

Rwanda National Biology Exam S3 Collection (2010 - 2023)

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**Biology and Health
Sciences I**

002

01/08/2023 08:30 AM – 11:30 AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2022-2023

SUBJECT: Biology and Health Sciences I

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form and **DO NOT** write your names and index number on additional answer sheets if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper consists of **THREE** sections: **A**, **B** and **C**.

Section A: Attempt **all** questions. **(55 marks)**

Section B: Attempt any **three** questions. **(30 marks)**

Section C: Attempt only **one** question. **(15 marks)**

- 4) Use only a **blue** or **black** pen.

Section A: Attempt all questions. (55 marks)

- 1) List any four characteristics of animals in Class of Mammalia **(4 marks)**
- 2) Fill in the missing terms:
DCPIP is a _____ reagent in colour. When _____ is present in a food sample, the _____ disappears. **(3 marks)**
- 3) a) What is meant by the term photosynthesis? **(1 mark)**
b) Name the gas in the air that is needed for photosynthesis. **(1 mark)**
c) Name the cell organelle in which photosynthesis occurs. **(1 mark)**
- 4) a) Name the activity of man that has caused a lot of destruction of the environment. **(1 mark)**
(b) Apart from the activity you have named in (a) above, suggest other three economic activities which are harmful to our environment. **(3 marks)**
- 5) Indicate whether the relationships below are commensalism, grazing, mutualism or parasitism.
a) Barnacles attached to the sides of a whale. _____
b) Cattle egrets: birds that follow grazing cattle. _____
c) A flatworm attached to a horseshoe crab _____
d) A donkey feeding on grass in a field _____ **(4 marks)**
- 6) Name three plant hormones. **(3 marks)**
- 7) a) What is sexual orientation? **(1 mark)**
b) What is the advantage of abstinence? **(2 marks)**
- 8) Describe briefly how energy is lost along a food chain. **(3 marks)**
- 9) Why is it risky to practice pre-marital sexual intercourse? **(2 marks)**
- 10) Explain how the pollen grains of insect-pollinated plants are adapted for transfer. **(3 marks)**
- 11) Distinguish between single circulation and double circulation. **(3 marks)**
- 12) Differentiate between spermatogenesis and oogenesis. **(4 marks)**
- 13) What good healthy practices can you do daily in order to maintain your respiratory system healthy? **(4 marks)**
- 14) Anaerobic respiration by micro-organisms is called fermentation.
a) Name the micro-organism involved. **(1 mark)**
b) Which industrial process involves fermentation? **(2 marks)**
- 15) It is advisable to irrigate our crops in the evening but not in the afternoon. Explain why? **(3 marks)**

16) Study the table below which shows the changes in uptake or output of sugar by the liver (Normal blood sugar level is in the range of 90 mg - 100 mg/100 cm³). Use the data given to answer the questions that follow:

Time (Min)	Glucose concentration	
	Hepatic portal vein	Hepatic vein
0	102	100
15	110	102
30	125	97
45	107	94
60	94	80
75	75	80
90	80	80

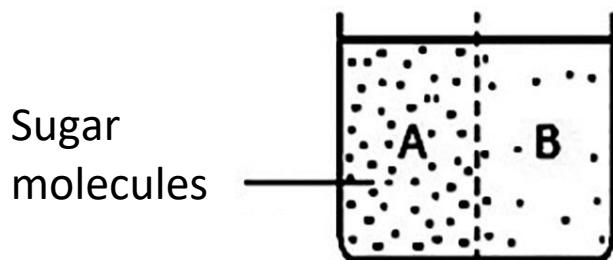
- a) Why is the glucose level in the hepatic portal vein:
 i) increasing in the first 30 minutes? (1 mark)
 ii) decreasing after the 30th minute? (1 mark)
- b) Why is the glucose level in the blood leaving the liver lower than that in the blood entering it? (2 marks)
- 17) Mutation always causes a mutant phenotype. Do you agree? (2 marks)

Section B: Attempt any three questions (30 marks)

- 18) Insects are both useful and harmful. Justify. (10 marks)
- 19) a) What term is used to describe organisms that cause diseases? (1 mark)
 b) The general defense system tries to prevent disease-causing organisms from entering the body. List two parts of the general defense system in the body. (2 marks)
 c) Distinguish between active immunity and passive immunity by defining each. (2 marks)
 d) Which of the two produces the longest-lasting immunity? (1 mark)
 e) Viruses cause diseases in plants, humans, and other animals. Name any two diseases which are caused by viruses. (2 marks)
 f) Some people receive vaccinations to protect them from disease. What is meant by term vaccination? (2 marks)
- 20) Make a table to distinguish between mitosis and miosis. (10 marks)
- 21) What do you do daily in order to maintain the health of your digestive system? (10 marks)
- 22) Red green colour blindness is a sex-linked trait. A colour-blind woman marries a man who has normal colour vision. If they have eight children; six boys and two girls, how many are normal, how many are colourblind? (Use appropriate symbols to show your working). (10 marks)

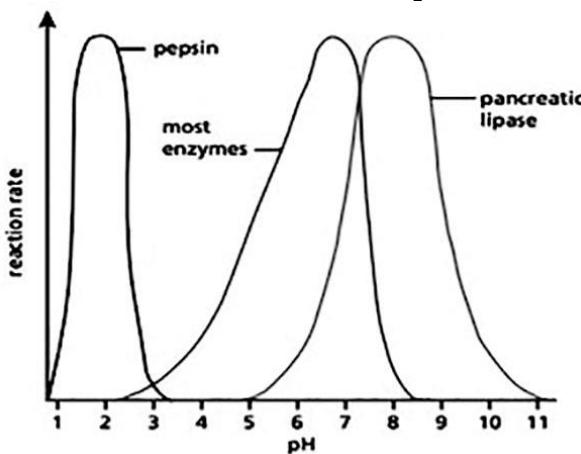
Section C: Attempt any one question (15 marks)

- 23) An experiment was carried out by a group of students to investigate a physiological process which occurs in plants and animals. The setup of the experiment involves a beaker containing two solutions separated by a membrane.



