needed for the photosynthesis. ✓

2.1.5 - Radiant energy is converted to chemical potential energy and stored in organic fuel molecule like starch / glucose. ✓
- O_2 is released which is used for cellular respiration by living organisms. ✓
- Carbohydrate (glucose / starch) are produced serve as food

2.1.6 Structure of chloroplast



caption ✓
shape ✓
3 labels ///
(5)

2.2.1 To determine whether CO_2 is released during cellular respiration. ✓

2.2.2 Absorb CO_2 from incoming air. ✓

2.2.3 In Flask A – the lime water is meant to show that there is no CO_2 coming in from the atmosphere. ✓

Flask B – the lime water is used to determine whether the animal has released CO_2. ✓

2.2.4 Lime water in flask B will turn milky. ✓

Flask B – the water will stay clear. ✓

2.2.5 (a) - Set up a control without the mouse /
- Set up a similar investigation with different living organisms to verify results. //

(b) - Set up a number of samples / repeat the investigation //

2.2.6 Mitochondria ✓

2.3.1 In the cortex ✓

2.3.2 Diffusion / Glomerular / Ultra / Pressure filtration ✓

2.3.3 Glomerulus / blood capillary ✓

2.3.4 - Walls are made of a single layer to facilitate diffusion of substances.
- Many tiny pores act as micro filters, restricting large substances such as proteins / blood corpuscles.
- Lots of capillaries to ensure large surface area. (2 x2) 4.

2.3.5 Water, glucose, amino acids, urea, uric acid

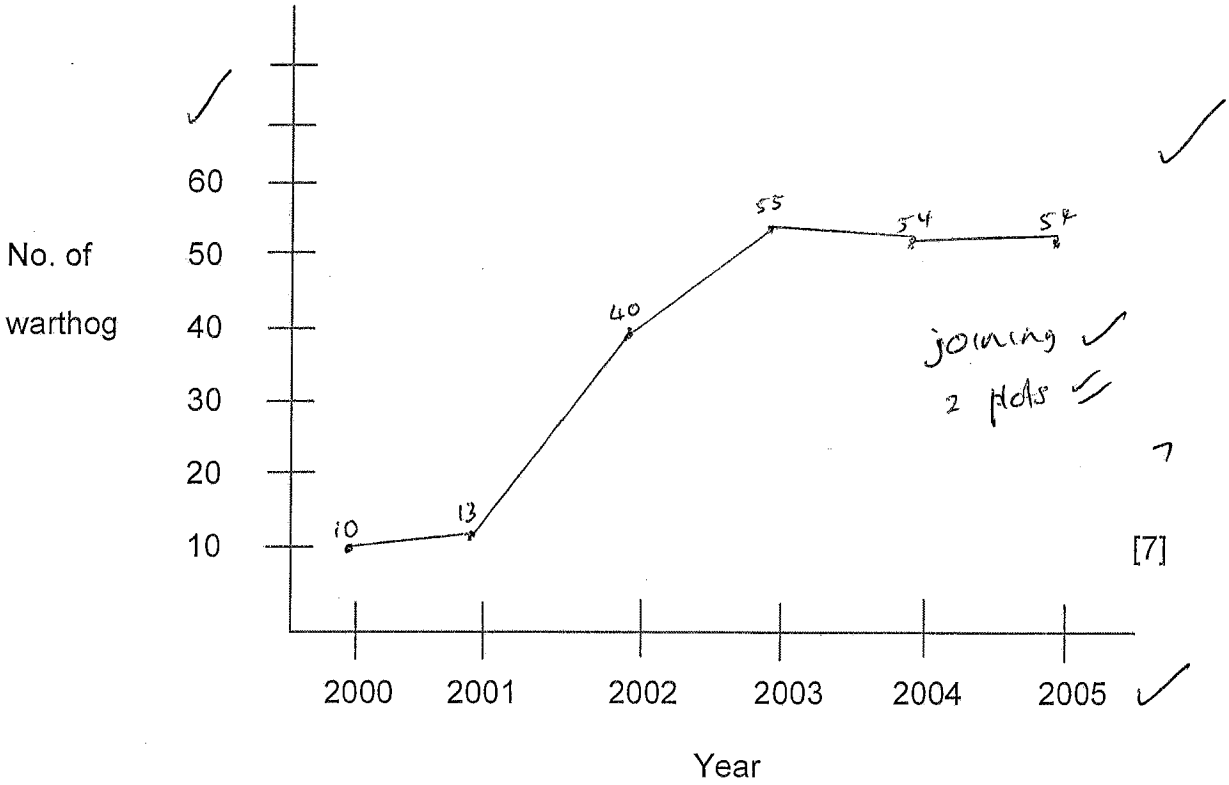
2.3.6 To create a high pressure in C for filtration. ✓

