KZN DEPARTMENT OF EDUCATION

GREENBURY SECONDARY SCHOOL

DEPARTMENT OF MATHEMATICS AND SCIENCES

NOVEMBER EXAMINATION 2016

LIFE SCIENCES PAPER 1

GRADE 11

EXAMINER: S.SINGH

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DATE: 01/11/2016

DURATION: 2.5.HRS

MAX.MARKS: 150

INSTRUCTIONS TO LEARNER:

1. Answer all questions.

2. Begin each question on a new page.

3. Rule off after each sub - question.

4. Number your answers exactly as the questions are numbered.

5. Draw all diagrams in pencil and label in ink.

6. Write neatly and legibly.

7. This paper consists of **11** printed pages.

SECTION A

QUESTION 1

1.1. Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number.

1.1.1. A function of bile in the human alimentary canal is to...

    A.   convert glycogen to glucose

    B.   create an acidic environment for enzyme action

    C.   hydrolyse sucrose into glucose and fructose

    D.   create an alkaline environment for enzyme action.

1.1.2. Which one of the following is a function of the mitochondrion

    A.   deamination

    B.   production of oxygen

    C.   storage of glucose

    D.   release of energy

1.1.3. Which of the following shows the correct path of air movement?

    A.   alveoli ---> bronchiole ---> trachea ---> bronchus

    B.   trachea ---> Bronchus ---> bronchiole ---> alveoli

    C.   bronchiole ---> alveoli ---> trachea ---> bronchus

    D.   bronchus --> bronchiole --> trachea ---> alveoli

1.1.4. The gas which is released during the process of photosynthesis identified by using a
   A. glowing splinter
   B. clear lime water
   C. potassium hydroxide
   D. Ethanol

1.1.5. Cellular respiration in a green leaf takes place ...
   A. during the day only
   B. Continuously
   C. in tissues without chlorophyll only
   D. during the night only

1.1.6. Which one of the following does NOT occur during inhalation in a human?
   A. Pressure within the thoracic cavity increases.
   B. the lungs expand
   C. the diaphragm contracts and flattens
   D. Volume in thoracic cavity decreases.

1.1.7. Which ONE of the following represents density dependent and density independent factors respectively?

	Density dependent factors	Density independent factors
A	Disease and competition	Flood and drought
B	Fire and flood	Food supply and predation
C	Food supply and disease	Competition and predation
D	Competition and fire	Flood and drought

1.1.8. Which of the following substances can directly be absorbed by blood without further digestion?
   A. proteins.
   B. glucose
   C. fats
   D. starch

1.1.9. Which of the following survival curves represents a troop of baboons?
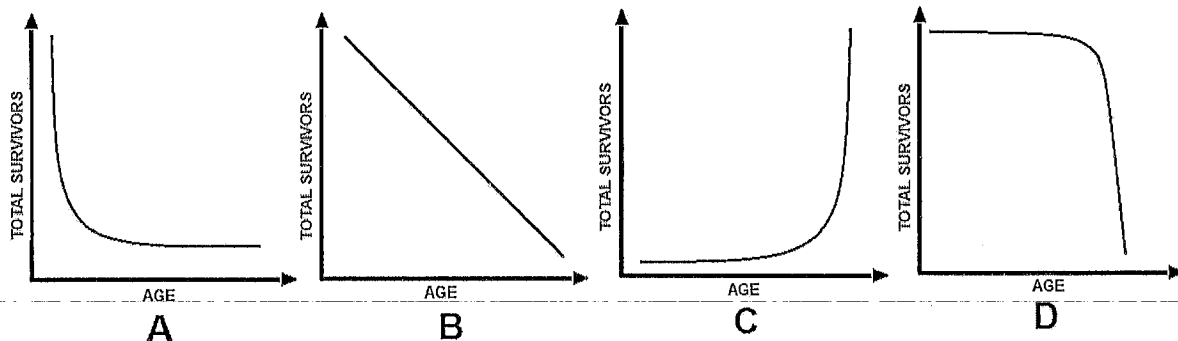
1.1.10. If a drop in the pH of blood occurs, the kidneys will...

    A. increase the absorption of urea

    B. decrease the absorption of sodium ions

    C. increase the re-absorption of hydrogen ions

    D. increase the re-absorption of bicarbonate ions

10 X 2 = 20

1.2. Give the correct biological term for each of the following descriptions.

1.2.1. The pigment which is responsible for absorbing radiant energy during photosynthesis.

1.2.2. Expected colour change of diluted iodine solution when the presence of starch in a leaf is confirmed.

1.2.3. Folds on the inner membrane of the mitochondria.

1.2.4. A method of artificially removing waste products from the bloodstream if the kidneys are unable to do so on their own.