- a) Which solution is hypertonic? **(2 marks)**
- b) Which solution has more water potential? **(2 marks)**
- c) In which direction will the water molecules move by osmosis? Why? **(6 marks)**
- d) What name is given to the membrane separating the two solutions **A** and **B**? **(3 marks)**
- e) Which alternative setup can you design to replace this but in the same experiment? **(2 marks)**

- 24) The graphs below show the effect of pH on human digestive enzymes.



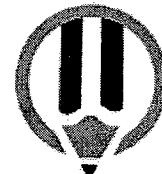
- a) From the graphs above, what is the optimum pH of the following enzymes:
 - i) Pepsin **(4 marks)**
 - ii) Pancreatic lipase
- b) Which enzyme works best in:
 - i) Strongly acidic medium **(4 marks)**
 - ii) Slightly alkaline medium
- c) According to the graph of most enzymes, the optimum pH is 6 to 7. Suggest any two digestive enzymes that work best within this pH range. **(4 marks)**
- d) What would happen in the human body if the pH in the stomach is increased to 7? **(3 marks)**

-END-

**Biology and Health
Sciences I**

001

02/08/2022 08:30 AM – 11:30 AM



NESA

NATIONAL EXAMINATION AND
SCHOOL INSPECTION
AUTHORITY

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2021-2022

SUBJECT: Biology and Health Sciences I

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form and **DO NOT** write your names and index number on additional answer sheets if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper consists of **THREE** sections: **A**, **B** and **C**.

Section A: Attempt **all** questions. **(55 marks)**

Section B: Attempt any **three** questions. **(30 marks)**

Section C: This section is **compulsory**. **(15 marks)**

- 4) Use only a **blue** or **black** pen.

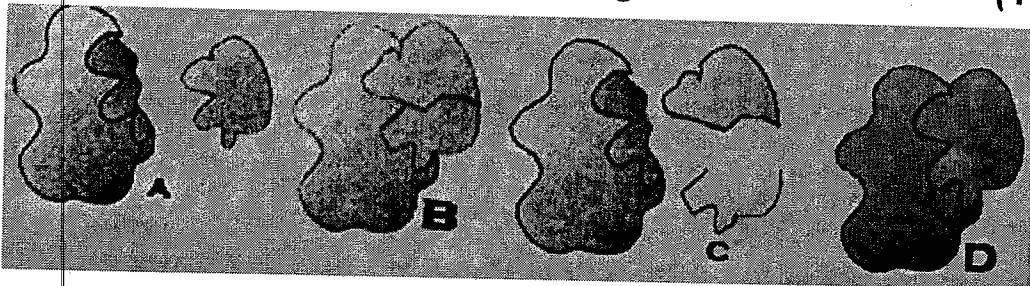
SECTION A: ATTEMPT ALL QUESTIONS (55 marks)

- 1) Write **TRUE** or **FALSE** on each statement below:
- a) Respiration is the chemical breakdown of glucose to release energy in the body. **(1 mark)**
 - b) All organisms move from one place to another. **(1 mark)**
 - c) All animals carry out locomotion. **(1 mark)**
 - d) All living organisms reproduce by asexual reproduction. **(1 mark)**
 - e) Photosynthesis is a characteristic of all living organisms. **(1 mark)**
- 2) Match the following cell organelles with their functions. **(4 marks)**
- | Organelles | Functions |
|-------------------|----------------------------|
| Chloroplasts | Site for energy production |
| Nucleus | Site for Photosynthesis |
| Ribosomes | Protein synthesis |
| Mitochondrion | Contain chromosomes |
- 3) State the similarities and differences between a tree in your school compound and a bird that has a nest on one of its branches. **(5 marks)**
- 4) Indicate positive results when testing for starch, proteins and vitamin C. **(3 marks)**

Food substance tested	Positive results/Observation
Starch	
Protein	
Vitamin C	

- 5) How is photosynthesis important to:
- a) Plants? **(2 marks)**
 - b) Human being? **(2 marks)**
 - c) Environment? **(2 marks)**
- 6) What are the factors that limit the rate of photosynthesis in green plants? **(3 marks)**

- 7) Observe the images below that represent enzyme's activity on substrate and answer the questions that follow.
- a) Using letters, **A**, **B**, **C** and **D** show the order of enzyme's activity from the first to the last. **(2 marks)**
- b) Describe the enzyme's activity in each image. **(4 marks)**



- 8) Explain why breastfeeding in infants is very important. **(3 marks)**
- 9) Explain how a damaged liver would weaken the digestion of fats in humans. **(3 marks)**
- 10) Using your knowledge of blood transfusion, fill the table below using a tick (v) where transfusion is possible and cross (X) where it is not. **(4 marks)**

