Phoenix North Cluster Life Sciences Committee
Final Examination- 2019

LIFE SCIENCES PAPER 1
GRADE 11

Marks - 150 **Time - 2,5 hours**

EXAMINER : MR. S. K MOODLEY (TRENANCE MANOR SECONDARY)

MODERATOR: MR V. RAMOTHAR (SOLVISTA SECONDARY)

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Write neatly and legibly.
6. If answers are NOT presented according to the instructions of each question, candidates will lose marks.
7. ALL drawings should be done in pencil and labelled in blue or black ink.
8. Draw diagrams or flow charts only when requested to do so.
9. The diagrams in this question paper may NOT necessarily be drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators, protractors and compasses may be used
12. This question paper consists of 8 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. Eg.1.1. D

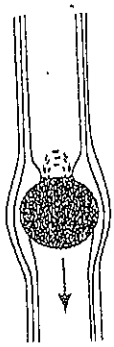
1.1.1. Light independent phase of photosynthesis occurs in the
- A. Matrix
- B. Stroma
- C. Grana
- D. Cristae

1.1.2. Reagent used to test for starch
- A. Benedict's solution
- B. Alcohol
- C. Millons
- D. Iodine solution

1.1.3. Organ that stores bile

A. Stomach
B. Gall bladder
C. Duodenum
D. Liver

1.1.4. The process that is illustrated is called...



A. Peristalsis
B. Digestion
C. Assimilation
D. Absorption

1.1.5. Another name for anaerobic respiration is....

A. Fermentation
B. Transpiration
C. Oxidation
D. Guttation

1.1.6. Cellular respiration as well as photosynthesis in green leaves take place simultaneously....

A. 24 hours a day
B. During the night only
C. During the day only
D. Only when the sun is shining brightly

1.1.7. Functional unit of the kidney

A. Bowmans capsule
B. Loop of Henle
C. Pelvis
D. Nephron

1.1.8. An increased antidiuretic hormone (ADH) level...

A. Promotes water excretion
B. Promotes water retention
C. Increases urea excretion
D. Increases urine production

1.1.9. Which of the following is usually associated with organisms that depend on the same resources?

A. Carrying capacity
B. Migration
C. Deaths
D. Competition

1.1.10. Which of the following is a density dependant factor?

A. Fire
B. Drought
C. Predation
D. Temperature

10x2=(20)

1.2. **Give the correct biological terms for each of the following descriptions. Write only the TERM next to the question number.**

1.2.1. Waxy layer to reduce water loss in plants cuticle
1.2.2. A molecule that is broken down during cellular respiration to provide energy in a living cell. glucose
1.2.3. The general energy carrier in the cells of living organisms.
1.2.4. The process of breaking up of fat into tiny fat droplets.
1.2.5. A double walled cup that is next to the glomerulus wall of Bowmans capsule

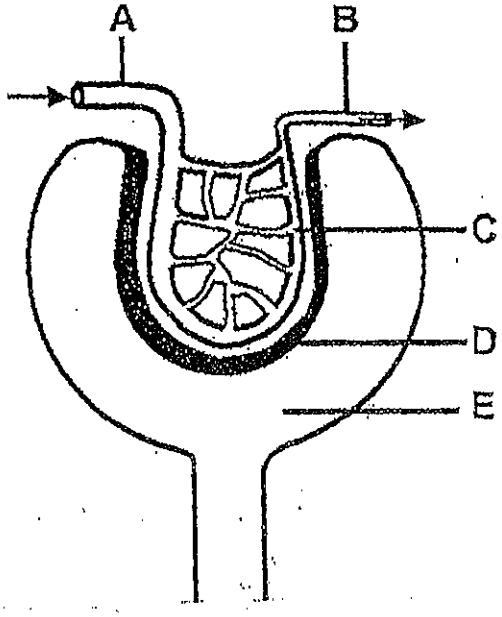
5x1= (5)

1.3. **State whether each of the processes in Column A applies to A only, B only, both A and B or none in Column B. Write A only, B only, both A and B or none next to the relevant question number.**

COLUMN A	COLUMN B
1.3.1. Blood leaving the kidney contains more of this substance than the blood entering the kidney	A. Amino acids B. Carbon dioxide
1.3.2. Duct carrying urine from kidney to bladder	A. Ureter B. Urethra
1.3.3. Blood contains a higher level of carbon dioxide than oxygen	A. Pulmonary artery B. Renal vein B
1.3.4. Secretion of the hypothalamus	A. Aldosterone B. ADH both
1.3.5. Regulates the composition of blood	A. Kidneys B. Hypothalamus