1.2.5. The acid that accumulates in the muscles of humans during continuous strenuous physical activity.

1.2.6. The photo-chemical splitting of water during photosynthesis.

1.2.7. The removal of undigested remains from the body.

1.2.8. The tube that transports urine from the bladder to the exterior.

8 X 1 = 8

1.3. Indicate whether each of the statements 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 1	COLUMN 11
1.3.1.	Molecule that carry energy	A. ATP B. ADP
1.3.2.	Products of anaerobic respiration	A. Alcohol B. CO_2
1.3.3.	Storage of chlorophyll	A. Grana B. Thylakoid
1.3.4.	Acid secreted in the stomach during digestion	A. HCl B. Fatty acid
1.3.5.	Decomposition of glucose in a living cell	A. Anabolic reaction B. Catabolic reaction

5 X 2 = 10

1.4. The diagram below illustrates gaseous exchange in the body tissues of humans. Study the diagram and answer the questions.
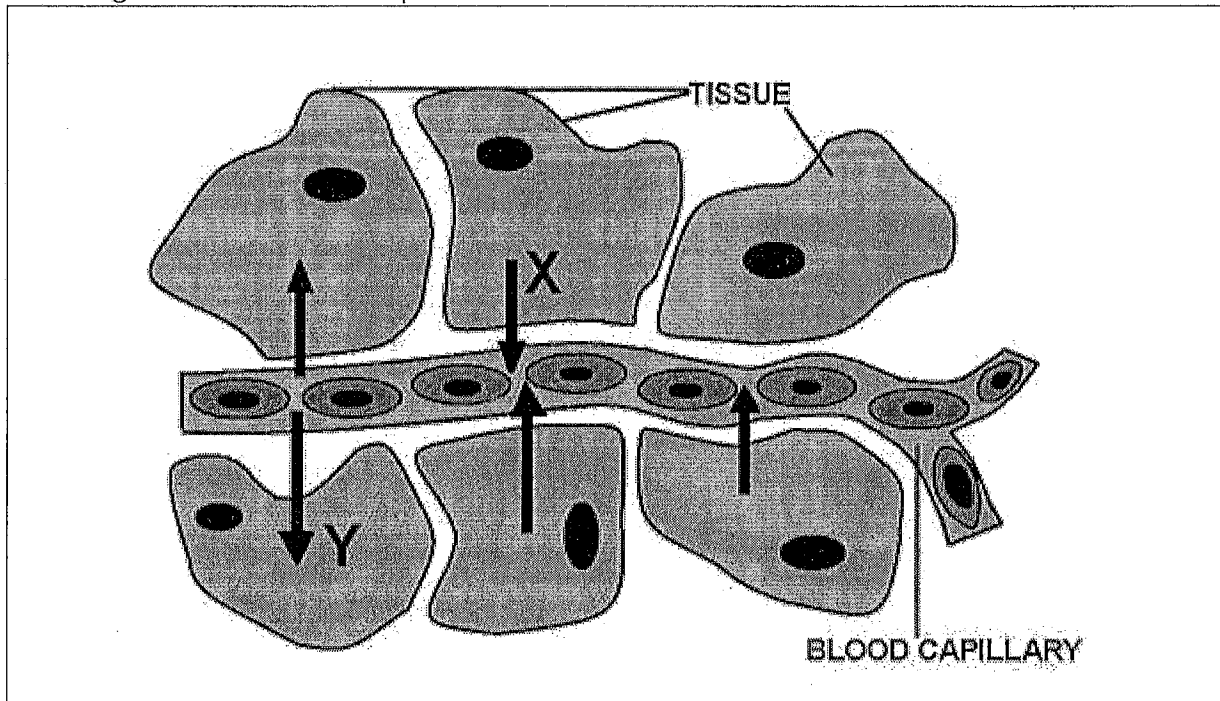
1.4.1. Which respiratory gas is represented by **X** and **Y** respectively? (2)

1.4.2. Name the physiological process responsible for the gaseous exchange as indicated by the arrows? (1)

1.4.3. Name TWO different ways in which the gas referred as **X** is transported in the blood. (2)

1.4.4. Which protein plays an important role in the transport of the gas referred to as **Y**. (1)

(6)

1.5. Study the following passage on obesity and answer the questions that appear on the following page.

Obesity can be described as an imbalance between energy intake and expenditure such that excess energy is stored in fat cells, which enlarge or increase in number. In a sample of 7 726 South African women aged 15–95 years old, black women had the highest prevalence of overweight and obesity (58,5%), followed by women of mixed ancestry (52%), white women (49,2%) and then Indian women (48,9%). A different pattern was seen in men. In a sample of 5 401 South African men aged 15–95 years, the prevalence of overweight and obesity was highest in white men (54,5%), followed by Indian men (32,7%) and men of mixed ancestry (31%), with the lowest prevalence in African men (25%). Some of the health risks associated with obesity are diabetes, coronary heart disease, hypertension, cancer and psychological ill health.