Recipient Donor	O	A	B	AB
O				
A				
B				
AB				

- 11) How is the liver involved in the storage process? **(2 marks)**
- 12) Where exactly does cellular respiratory take place? **(2 marks)**
- 13) Which hormone prepares the body for action? **(1 mark)**
- 14) What is a reflex arc? **(1 mark)**
- 15) Give at least three differences between Mitosis and Meiosis. **(3 marks)**
- 16) The ability of asexual reproduction to produce many offsprings is disadvantageous. Explain. **(2 marks)**
- 17) Explain why two different species in an ecosystem can not occupy the same niche. **(2 marks)**

SECTION B: ATTEMPT ONLY THREE QUESTIONS (30 marks)

- 18) Describe the adaptations of the human skin to its functions. **(10 marks)**
- 19) Describe the process of fertilization in flowering plants. **(10 marks)**

- 20) A cross between a red flowered plant of certain species with a white flowered plant produced all pink flowered plants.
- a) Work out the genotypes and phenotypes of offsprings from a cross between two pink flowered plants. **(4 marks)**
- b) Name the type of inheritance exhibited above. **(2 marks)**
- c) Define the type of inheritance named in (b) above. **(2 marks)**
- d) If 17324 plants were produced from the above cross, work out the number of white flowered plants. **(2 marks)**
- 21) Rwanda has put in place a body known as Rwanda Environmental Management Authority (REMA). What measures has REMA put in place to solve the issues related to environmental degradation in Rwanda? **(10 marks)**
- 22) During an ecological tour of a lake, a group of students recorded the following observations:
- (i) Tilapia feeds on mosquito larvae.
(ii) Mosquito larvae feed on planktonic algae.
(iii) Planktonic crustaceans feed on planktonic algae.
(iv) Hawks feed on tilapia, worms and planktonic crustaceans.
- a) From this record of observations, construct a food web. **(3 marks)**
- b) Construct a food chain that ends with:
- (i) Hawk as a secondary consumer. **(1 mark)**
(ii) Hawk as a tertiary consumer. **(1 mark)**
- c) Which group of organisms in this lake are the producers? **(1 mark)**
- d) Using the food web you constructed in (a) above, name:
- (i) Two organisms that compete for food in the lake. **(1 mark)**
(ii) The type of food the organisms above compete for. **(1 mark)**
- e) State any two ways by which human beings may interfere with this lake ecosystem. **(2 marks)**

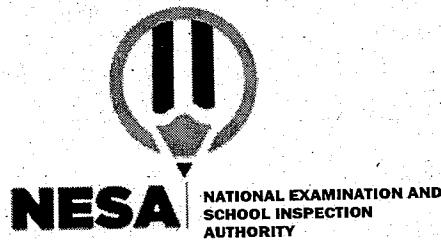
SECTION C: THIS SECTION IS COMPULSORY (15 marks)

- 23) a) You are required to make a well labelled biological drawing of a plant leaf. **(10 marks)**
- b) How is a leaf adapted to its functions? **(5 marks)**

Biology and Health Sciences I

001

27/07/2021 08.30 AM - 11.30 AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2020-2021

SUBJECT: Biology and Health Sciences I

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form and **DO NOT** write your names and index number on additional answer sheets if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper consists of **THREE** sections: **A**, **B** and **C**.

Section A: Attempt all questions.	(55 marks)
Section B: Attempt any three questions.	(30 marks)
Section C: This section is compulsory .	(15 marks)
- 4) Use only a **blue** or **black** pen.

SECTION A: ATTEMPT ALL QUESTIONS (55 marks)

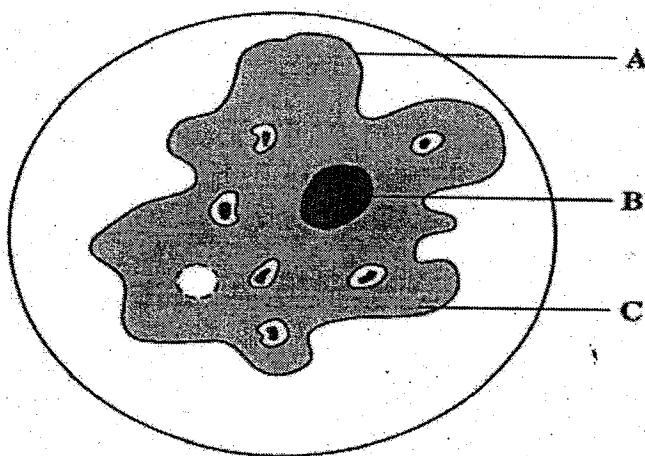
- 1) Movement is a life process. Name four other life processes that all plants and animals do. **(4 marks)**

1.....
2.....
3.....
4.....

- 2) Give Three characteristics of class amphibia. **(3 marks)**

1.....
2.....
3.....

- 3) Amoeba is a single celled animal. The students took some amoebae from the pond. They looked at one under a microscope.



- (i) Use the words from the box to name the parts of this amoeba. **(3 marks)**

Cell membrane, Cell wall, Chloroplast,
Cytoplasm, Nucleus, Vacuole

Letter	Name
A	
B	
C	

(ii) Draw lines to link each part of the amoeba cell with its function.

(3 marks)

Part	Function
A	Controls the characteristics of the cell
B	Allows substances to move in and out of the cell
C	Where chemical reactions take place

(iii) In which of these parts would you find genes? **(1 mark)**

4) a) Complete these sentences using appropriate words. **(4 marks)**

Blood from the body enters the right side of the heart through the blood vessel called the.....

The blood is pumped through theto the lungs.