[5x2=10]

1.4. The diagram below shows the structure of a Malpighian body. Study the diagram and answer the questions that follow.



1.4.1. Name parts labelled A,B,C,D and E (5)

1.4.2. Name and explain the process that occurs in the Malpighian body. (5)

1.4.3. Name the specialised cells found at D. (2)

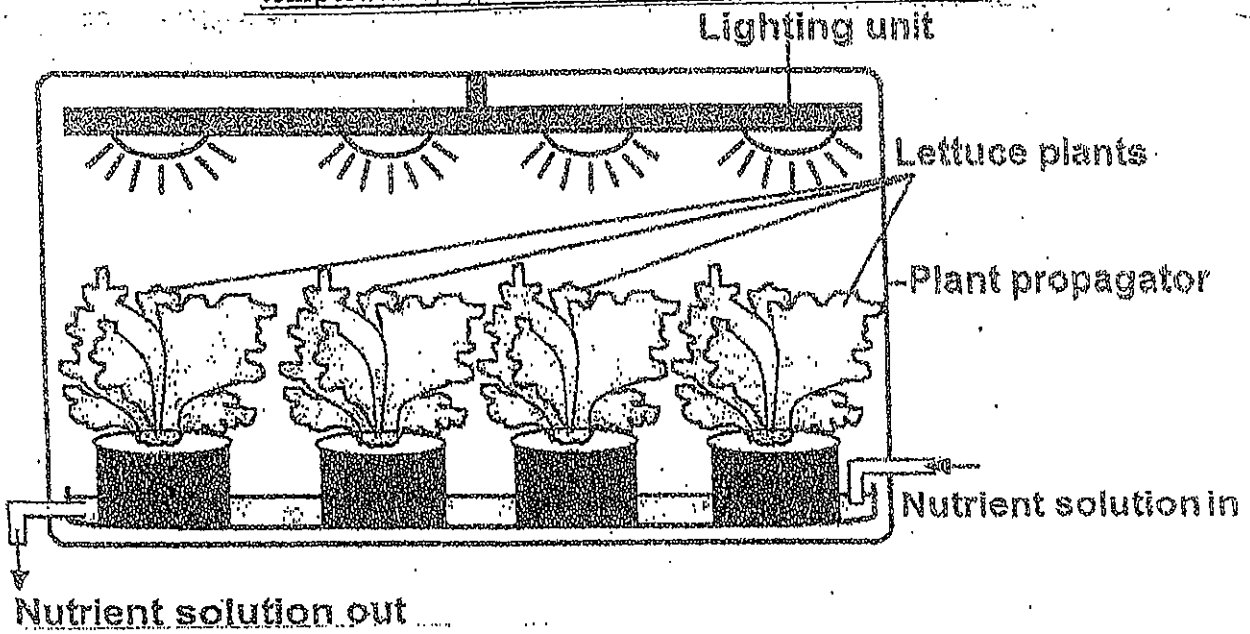
1.4.4. Describe the significance of the shape of structure labelled E. (3)

[15]

Total marks for section A = 50 marks.