1.5.1. What is main cause for obesity? (2)

1.5.2. What is the total number of people sampled during this survey? Show calculations. (2)

1.5.3. Which group of people have the lowest prevalence of obesity? (1)

1.5.4. Name ONE of the health risks mentioned in the extract that has the potential of causing stroke. (1)

(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1. The graph below shows the size of an impala population between 1952 and 1985 at a game reserve. Study the graph and answer the questions.
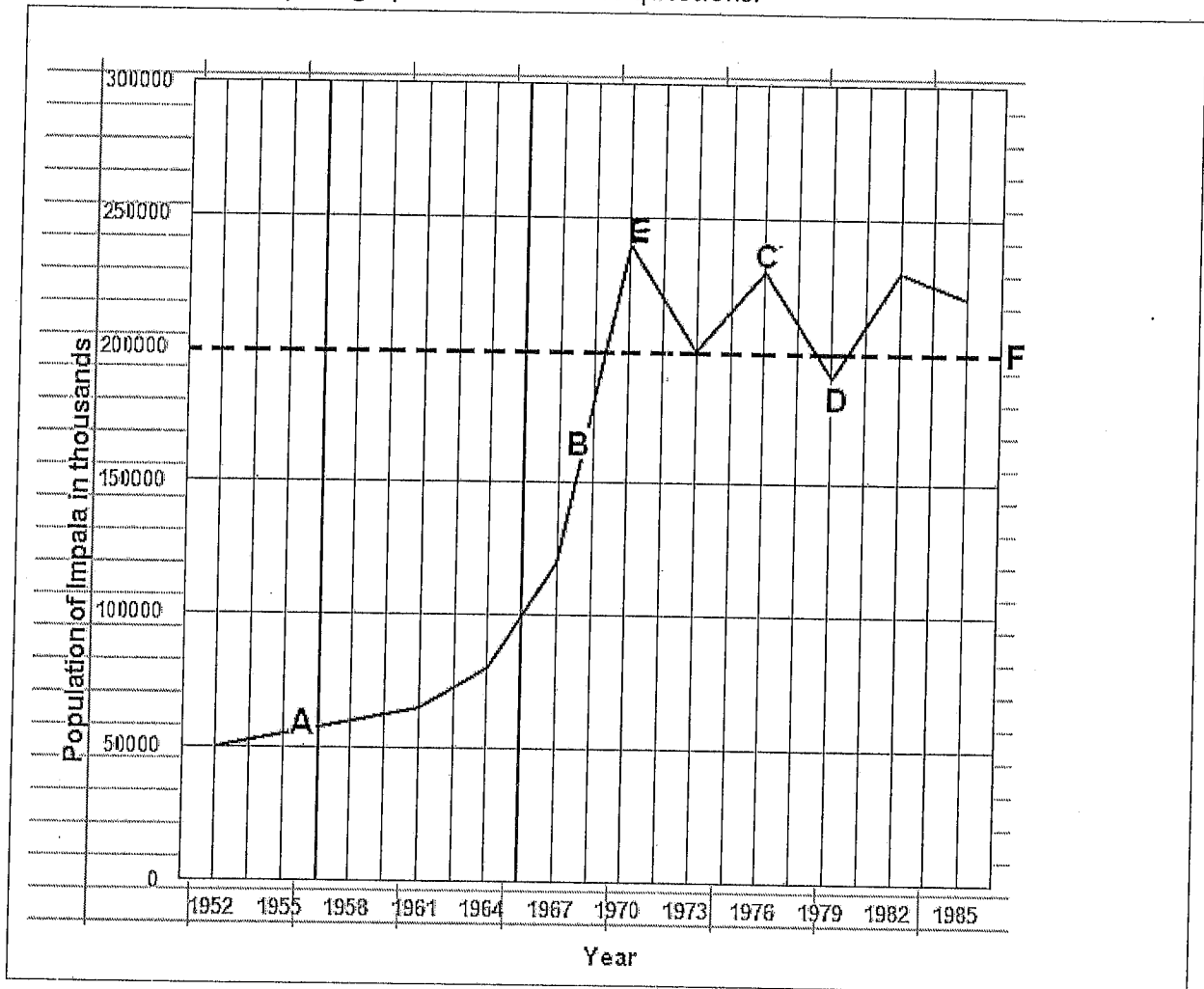
2.1.1. Identify the growth phases indicated by **A** and **B** on the graph respectively. (2)

2.1.2. Give TWO reasons each for the shape of the growth indicated by: (2)
  (a)   growth phase A
  (b)   growth phase B (2)

2.1.3. What does the dotted line **F** represent? (1)

2.1.4. Describe the effect on the environment when the impala population reaches the point on the graph marked **E**. (2)
 **(9)**

2.2.

A group of grade 11 learners were asked to investigate the number of frogs in a pond close to their school. They carried out the following steps:
  - They caught and marked 15 frogs
  - They then released them back into the pond.
 - Two days later they caught 30 frogs of which 10 were marked.