The blood returns to the heart through the blood vessel called the

The blood is pumped to the body parts through the blood vessel called the.....

b) Describe the differences between arteries and veins? **(3 marks)**

c) Complete this sentence.

In the lungs the blood losesgas and picks up.....gas. **(2 marks)**

5) a) Some drugs, when mis-used, harm the body.

Complete the table by putting a tick (✓) under alcohol or solvent or both, to show the effect of these drugs.

(3 marks)

One has been done for you.

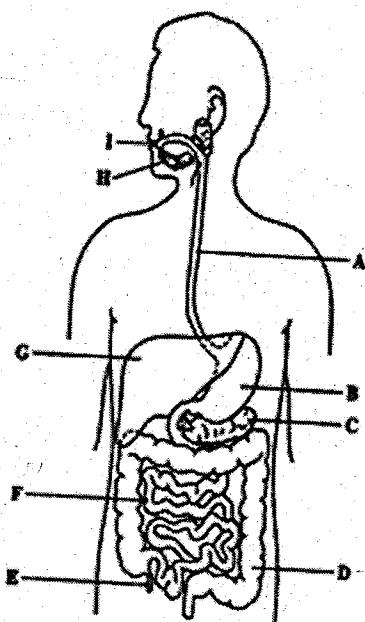
Drug		Effect
Alcohol	Solvent	
✓	✓	Possibility of addiction
		Hallucinations
		Damage to brain and liver cells
		Damage to Kidney cells

b) It is dangerous to drink alcohol and then drive or operate machinery.

Explain why.

(2 marks)

6) The diagram shows the human digestive system.



a) Name the parts A,D and F.

(3 marks)

A.....

D.....

F.....

- b) Use the letters from the diagram to show where
- (i) Hydrochloric acid is produced..... (1 mark)
 - (ii) Insulin is produced (1 mark)
 - (iii) Amylase is produced..... (1 mark)
- c) What does amylase do in the digestive system? (2 marks)

7) Variation is often caused by mutation.

- (i) What is mutation? (1 mark)
- (ii) Name one cause of a mutation (1 mark)
- (iii) Describe two other causes of variation. (2 marks)

8) Fill in the gaps with the most appropriate word or words.

Ecology is the study of how living organisms interact each other and with their.....

Ecosystems are made up of.....and abiotic components. Two examples of abiotic components are.....and.....

The.....is the place where a particular organism lives. (5 marks)

- 9) a) What does asexual reproduction mean? (1 mark)
- b) Give two examples of asexual reproduction in animals. (2 marks)

10) a) Name two foods which are good sources of Protein

1..... 2..... (2 marks)

b) Explain briefly why the human body needs Proteins? (2 marks)

c) Describe an experiment you would carry out to test for protein in a piece of food. Say what you would expect to see if protein was present.

(3 marks)

SECTION B: Attempt any three questions (30 marks)

is the process by which green plants use oxygen Sun Light to make plant their own food

11) a) Define Photosynthesis (1 mark)

b) What are the raw materials of Photosynthesis? (2 marks)

c) Explain how a leaf is adapted for Photosynthesis. (4 marks)

d) Mention three factors that influence the rate of Photosynthesis. (3 marks)

12) Describe the different types of carbohydrates giving examples of each type. (10 marks)

13) How are Red blood cells adapted to transport of oxygen? (10 marks)

14) a) Describe the composition of blood. (6 marks)

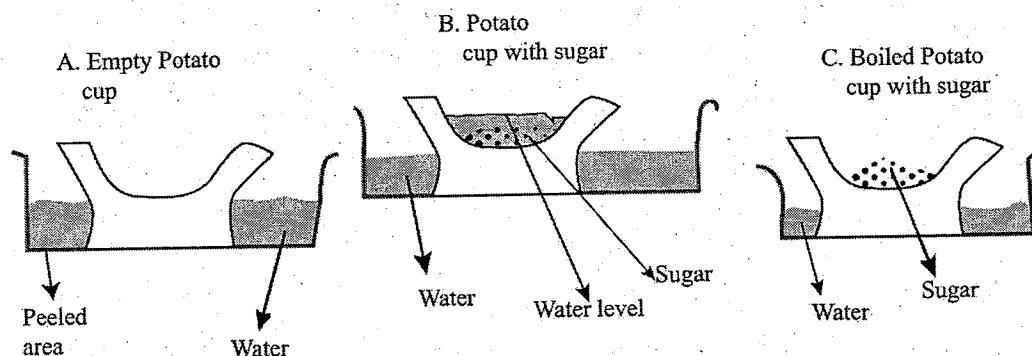
b) Explain why animal cells burst when in water but plant cells do not. (4 marks)

15 a) Give differences between Mitosis and Meiosis. (8 marks)

b) What is the role of Mitosis? (2 marks)

SECTION C: This Section is compulsory (15 marks)

- 16) Senior Three students in a secondary school carried out an experiment to investigate a biological process in a living tissue. The set up of their experiment is shown below. Interpret the set up and answer the questions that follow:



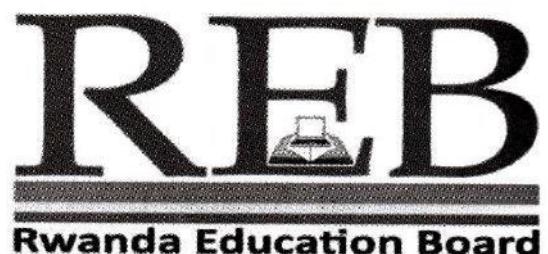
- a) Explain in detail why water gathers in the hallowed portion of potato B. **(4 marks)**
- b) Explain why water does not gather in the hallowed portion of potato A and C. **(4 marks)**
- c) Why is the set up in A necessary in this Experiment? **(2 marks)**
- d) Why did they use boiled potato in C? **(3 marks)**
- e) What process is being investigated in this experiment? **(2 marks)**