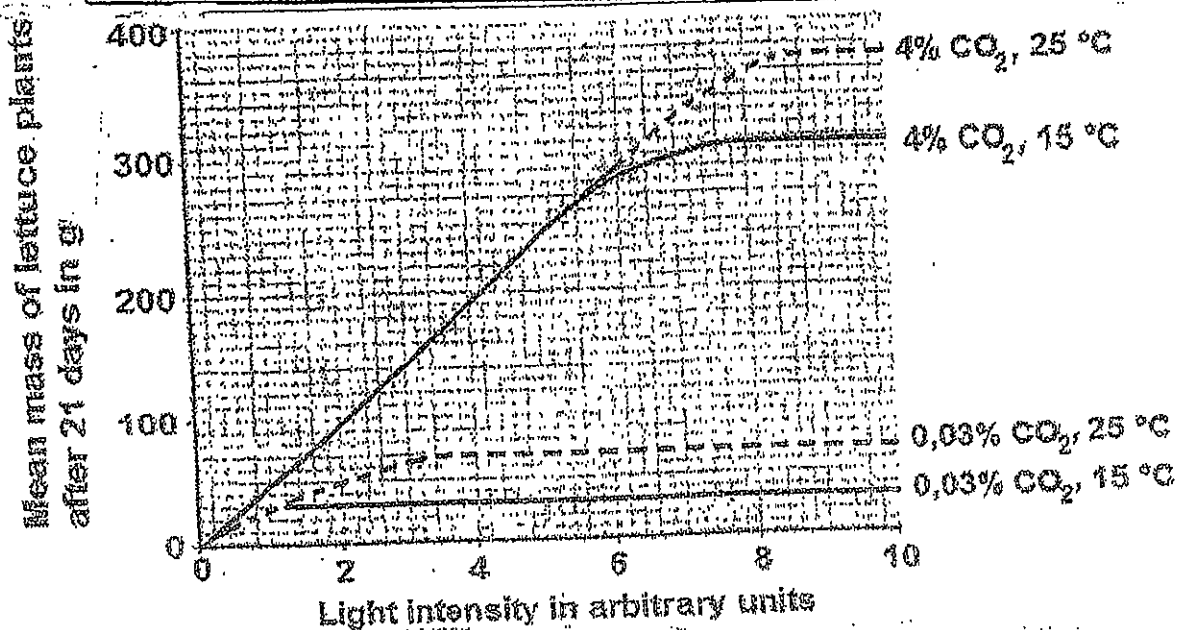
SECTION B
QUESTION 2

2.1 The diagram shows a plant propagator 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 is given below.
- Mean mass of lettuce plants serves as an indication of the rate of photosynthesis.

Study the results given below and answer the following questions:



2.1.1 What is the influence of light intensity on mean mass of lettuce plants? (2)

2.1.2 Name the **TWO** limiting factors that influence the photosynthesis as the light intensity increases. (2)

2.1.3 How was the scientists able to increase the rate of photosynthesis to the maximum level? (3)

2.1.4 What would happen to the rate of photosynthesis if the temperature is raised beyond 35°C ? Give a reason for your answer. (3)

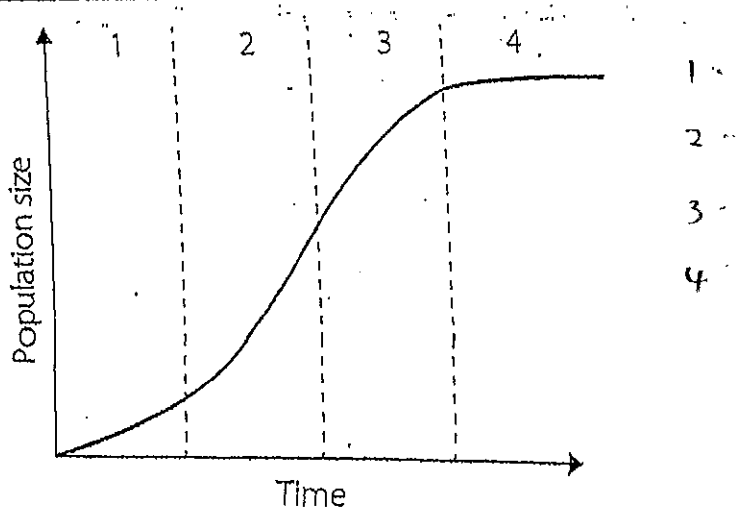
2.1.5 Draw a labelled diagram of the cell organelle in which photosynthesis occurs ? (5)

2.1.6 Discuss the biological importance of photosynthesis. (4)

2.1.7 Why is too much light exposure detrimental to photosynthesis? (2)

(21)

2.2 Study the graph below and answer the questions that follow



2.2.1 Identify the growth form shown in the graph. (1)
2.2.2 Name the phases marked 1 to 4. (4)
2.2.3 Explain why the initial phase starts slowly. (4)
2.2.4 During which phase:

(a) is the population growing the fastest?
(b) does natality far exceed mortality?
(c) does environmental resistance come into effect?
(d) does natality equal mortality? (4)