2.2.1. Calculate the number of frogs that were present in the pond.
  Show all calculations (2)

2.2.2. List TWO precautions that the learners must consider when marking the frogs. (2)

2.2.3. Name the method used to estimate the frog population (1)
  (5)

2.3. The diagram shows a plant propagator (a unit in which plants are grown) in which scientists can control temperature, light intensity and carbon dioxide concentration:
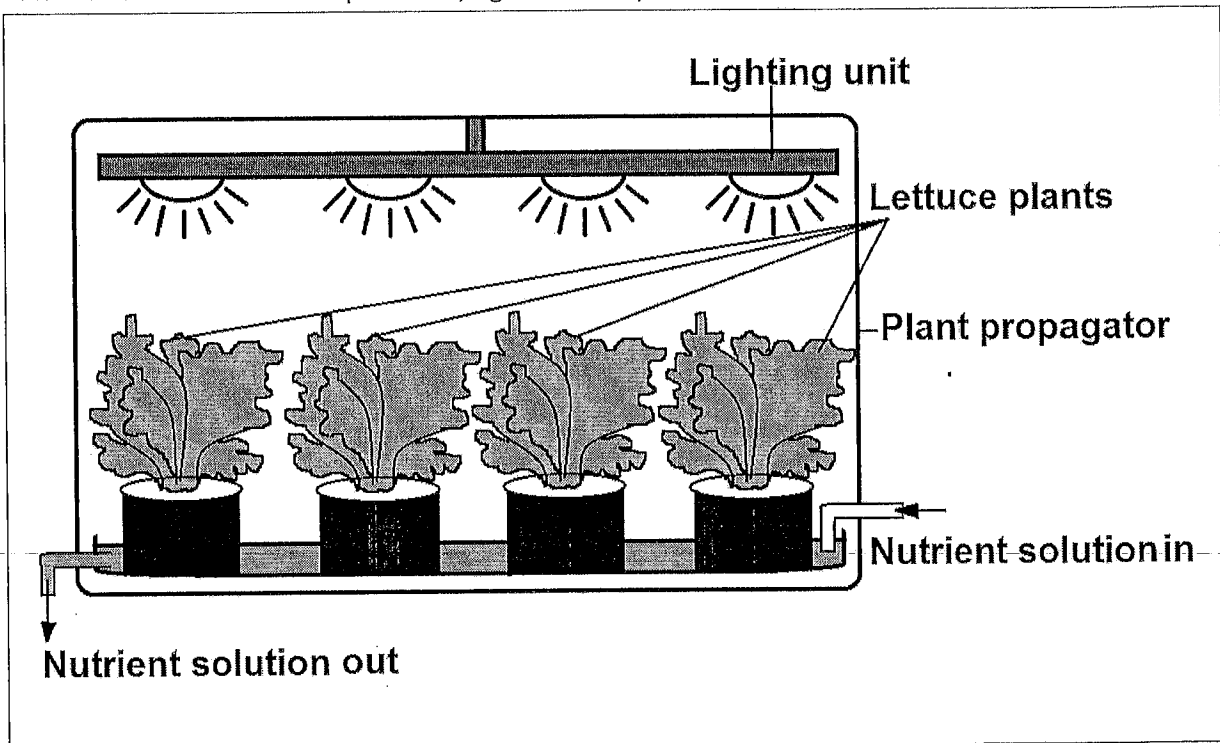
- The scientists set different temperature, CO_2-concentration and light intensity for four lettuce plants.
- The graphical illustration of the results are given below.
- Mean mass of lettuce plants serves as an indication of rate of photosynthesis.

Study the results given below and answer the following questions:
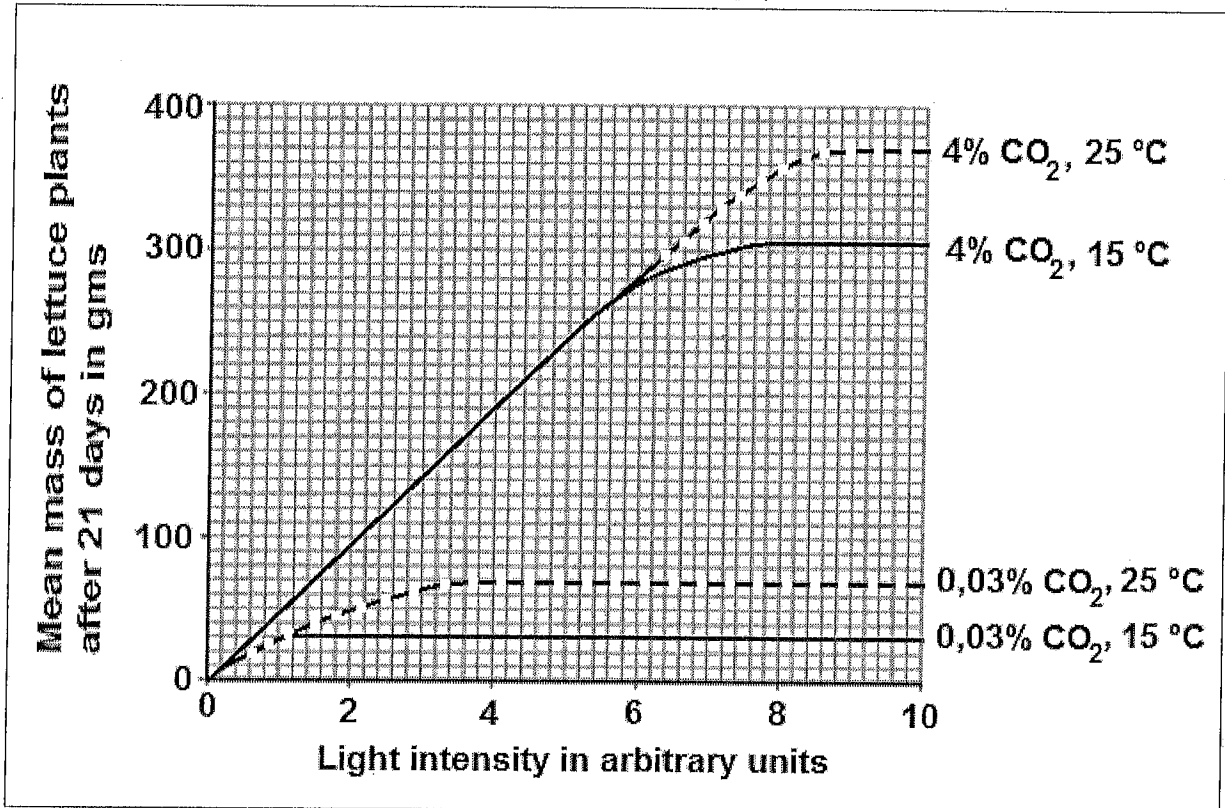
2.3.1. Explain the effect of light intensity on the mass of lettuce plants. (2)

2.3.2. Name the TWO limiting factors that influence photosynthesis in the lettuce plants as light intensity increases. (2)