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**BIOLOGY AND HEALTH
SCIENCES I**

001

19/11/2019 08.30 AM – 11.30 AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2019

SUBJECT: BIOLOGY AND HEALTH SCIENCES

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your names and index number on the answer booklet as they appear on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
2. Do not open this paper until you are told to do so.
3. This paper consists of **three** sections **A, B and C**
 - Answer **ALL** questions in section A. **(55 marks)**
 - Answer **THREE** questions in section B. **(30 marks)**
 - Answer only **one** question in section C **(15 marks)**
4. Use only a **blue** or **black** pen.

SECTION A: Attempt all questions from this section.**(55 marks)**

1. Write **T (True)** or **F (False)** against the following statements.

Anaerobic respiration in the body:

- a) Produces carbon dioxide
- b) Uses glucose
- c) Needs oxygen
- d) Liberates more energy than aerobic respiration
- e) Takes place in the Mitochondria.

(5 marks)

2. Suggest why it is difficult to decide whether viruses are living Organisms. **(4 marks)**

3. Green plants make their own food by photosynthesis.

- a) What are raw materials of photosynthesis? **(2 marks)**
- b) What gas is given off during photosynthesis? **(1 mark)**
- c) What sugar is produced by photosynthesis? **(1 mark)**
- d) Where does energy come from to make photosynthesis work? **(1 mark)**

4. From the following environmental factors, select those that are abiotic and those that are biotic

- a) Sunlight
- b) Parasites
- c) Symbionts
- d) Wind
- e) Competition
- f) Mineral salts

(2 marks)

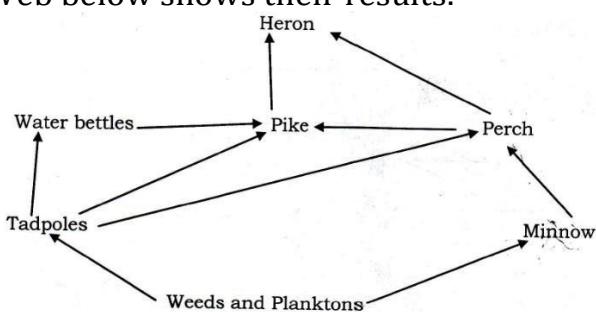
5. Explain why elimination of water by the kidneys may be considered to be both excretion and osmoregulation. **(2 marks)**

6. Explain how microscopic animals can survive without having a circulatory system. **(3 marks)**

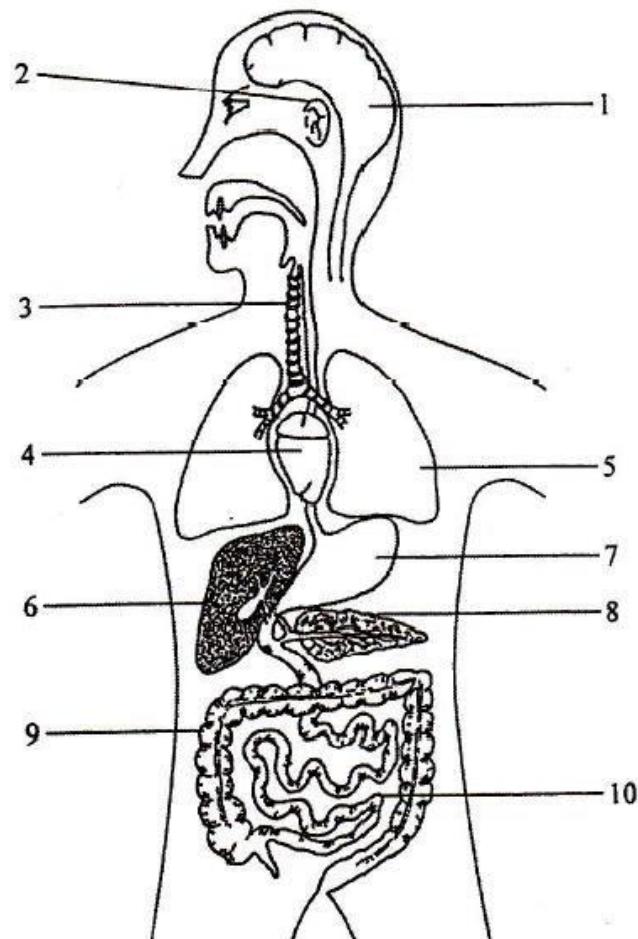
7. If sucrose is tested using Benedict's test for reducing sugars, no change is observed. The bonds between the glucose and fructose must be broken before the test for reducing sugars.