2.3.7 ADH ✓

2.3.8 - Makes collecting duct / distal convoluted tubule more permeable to water.
- Allowing more water to be reabsorbed. ✓

QUESTION 3

3.1.1 Warthog population from the year 2000 – 2005.



joining ✓
2 pts ✓

[7]

3.1.2 Logistic growth form ✓

3.1.3 (a) 2000 – 2001 ✓

(b) 2001 – 2003 ✓

(c) 2004 – 2005 / 2003 to 2005 ✓

3.1.4 The total number of individuals that the environment can support.

3.1.5 54 / 55

3.1.6 Drought / temp, amount of rainfall, fire, flood.

3.1.7 - The number of individuals, density in the population will determine the amount of food available.

- Large population will result in more competition of food, therefore less food available.
- Small population will result in less competition for food, therefore more food available.

3.2.1 A large amount of oxygen from the inhaled air diffused through the alveoli into the blood capillaries. [3]

3.2.2 100 (4 ÷ 0,04)=100

3.2.3 - As a result of cellular respiration, CO2 is produced as a by-product.
- This high amount of CO2 is brought by the blood to the lungs from where it is released in the exhaled air. [3]

3.2.4 It is not absorbed into the blood since it is not needed and therefore the same amount is exhaled. [2]

3.3.1 Squamous epithelium

3.3.2 B

3.3.3 B to C

3.3.4 Diffusion

3.3.5 Oxyhaemoglobin; in solution in the plasma

3.3.6 Bicarbonate ions
Carbaemoglobin
Solution in the plasma [3]

3.3.7 Air sac – lobed, creating large surface area for gaseous exchange.
- Single layer of squamous epithelium – rapid diffusion of gas.
- Richly supplied with blood capillaries for transport of gases.
- Moist easy diffusion of gases. [Any 1X2]

QUESTION 4

4.1

- When abnormal levels of glucose are detected ✓
- By the pancreas ✓
- The islets of Langerhans ✓ secretes hormones
- Into the bloodstream ✓

When blood glucose level rises ✓

- Insulin ✓ is secreted
- To decrease the blood glucose level ✓
- Back to normal ✓
- Insulin secretion is then inhibited ✓

When blood glucose level falls ✓

- Glucagon ✓ is secreted
- To increase the blood glucose level ✓
- Back to normal ✓
- Glucagon secretion is then inhibited ✓

[Any] [10]

Causes of diabetes mellitus

- Inadequate secretion ✓
- Non-secretion of insulin ✓
- Production of defective insulin ✓
- Body cells resistant to the action of insulin ✓
- Inability of the cells to use glucose efficiently ✓

[Any] [2]

Symptoms

- Glucose in the urine
- Frequent urination
- Extreme thirst
- Fatigue / lethargy / faintness
- Nausea / Vomiting
- Weight loss
- Blurred vision
- Non-healing of wounds

[Any] [3]

Management of diabetes mellitus

- Exercise
- Eating diet suitable for diabetic person
- Using prescribed medication / drugs for the management of diabetes mellitus

[Any] [2]

Content [17]

R - All info given is relevant

L - Information presented in correct sequence

C - All aspects written on [3]