2.3.3. Identify the following from the graph above:

(a) The optimum light intensity for growth of lettuce at 4% CO_2 and 25^0C. (1)
(b) The mean mass of lettuce at the optimum temperature identified in Question 2.3.3. (a) above. (1)

2.3.4. What would happen to the rate of photosynthesis if the temperature is raised beyond 35^0C? Give a reason for your answer. (2)

2.3.5. Draw and label a diagram of the organelle in which photosynthesis occurs. (5)

(13)

2.4. The diagram below shows the structure of a renal Malpighian corpuscle. Study the diagram and answer the questions that follow.
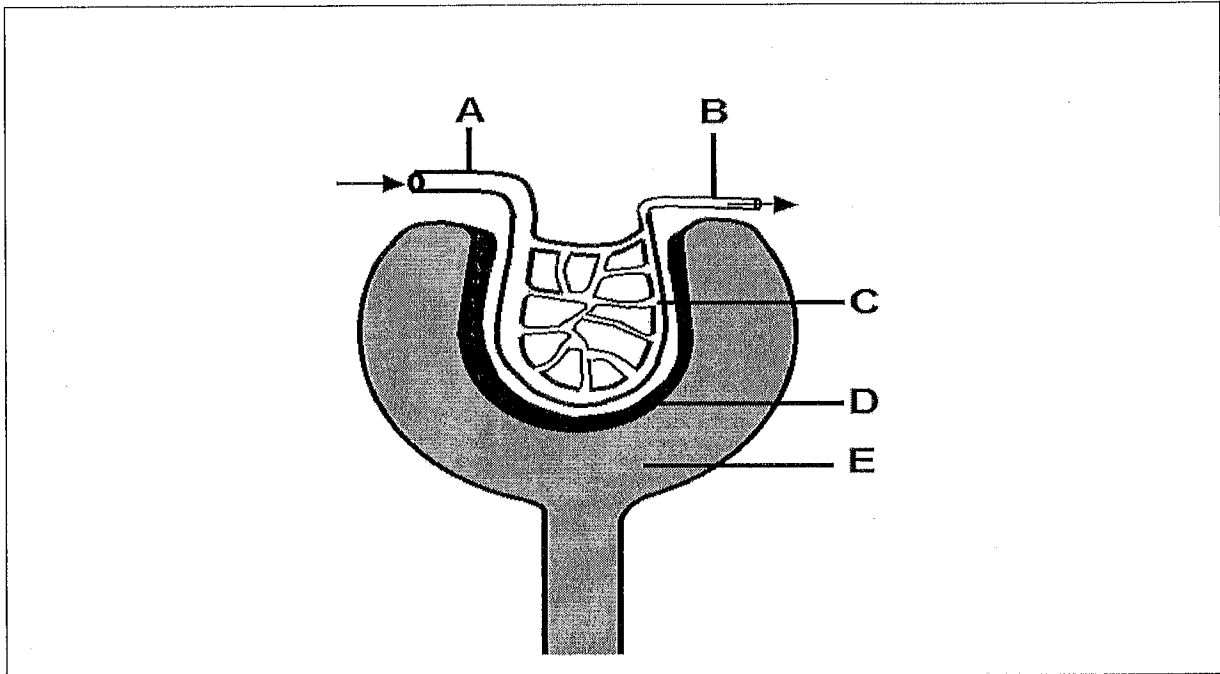
2.4.1. Name parts labelled **A, B** and **C.** (3)

2.4.2. Which physiological process of excretion takes place in the above diagram? (1)

2.4.3. Explain how the difference in diameter of the parts labelled A and B is responsible for the process that occurs in the malpighian body. (6)

2.4.4. Name the specialised cells found at D. (1)

2.4.5. Describe how these cells mentioned in QUESTION 2.4.4. are structurally suited for their function. (2)

(13)

Question 2:[40]

QUESTION 3

3.1. The table below represents the composition of substances found in the different parts of the nephron. The quantities of the different substances are expressed as grams per litre.

Component	Plasma in the different arterioles	Glomerular filtrate	Urine
Urea	0.03	0.03	2.0
Glucose	0.20	0.20	0.0
Amino Acids	0.06	0.06	0.0
Large proteins	8.00	0.00	0.0
Salts	0.72	0.72	1.5

3.1.1. Name the TWO substances that were completely reabsorbed. (2)

3.1.2. Name the hormone that is responsible for reabsorption of water in the kidney. (1)

3.1.3. Explain how the composition of urine will change if the person had a meal rich in proteins. (3)

(6)

3.2. The diagram below shows an investigation on cellular respiration. Study it and answer the questions that follow.
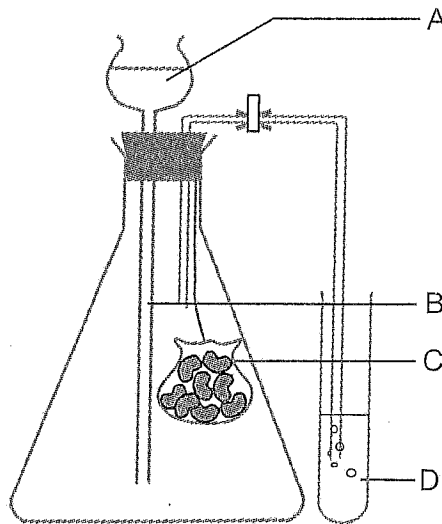
3.2.1. Write a hypothesis for this investigation. (2)