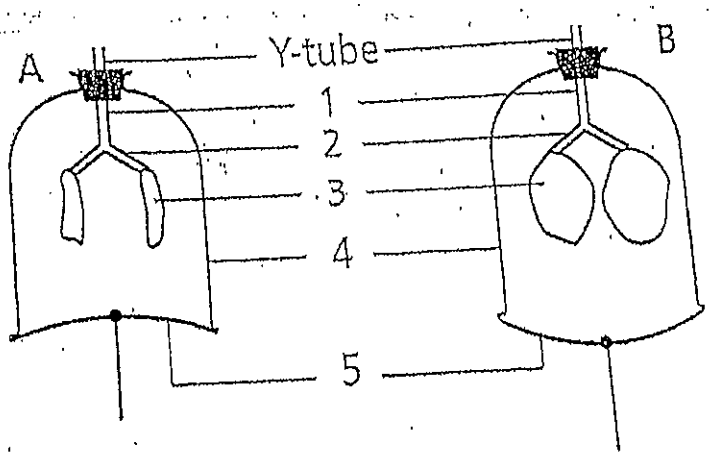
2.2.5 List and discuss how ANY two density dependant factors could have contributed to population growth slowing down during stage 3 of the graph (6)

[19]

Total marks for question 2 = (40)

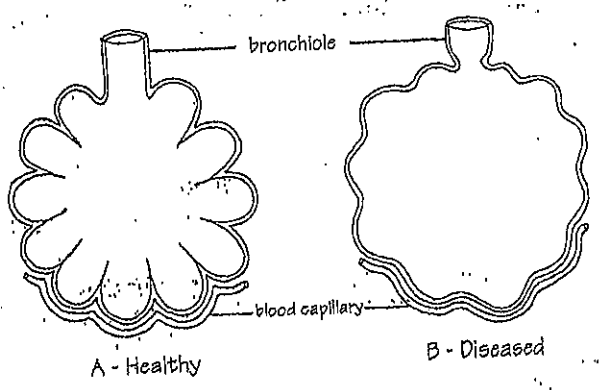
QUESTION 3

3.1 Study the diagram of the apparatus used to demonstrate the mechanism of breathing and then answer the questions



3.1.1 Name the parts numbered 4 and 5. (2)
3.1.2 Which human structures are represented by the parts numbered 1 to 5 (5)
3.1.3 Which apparatus (A or B) represents exhalation?
Give a reason for your answer. (3)
3.1.4 Give ONE shortcoming of the apparatus in demonstrating the mechanism of breathing. (2)
3.1.5 Describe the mechanism of breathing in humans that Diagram B illustrates (4)

3.1.6 The diagrams below show small part of the lungs from a healthy person (A) and a diseased person (B) suffering from the effects of air pollution. Both are drawn to the same scale.



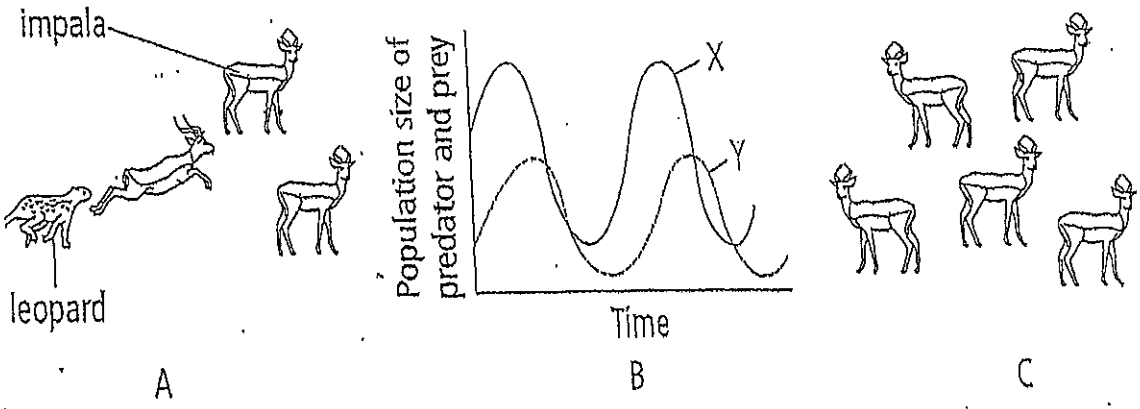
3.1.6.1 Name these structures illustrated above. (1)

3.1.6.2 Name ONE visible difference between the structures A and B. (2)

3.1.6.3 Briefly describe why the features in the lungs of B would make them function less efficiently than lungs in A. (3)

[22]

3.2 Study the illustrations below and then answer the questions that follow.



3.2.1 What type of interaction is indicated at A? (1)

3.2.2 Describe the interaction mentioned in 3.2.1. (2)

3.2.3 What effect will this interaction have on the size of the impala population? (2)

3.2.4 With reference to graph B, which of X or Y indicates:

(a) The impala population? (1)