Describe how the bond can be broken chemically. **(2 marks)**

8. A group of students studied the feeding relationship in a pond. The Food Web below shows their results.



- a) What information is given by the arrows in this Food web? **(2 marks)**
- b) A disease killed most of the Minnows. Explain the likely effect of the death of most minnows on the following organisms in the pond:
- Perch **(2 marks)**
 - Tadpoles **(2 marks)**
 - Planktons **(2 marks)**
9. The diagram below represents a human body. Some of the organs are numbered: Copy the table below and complete it. The first answer is done for you. **(6 marks)**



Function	Organ number
Helps to control bodily functions	1
Senses both sound and balance	
Acidic part of digestive system	
Stores carbohydrates as glycogen	
Allows absorption of digested food into the blood stream	
Produces digestive enzymes and insulin	
Absorbs water from undigested food	

10. This question is about cell division. Copy the table below and complete it by putting a tick (\checkmark) in the correct column. The first answer is done for you. **(6 marks)**

S/N	Feature		
		Meiosis	Mitosis
1	Changes take place in the nucleus	\checkmark	\checkmark
2	Produces gametes		
3	Produces daughter cells with identical chromosomes		
4	Half chromosomes are passed to each daughter cell		
5	Homologous chromosomes are randomly assorted into daughter cells		
6	Mutations can occur to change genetic code		
7	Chromatids are separated by fibres within the cell		

11. Individuals are different. A group of students studied the Variation in the Leaf area of one type of Rose Flowers.
The table below shows their results.

Area in cm ²	3.0 – 5.0	5.0 – 7.0	7.0 – 9.0	9.0 – 11.0	11.0 – 13.0
Frequency	20	65	98	62	17

- a) i) What type of variation is shown by the leaf area? **(1 mark)**
 ii) Give two possible causes of this variation. **(2 marks)**
- b) i) What is Mutation? **(1 mark)**
 ii) Explain how mutations can be caused. **(2 marks)**
12. Certain Mollusca can either be striped or unstriped. The B allele for striped is dominant over the allele of unstriped Mollusca. If Mollusca of genotype Bb is crossed with a homozygous dominant having a striped shell:
- a) What would be the ratio of genotypes in the offspring?
 Show your working. **(2 marks)**
- b) What is the expected ratio of phenotypes? **(1 mark)**

13. Briefly explain how the flow of blood is maintained in a mammal. **(3 marks)**

SECTION B: Attempt only three questions (30 marks)

14. a) Define the term "health". **(4 marks)**
 b) What are the factors that affect good health? **(6 marks)**
15. a) Explain the major differences between Mitosis and Meiosis. **(8 marks)**
 b) What is the role of Mitosis? **(2 marks)**

16. Using your knowledge of Biology, suggest how you can eliminate malaria
in your District. **(10 marks)**

17. a) What is variation? **(2 marks)**
b) With examples, describe different types of variation. **(8 marks)**

18. Discuss the mechanisms by which blood glucose is controlled in a human.
(10 marks)

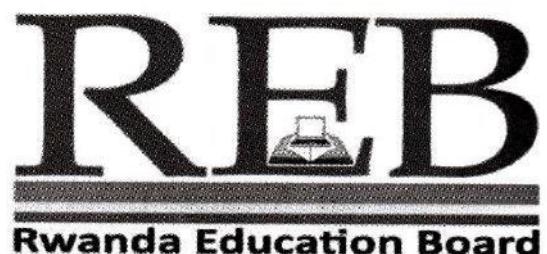
SECTION C: This question is compulsory (15 marks)

19. Assuming that you are provided with a simple leaf of a plant labelled specimen Q;
a) Draw a well labelled biological drawing of specimen Q. **(10 marks)**
b) How is specimen 4 adapted to its functions? **(5 marks)**

**BIOLOGY AND HEALTH
SCIENCES I**

001

27/11/2018 08.30 AM – 11.30 AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2018

SUBJECT: BIOLOGY AND HEALTH SCIENCES

DURATION: 3 HOURS

INSTRUCTIONS:

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2. Do not open this paper until you are told to do so.
3. This paper consists of **three** sections **A, B and C**
 - Answer **ALL** questions in section A. **(55 marks)**
 - Answer **THREE** questions in section B. **(30 marks)**
 - Answer only **one** question in section C **(15 marks)**
4. Use only a **blue** or **black** pen.

SECTION A: Attempt all questions from this section. (55 marks)

1. If a nucleus measures 100 mm on a diagram, with a magnification of x 10 000. What is the actual size of the nucleus? **(2 marks)**
2. How are root hair cells specialized for their role? **(2 marks)**
3. Match the following cell organelles with their appropriate functions. The first one has been done for you. **(5 marks)**

Organelles	Functions
(A) Nucleus	(i) Where lipids, including steroids are made.
(B) Mitochondrion	(ii) Controls entry of substances into cell.
(C) Plasma membrane	(iii) Controls the activities of the cell.
(D) Chloroplasts	(iv) Where polypeptides (proteins) are made.
(E) Smooth Endoplasmic reticulum	(v) Where photosynthesis takes place.
(F) Ribosome	(vi) Where aerobic respiration takes place.