3.2.2. Briefly describe how you would prepare a control for this experiment. (2)

(4)

3.3. Tabulate THREE differences between cellular respiration and photosynthesis. (7)

3.4. The accompanying diagram represents a structure associated with the human digestive system. Study the diagram and answer the questions that follow.
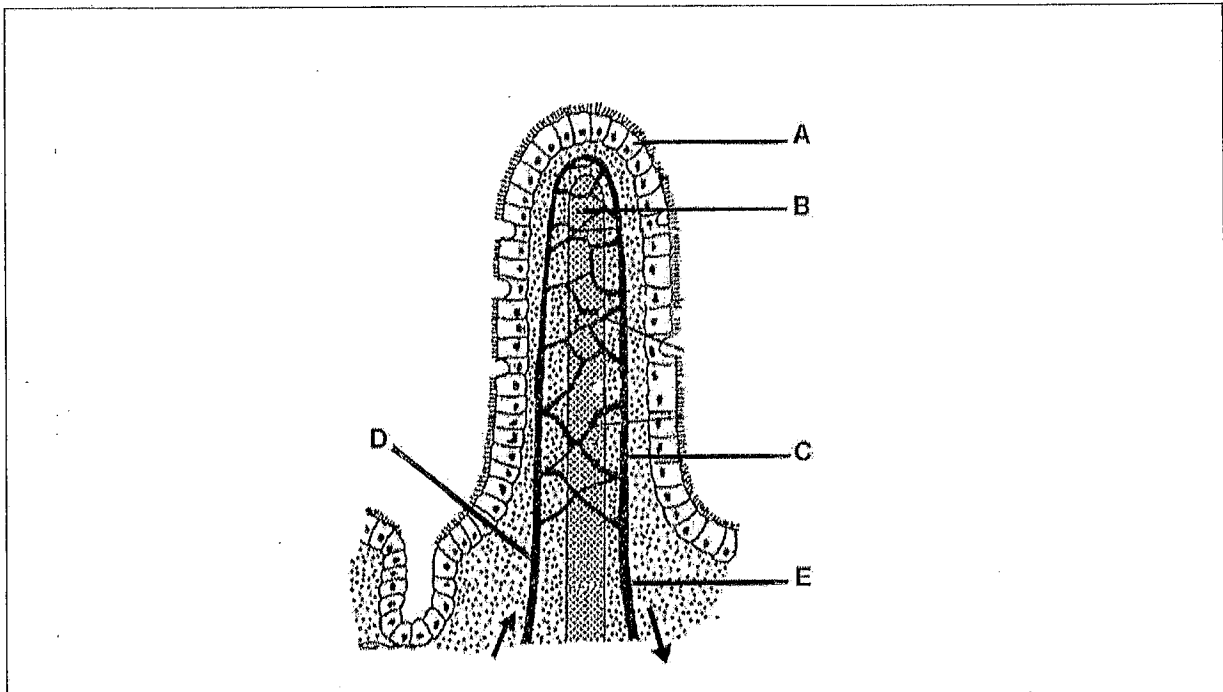
3.4.1. Identify the above structure. (1)

3.4.2. In which organ is this structure found? (1)

3.4.3. What is the main function of the structure shown in the above? (1)

3.4.4. Name TWO substances which are found in higher concentration in C than in D. (2)

3.4.5. Label parts A and B. (2)

3.4.6. Explain TWO structural features of the above diagram that enables it to perform its function effectively. (4)

(11)

3.5. The statistics below was obtained by a group of healthcare workers in a province over a four year period. It shows the death due to various diseases and disorders brought about by smoking. Study the statistics and answer the questions that follow

Resultant diseases or disorders due to smoking	Number of deaths	Percentage of deaths
Lung Cancer	128 900	29
Heart Disease	126 000	28
Chronic Obstructive Pulmonary Disease	92 900	21
Stroke	15 900	4
Other Cancers	35 300	8
Other Medical Diagnosis	44 000	10

3.5.1. State TWO planning steps that could be considered when doing the above investigation. (2)

3.5.2. How can the results be made more reliable? (2)

3.5.3. List TWO ways in which the South African government has tried to reduce smoking amongst its citizens. (2)

3.5.4. Use the information in the table above to draw a bar graph to illustrate the percentage of deaths due to various diseases and disorders brought about by smoking. (6)

(12)

QUESTION 4: (40)

SECTION B TOTAL: 80

SECTION C

QUESTION 4

Using named examples, describe how competition, predation and symbiosis influences the population size of the organisms concerned.

Content: (17)

Synthesis: (3)

NOTE: No marks will be awarded for answers in the form of flow charts or diagrams.