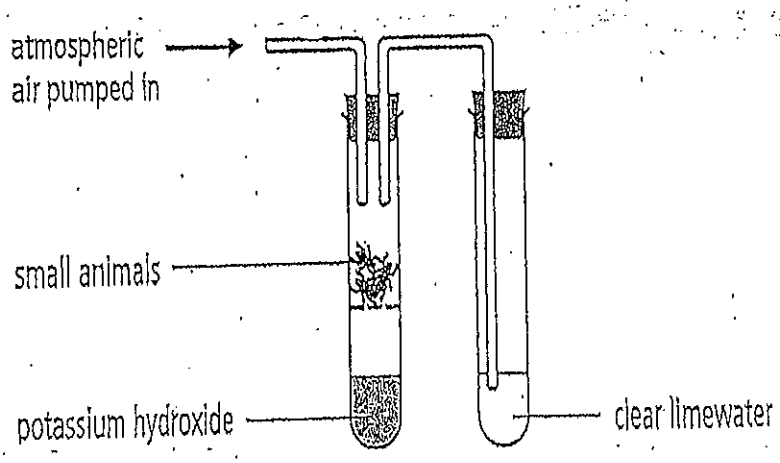
(b) The leopard population? (1)

3.2.5 Explain the pattern of the two growth curves in graph B. Make reference to the leopards and impala in explaining the pattern. (5)

3.2.6 What type of interaction can be expected among the population shown at C, if their food sources suddenly decrease? competition (1)

[13]

3.3 A group of grade 11 learners designed an investigation as illustrated below. Study the diagram and then answer the questions that follow.



3.3.1 Name the biochemical process that the learners intended to investigate. (1)

3.3.2 State ONE function of each of the following:

(a) Potassium hydroxide

(b) Clear lime water. (2)

3.3.3 Explain One way in which the experimental design should be improved to ensure that the results are valid (2)

[5]

Total for question 3 – (40)

TOTAL FOR SECTION B = (80)

SECTION C
QUESTION 4

The normal blood glucose level in the human body is maintained at approximately 0,7g per cm^3.

Describe the relationship between the pancreas and liver in maintaining a constant glucose level of the blood. Also discuss the implications if the pancreas doesn't produce enough of Insulin, and the symptoms of the resultant disease.

Content: (17)

Synthesis (3)

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

TOTAL MARK FOR SECTION C = (20)

GRAND TOTAL: (150)

KWAZULU NATAL DEPARTMENT OF EDUCATION

GRADE 11- LIFE SCIENCES – PAPER 1
NOVEMBER 2019
MEMORANDUM

SECTION A
QUESTION 1

1.1

1.1.1 B
1.1.2 D
1.1.3 B
1.1.4 A
1.1.5 A
1.1.6 C
1.1.7 D
1.1.8 B
1.1.9 D
1.1.10 C

[10x2=20]

1.2

1.2.1 Cuticle
1.2.2 Glucose
1.2.3 ATP /Adenosine Triphosphate
1.2.4 Emulsification
1.2.5 Bowmans Capsule

[5x1=5]

1.3

1.3.1 B only
1.3.2 A only
1.3.3 Both A and B
1.3.4 B only
1.3.5 A only

[5x2=10]

1.4

1.4.1 A- Afferent arteriole √
B- Efferent arteriole √
C- Glomerulus
D- Wall of Bowman's Capsule
E- Capsular space of Bowman's Capsule

[5]

1.4.2 *Ultra – filtration / Glomerular filtration
Part labelled B is narrower than Part labelled A, therefore slowing down the rate of blood flow. This creates higher blood pressure in part labelled C.High blood pressure leads to leakage of blood plasma with smaller substances such as glucose, amino acids, water, urea and other nitrogenous waste products through the micro pores on the capillary network at C. Blood cells, plasma proteins and other large solutes are left behind in blood.