- (A) ↔ (iii) Example
(B) ↔ (vi)
(C) ↔ (ii)
(D) ↔ (v)
(E) ↔ (i)
(F) ↔ (iv)

4. What is the importance of Predator-Prey relationship? **(1 mark)**
5. Explain how the structure of Arteries, Veins and Capillaries enable them to carry out their functions. **(4 marks)**
6. (a) In the Food Hygiene regulation of 1990, it is stated that cooked meat products must be stored at a temperature below 8°C. Explain how this will help to reduce food poisoning. **(3 marks)**
(b) Cooked food such as meat pies, which are being kept warm ready to eat, must be stored at temperatures above 63°C. Explain how this helps to reduce food poisoning. **(3 marks)**
7. Experiment on photosynthesis may involve the following:
(a) Variegated leaves

- (b) Sodium hydroxide
- (c) Ethanol
- (d) Iodine
- (e) Starch
- (f) Oxygen

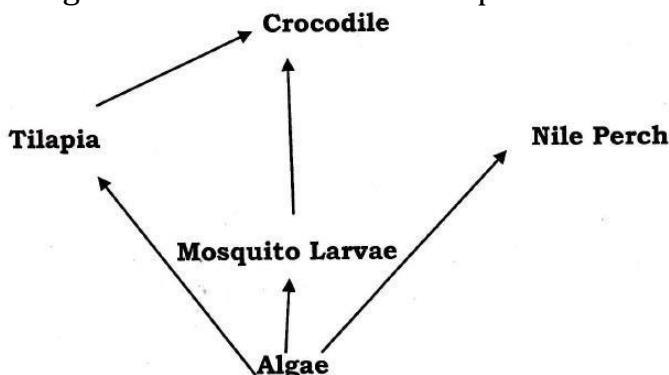
Which would you use to:

- (i) Prevent leaves getting CO_2 ? **(1 mark)**
- (ii) Remove chlorophyll from leaves? **(1 mark)**
- (iii) Test whether chlorophyll is essential for photosynthesis? **(1 mark)**
- (iv) Test decolorized leaf for starch? **(1 mark)**

8. The table shown below gives the names of certain structures which connect one organ of the human body with another. Complete the right hand column of the table to show two organs which are connected by each structure. The first one has been done for you. **(6 marks)**

Structures	Organs connected by this structure
Bronchus	Trachea with Lungs
Bile duct with
Ureter with
Optic nerve with

9. The figure below shows an example of a food web.



What would happen if the Nile Perch were removed from the food web? **(2 marks)**

10. A man with blood group B marries a woman with blood group A. What percentage of offspring will have blood group O?
Show your working. **(4 marks)**

11. Match the following organisms using an arrow with the structures for gaseous exchange. **(5 marks)**

- | | |
|--------------|---------------------|
| A. Earthworm | i) Tracheoles |
| B. Amoeba | ii) Alveoli |
| C. Insects | iii) Gill lamellae |
| D. Mammal | iv) Cell membrane |
| E. Fish | v) Skin capillaries |
| F. Frog | |

12. Which of the following terms (i) to (v) would you associate with:

- (a) Asexual reproduction?
- (b) Sexual reproduction?

Terms:

- (i) Meiosis
- (ii) Identical offspring
- (iii) Spores
- (iv) Flowers
- (v) A variety of offspring

(4 marks)

13. (a) Describe the differences between a parasite and a pathogen. **(2marks)**

(b) List at least one disease caused by each of the following: **(4marks)**

- (i) Virus
- (ii) Bacteria
- (iii) Fungi
- (iv) Protocista

14. Explain the difference between Natural selection and Artificial selection. **(4marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS (30 Marks)

15. (a) Define "transpiration". **(2 marks)**

(b) How do plants benefit from transpiration? **(8 marks)**

16. (a) Define the term "photosynthesis". **(2 marks)**

(b) Describe the conditions necessary for photosynthesis. **(8 marks)**

17. (a) What are major characteristics of enzymes? **(5 marks)**

(a) Imagine if your stomach pH was 7 instead of the normal pH of 2; what would happen? **(5 marks)**

18. Many organisms are able to reproduce asexually and sexually. Suggest the advantages of each process. **(10 marks)**

19. Write short notes on the following biological terms:

(a) Variation. **(4 marks)**

- (b) Mutations. (4 marks)
(c) Adaptive features. (2 marks)

SECTION C: THIS SECTION IS COMPULSORY **(15 Marks)**

20. In the tables below, indicate how you carry out tests for reducing sugars and non-reducing sugars by filling in the procedure, expected observations and your logical conclusion.

- (a) Test for reducing Sugars

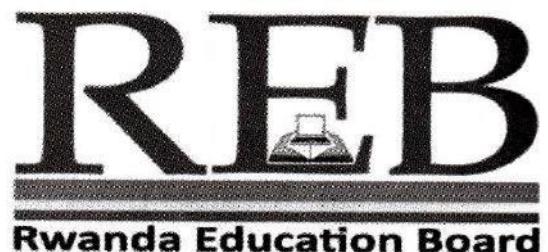
Procedure	Observation	Conclusion
(i)		
(ii)		
(iii)		
(iv)		

- (b) Test for non-reducing Sugars

Procedure	Observation	Conclusion
(i)		
(ii)		
(iii)		
(iv)		
(v)		
(vi)		

**BIOLOGY I
001**

28/11/2017 08.30 AM – 11.30 AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2017

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your names and index number on the answer booklet as they appear on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
2. Do not open this paper until you are told to do so.
3. This paper consists of **three** sections **A, B and C**
 - Answer **ALL** questions in section A. **(55 marks)**
 - Answer **THREE** questions in section B. **(30 marks)**
 - Answer only **one** question in section C **(15 marks)**
4. Use only a **blue** or **black** pen.