GREENBURY SECONDARY SCHOOL

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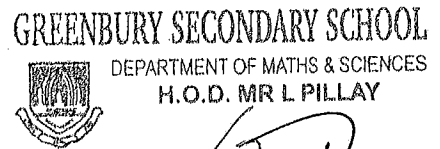
H.O.D. MR L PILLAY

GRAND TOTAL: 150

TOTAL SECTION C: 20

NOVEMBER 2016
GRADE 11 LIFE SCIENCES P1
MEMORANDUM

GREENBURY SECONDARY SCHOOL
DEPARTMENT OF MATHS & SCIENCES
H.O.D. MR L PILLAY

SECTION A
QUESTION 1

1.1.1. D √√	1.2.1. chlorophyll √	1.3.1. A only √√
1.1.2. D √√	1.2.2. blue-black √	1.3.2. Both A and B √√
1.1.3. B √√	1.2.3. cristae √	1.3.3. Both A and B √√
1.1.4. A √√	1.2.4. dialysis √	1.3.4. A only √√
1.1.5. B √√	1.2.5. lactic acid √	1.3.5. B only √√
1.1.6. D √√	1.2.6. photolysis √	
1.1.7. A √√	1.2.7. defaecation √	**(10)**
1.1.8. B √√	1.2.8. urethra √	
1.1.9. D √√	**(8)**	
1.1.10. D √√ **(20)**		

1.4.1. $X = CO_2$ √ $Y = O_2$ √

1.4.2. Diffusion √

1.4.3. - In the form of bicarbonate ions √
- carbaminohaemoglobin / carbhaemoglobin √
- in solution in blood plasma √ **ANY 2**

1.4.4. haemoglobin √   **(6)**

1.5.1. An imbalance between energy intake and expenditure √
Such that excess energy is stored in fat cells which √
enlarge/ increase in number √   (any 2) **or**
increased intake of energy and not enough exercise to use up the energy √
causes the excess energy to be stored as fat in cells √

1.5.2. 7726 + 5401 √
= 13137 √

1.5.3. African men √

1.5.4. Hypertension √   **(6)**

SECTION A 50 MARKS

SECTION B

QUESTION 2

2.1.

2.1.1. A – Establishment phase/Lag phase √

   B – Accelerating growth phase/Log phase/Exponential growth phase. √ /

   Growth phase/ exponential growth phase   (2)

2.1.2. **(a) Growth phase A**

- Population size is small. √
- Population is adapting to its environment. √
- Young population with few reproducing animals. √ /Not sexually matured to reproduce) √
- Some cannot find a mating partner when the population density is low. √ **(Any 2)**

   (b) Growth phase B

- Birth rate is higher than the death rate. √
- Little or no limiting factors. √
- Conditions for growth are highly favourable. /Sufficient food and
- water supply, limited competition for resources √
- High number of reproductive population. √   **(Any 2) (2)**
- Population realize their full reproductive potential

2.1.3. The carrying capacity of the habitat √   (1)

2.1.4. The environment will be unable to support the impala population √

   due to habitat degradation √ /demand on limited resources   (2)

   (9)

2.2.1. $\underline{15 \times 30}$ √   = 45 frogs √   (2)

   10

2.2.2. - the mark must last for the entire duration of the investigation √

   - The mark must not affect the movement of the animal   √

   - the mark must not make the animal visible to predators √   any 2

2.2.3. mark - recapture technique √   **(5)**

2.3.

2.3.1. The rate of photosynthesis increases √ as the light intensity increases √ up to an optimum therefore the mean mass of the lettuce plant will increase. √   any 2

2.3.2. carbon dioxide √ and   Temperature √

2.3.3.   a)   8.2 arbirary units √   b) 365g - 370g √

2.3.4.   -   The rate of photosynthesis will drop √ drastically

   -   because at higher temperature the enzymes will denature √ /

   -   and therefore render useless / not function   (2)

2.3.4.

Diagram: 1

Caption: 1

Labels: 3

Diagram of chloroplast

(13)

2.4.1. A   Afferent vessel √

       B   Efferent vessel √

       C   Glomerulus   √

2.4.2. Ultra filtration   √

2.4.3. Part labelled B (efferent vessel) is narrower than part labelled (A Afferent vessel) √

Narrow diameter of part labelled B therefore resist the flow of blood by slowing down the blood flow   √

This creates high blood pressure √ in the part labelled C (glomerulus) √

This increase in blood pressure forces blood plasma √ with smaller substances such as glucose , amino acids, water, urea and other nitrogenous waste products   √

through the specialised cells of the capillary network at C. Blood cells, plasma proteins and other large solutes are left behind in blood. √   (any 6)

2.4.4. Podocytes √

2.4.5. Presence of slit pores   √ between the podocytes

Act as selective filters √

Allowing only fairly small particles √

to pass through into the capsular space √   (any 2)

irregular in shape - therefore they leave slit pores~

(13)

QUESTION 3

3.1.

3.1.1. Glucose √ and amino acids √ (2)

3.1.2. ADH √ (1)

3.1.3. High proteins results in high amino acid levels √
Excess proteins are deaminated to form urea √
Urine will have increased concentration of urea √ (3)

(6)

3.2.

3.2.1. CO_2 is released √ when germinating seeds respire . √ (2)

3.2.2. Set up exactly as the experiment √ but kill the seeds by boiling it √ (2) **(4)**

3.3.

Photosynthesis	Cellular Respiration
Occurs in chlorophyll containing organisms	Occurs in all living organisms independent of chlorophyll
Is an energy storing process converting radiant energy into chemical energy	Is an energy releasing process releasing chemical energy stored in glucose
Occurs in presence of light	Is independent of light
CO_2 is a raw material for the process	CO_2 is a product of the process
Glucose is produced	Glucose is broken down
O_2 is a product of the process	O_2 is a requirement for aerobic respiration
Water is required	Water is released.