(5)

* Compulsory Mark

1.4.3 Podocytes (2)

1.4.4 Bowman's capsule is cup shaped. Fits closely with the glomerulus. Allows for effective filtration. **OR**

Bowman's capsule is cup shaped. Provides a large surface area for effective filtration (3)

[15]

QUESTION 2

2.1.1 The rate of photosynthesis increases as the light intensity increases, therefore the mean mass of lettuce plants increase. (any 2) (2)

2.1.2 Carbon Dioxide
Temperature (2)

2.1.3 They raised the level of CO_2 to an optimum level of 4% and temperature of 25°c as they increased the light intensity to 8 arbitrary units. (3)

Any 3

2.1.4 The rate of photosynthesis will drop because at higher temperature the protein molecules of the enzymes become denatured and therefore become functionless (3)

Any 3

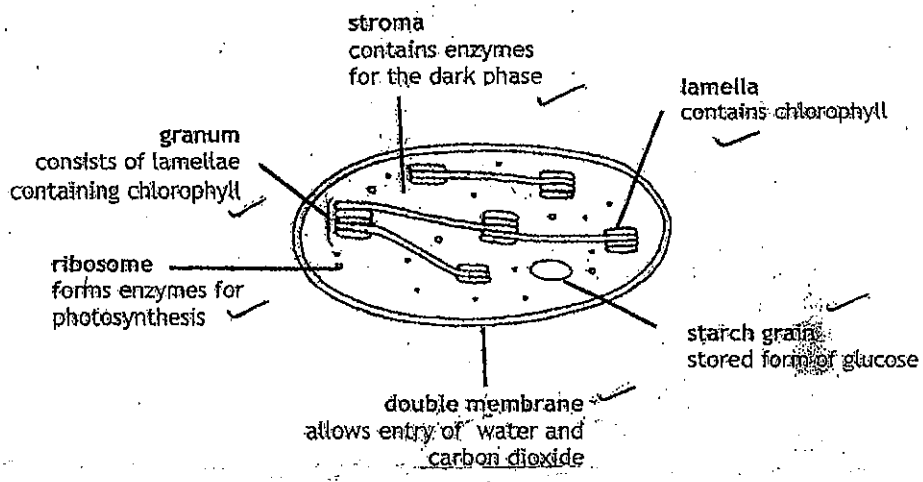
2.1.5

Structure of a chloroplast

Caption : 1

Drawing : 3

Labels : Any 3



(5 marks)

2.1.6

(a) Provision of food /energy for organisms in the higher trophic levels. Primary producers absorb radiant energy, and they form the base of the food pyramid, providing food to all other consumers above them. (2)

(b) Control of carbon dioxide and oxygen levels in the atmosphere. Photosynthesis uses up large amounts of CO2 to maintain balance of gases in the atmosphere. Excess CO2 can lead to harm to living organisms on earth. (2)

2.1.7 Too much light exposure can damage the photosynthetic process and bleach the leaves. (2)

2.2.1 Logistic (1)

2.2.2 1.Lag Phase/Establishment Phase

2. exponential(geometric) growth phase

3. Decelerating growth phase

4. Stationary (equilibrium) phase (4)

2.2.3 population size is small

Population is adapting to its environment/population is new to the area

There are few reproducing individuals

Some can't find a mating partner when density is low

2.2.4 (a) 2 Exp. (b) 2 Exp. (c) 3 Decelerating phase (d) 4 Stat. [4]

2.2.5 Competition: increased number resulted in more competition for food, shelter and space (3)

Territoriality: results in organisms claiming space for themselves, leaving others with limited space (3)

Disease: due to an increase in population size, diseases spread more rapidly causing population growth to slow down Predation - (3)

ANY OF THE TWO OPTIONS ABOVE [6]

QUESTION 3

3.1.1 4- bell jar 5- rubber sheet (2)

3.1.2 1. Trachea
2. Bronchus
3. Lungs
4. Thoracic wall
5. Diaphragm (5)

3.1.3 Apparatus A : rubber sheet moves up to its original position therefore more pressure exerted on the balloons, resulting in air being forced out. (3)

3.1.4 Bell jar representing the thoracic wall is inflexible and therefore does not show the movement of the ribs and intercostal muscles OR there is a large space between the balloons and the bell jar and in humans the lungs sit against the thoracic cage (2)

3.1.5 Inhalation . The lung volume expands as a result of the contraction of the diaphragm and intercostal muscles (the muscles that are connected to the rib cage) thus expanding the thoracic cavity. Due to this increased volume, the pressure is decreased, and the air flows into the lungs (4)

3.1.6.1 Alveoli (1)

3.1.6.2 Healthy alveoli have deep folds.
Diseased alveoli have shallow folds.
Healthy alveoli have wide bronchiole.
Diseased alveoli have constricted bronchiole.