√ table 3 + 3 **(7)**

3.4

3.4.1. Structure of a villus √ 3.4.2 Small intestine √

3.4.3 Absorption of digested nutrients √

3.4.4 C – Large amounts of glucose √ and amino acids √ **(2)**

3.4.5 A – Columnar epithelium √ /cilia / ciliated columnar epithelium
B – Lacteal √ **(2)**

3.4.6
- The thin columnar epithelium √ of the villus
enhance easy absorption of nutrients across membrane by means of diffusion. √
- The columnar epithelial cells have a brush border microvilli √ on the free surface
to enlarge the surface area for absorption. √
- The columnar epithelial cells numerous mitochondria √
which facilitate active absorption of nutrients against diffusion gradients. √
- The goblet cells between the columnar epithelial cells secrete watery mucus √
that prevents friction and keeps the cells moist. √
- The villi contain many capillary blood vessels and lacteals in close contact √ with the
absorption surface

to transport the absorbed food away rapidly √   (any 2 X2 = 4)

3.5.

3.5.1. Decide on which clinics / hospitals to visit √

Decide on the number of institutions that will be visited √

Get permission from stakeholders concerned.

Decide during what time frame data will be collected

Make a list of the various disease/ illnesses that will be counted

Draw a table to record data   any 2

3.5.2. Repeat the investigation in other clinics in the same province √ (repeat investigation)

Repeat the investigation in other provinces. √

Increase the investigation period   Any 2

3.5.3. increased taxes on cigarettes √

Increased the price of cigarettes √
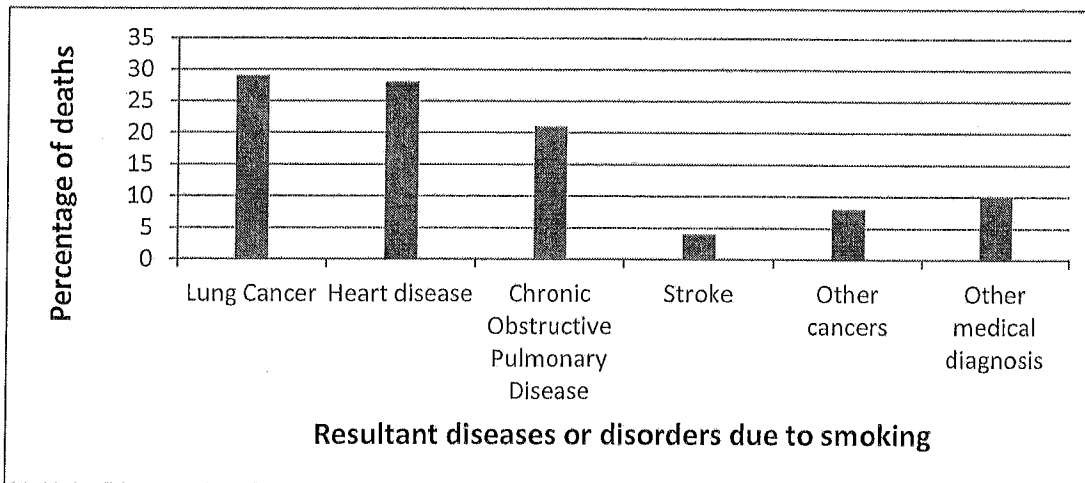
Laws against smoking in public places.

Cigarettes not to be sold to people under 18 years

Health warnings printed on cigarette boxes   Any 2

3.5.4.

3.5.4. Bar graph showing the percentage of deaths due to various diseases and disorders
brought about by smoking √

Correct Title of Graph	1 mark	Bar graph	1 mark
Correct labels on X and Y axis	1 mark	5-6 bars correctly plotted	2 marks
Correct scale on X and Y axis	1 mark	1 - 4 bars correctly plotted	1 mark

SECTION C

QUESTION 4

Predation
- A predator captures and kill other animals (prey) for its food✓
- Example: Lions that capture and feed on antelopes✓
- Prey population will decrease and the predator population will increase✓ (3)

Competition

- Interspecific competition✓
- Happens when large numbers of organisms of different species depend on same resources. ✓
- Example: Flour beetles✓
- One species will decrease in population size while the other will increase✓

OR

- Intraspecific competition✓
- Happens between organisms of same species that share the same available resource. ✓
- Example: Owls competing for same resources. Stronger owls will survive✓
- The owl population will decrease✓ (3)

- Symbiosis is the close association between two organisms so that one or both benefit✓

Parasitism✓
- One organism benefit (parasite) while the other is harmed (host) ✓
- Example: Tapeworm and humans✓
- The host organisms population size will decrease and the parasite population increase✓ (4)

Mutualism✓
- Symbiotic relationship between two organisms in which both benefit ✓
- Example: Bacteria and roots of leguminous plants✓
- Both populations will increase✓ (4)

Commensalism✓
- Symbiotic relationship between two organisms in which one benefits without harming the other. ✓
- Example: Sharks and sucker fish/Remora (benefit) ✓ (4)
- The population size of the organism that benefits will increase in size✓

Content (17)
Synthesis (3)
(20)

SECTION C

QUESTION 4

Relevance (R)	Logical sequence (L)	Comprehension (C)
A ll information provided is relevant to the topic	Ideas are arranged in logical sequence	All aspects required by the essay have been sufficiently addressed
Competition, predation and symbiosis described. Example given Mentioned how population size is influenced	All ideas are described in logical sequence: Describe Competition, Predation and symbiosis Example given Explains how the population number is influenced by each relationship in logical sequence	The following should be included: Predation: 2/3 Competition: 2/3 Symbiosis: 6/12