OR

Healthy alveoli have large surface area.
Diseased alveoli have smaller surface area.

(2)

3.1.6.3 Constricted bronchiole causes less oxygen to get in and longer time for CO_2 to be expelled.
Shallow folds mean less surface area for absorption of oxygen.
Absorption of oxygen takes longer time.
Smaller airways are a major site of airflow obstruction.
Less elasticity means less efficient gaseous exchange taking place and less of alveolar surface area. ANY 3 (3)

3.2.1 Predation (1)

3.2.2 Predators (leopards) hunt and kill their prey (impala) (2)

3.2.3 It will regulate the population size of impala so that it remains within the carrying capacity/so that a balance is maintained in the ecosystem (2)

3.2.4 (a) X ✓ (1)
(b) Y ✓ (1)

3.2.5 * The initial increase in the impala population
* Increased the number of prey available to the predators.
* This increased the number of predators, this results in more prey being eaten, causing the number of prey to fall and this will result in the number of predators falling ✓
* Once the population numbers drop to below carrying capacity of each, both population will increase in number again. ✓ (5)

3.2.6 Intraspecific competition ✓ (1)

[13]

3.3.1 Cellular respiration ✓ (1)

3.3.2 (a) Absorbs carbon dioxide ✓
(b) Indicates the presence or absence of carbon dioxide ✓ (2)

3.3.3 Potassium hydroxide should be removed as it will absorb the carbon dioxide given off by the organisms. (2)

[5]

QUESTION 4

When the level of blood glucose increases above 0,7mg/cm³

The Islets of Langerhans/pancreas are stimulated to release insulin into the blood. Insulin increases the rate of absorption of excess glucose by the cells of the liver and muscles by converting it to glycogen and this decreases the level of blood glucose and the glucose concentration is restored to normal.

When the level of blood glucose deceases below 0,7g per cm³

Cells of Islets of Langerhans /pancreas are stimulated to release glucagon into the blood which stimulates the liver to convert glycogen to glucose and this increases the level of blood glucose restoring the glucose concentration to normal.

[11]

Diabetes- when insulin cannot be produced in the body the glucose level of the blood rises, the condition is termed "Diabetes Mellitus" , the kidneys excrete some of the excess glucose

[2]

Symptoms of Diabetes

Glucose in urine

Extreme thirst

Nausea/Vomitting

Blurred Vision

Frequent urination

Fatigue/Lethargy/Faintness

Weight loss

Non-healing wounds/poor healing of wounds

[4]

Assessing the presentation of the essay

Relevance	Logical sequence	Comprehensive
All information on the following is relevant to the topic: • Role of pancreas and liver in maintaining a constant glucose level • Consequences of poor insulin production • Symptoms of Diabetes and there is no irrelevant information [1]	Ideas arranged in a logical cause-effect sequence for : • Role of pancreas and liver in maintaining a constant glucose level • Consequences of poor insulin production • Symptoms of Diabetes [1]	Answered all aspects required by the essay in sufficient detail with at least the following : • Role of pancreas and liver in maintaining a constant glucose level 8/11 • Consequences of poor insulin production 1/2 • Symptoms of Diabetes 2/4 [1]

CONTENT: (17)

SYNTHESIS (3)

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

TOTAL MARKS FOR SECTION C = (20)

GRAND TOTAL : (150)

LIFE SCIENCES WEIGHTING GRID GRADE 11 PAPER 1

2019

Quest No.	Cognitive ability levels				Photosynthesis	Animal Nutrition	Respiration	Gas Exchange	Excretion in Humans	Population Ecology	TOTAL
	A	B	C	D							
1.1	12	4	4		4	4	4		4	4	20
1.2	5				1	1	2		1		5
1.3	2		4	4					10		10
1.4.1	7	5	3						15		15
2.1	7	4	3	7	21						21
2.2	16		3							19	19
3.1	8	5	4	5				22			22
3.2	3	4	6							13	13
3.3	1	2		2			5				5
4		17		3		20					20
Actual Marks	61	41	27	21	26	25	11	22	30	36	150
Norm %	40	25	20	15	18	18	10	15	15	24	100%
Marks	60	37.5	30	22.5	27	27	15	22	23	36	150%

A = Knowing Science B= Understanding Science C= Applying scientific knowledge D= Evaluating, anlalysing, synthesising