SECTION A: Attempt all questions from this section. (55 marks)

1. (a) Give four (4) elements which plants need to produce their food. **(2 marks)**
(b) Plants and animals have a wonderful partnership. What do plants need from animals and what do plants produce that is needed by animals? **(3 marks)**
2. Write the appropriate answers required to complete the following sentences:
(Do not copy the sentences in the answer booklet; write the question number (a), (b), (c), (d) and the answers)
 - (a) Blood from the body (deoxygenated blood) enters the right side of the human heart through the blood vessel called the **(1 mark)**
 - (b) The deoxygenated blood is pumped through the pulmonary to the lungs. **(1 mark)**
 - (c) The oxygenated blood from the lungs enters the heart through the blood vessel called the **(1 mark)**
 - (d) The oxygenated blood from the heart is pumped to the body through the blood vessel called the **(1 mark)**
3. Copy and complete the following table. **(3 marks)**

Organisms	Kingdom
Bacteria
Amoeba	Protista
Mushrooms
Beans	Plantae
Man
4. (a) Define the following underlined terms:
 - (i) Warm-blooded animals **(1 mark)**
 - (ii) Cold-blooded animals **(1 mark)**

(b) Vertebrate animals are divided into five groups or classes: Mammals, Reptiles, Amphibians, Fish and Birds.
Identify the groups in which the following animals are classified:
 - (i) Warm-blooded animals **(2 marks)**
 - (ii) Cold-blooded animals **(2 marks)**
5. (a) Name the sex chromosomes that are present in a human body cell of:
 - (i) A male **(1 mark)**
 - (ii) A female **(1 mark)**

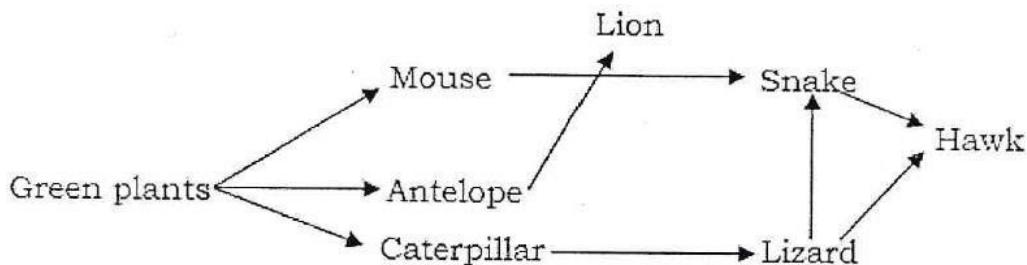
(b) Use the Punnet square to show that there is a fifty percent chance that fertilization will lead to male baby and fifty percent chance that it will lead to a female baby. **(3 marks)**

6. (a) Write the dental formula of an "adult human being". **(2 marks)**
 (b) Suggest two (2) practices that favour good functioning of the human digestive system. **(2 marks)**
7. Explain how the information about a sharp object injuring the skin reaches the human brain. **(3 marks)**
8. Give at least three functions of a human skeleton. **(3 marks)**
9. Match the following organs of the urinary system to their function by writing the letter of the organ and the letter for the corresponding function: **(4 marks)**

<u>Organ:</u>	<u>Function</u>
A. Ureter	a) Where urine is produced
B. Kidney	b) Urine is stored here
C. Urethra	c) Brings urine from the kidneys to the bladder
D. Urinary bladder	d) Urine is eliminated from the body through this tube

10. (a) Give one location in a seed in which food is stored. **(1 mark)**
 (b) What type of seed germination is observed in:
 (i) Bean seed? **(1 mark)**
 (ii) Pea seed? **(1 mark)**
 (c) Differentiate the two types of seed germination you have in (b) (i) and (b) (ii) above. **(2 marks)**
11. Water has many functions in the human body. State three of these functions. **(3 marks)**

12. Study the following food web



- (a) Give a name of one secondary consumer. **(1 mark)**
 (b) What would happen if the lions were attacked by a strange disease and died in large number? **(2 marks)**
13. (a) In human males, sperm cells are suspended in a fluid medium. What is the main advantage gained from suspending the sperm cells in fluid medium? **(1 mark)**
 (b) Name the structure that serves as the exchange surface for nutrients, wastes and oxygen between the mother and foetus in human females? **(1 mark)**
 (c) Match the following terms with their functions by writing the Roman number of the term and the letter for the corresponding function:

(4 marks)

Terms

- I. Oviduct
- II. Penis
- III. Ovary
- IV. Testes

Functions

- A. is an adaptation for internal fertilization.
- B. is the site for internal fertilization.
- C. produces testosterone
- D. produces oestrogen and progesterone

SECTION B: ATTEMPT ANY THREE QUESTIONS (30 MARKS)

14. (a) State the term used to describe the genetic condition in an organism whose cell nuclei contain pair of identical alleles. **(2 marks)**

(b) A farmer has cattle in which the polled (P) condition (absence of horns) is dominant to the horned (p) condition. A heterozygous polled bull was crossed with a homozygous horned cow.

(i) What is the genotype of the parents? **(1 mark)**

(ii) What are the possible gametes that can be produced by the parents? **(2 marks)**

(iii) Find the possible genotypes and phenotypes of the calves that may result from this cross. **(5 marks)**

15. (a) How can you identify living things (organisms)? **(6 marks)**

(b) Micro-organisms are useful and harmful to man. Explain this statement with examples. **(4 marks)**

16. (a) What is an antigen? **(1 mark)**

(b) There are four (4) blood groups: **A, AB, B and O**. From these blood groups, show the possible blood compatibility for transfusion. **(9 marks)**

17. (a) Explain how algae reduces the pollution in aquatic (water) areas. **(2 marks)**

(b) State at least two harmful effects of algae. **(2 marks)**

(c) Show how the following non-flowering plants are important:

(i) Fungi **(3 marks)**

(ii) Pteridophytes **(3 marks)**

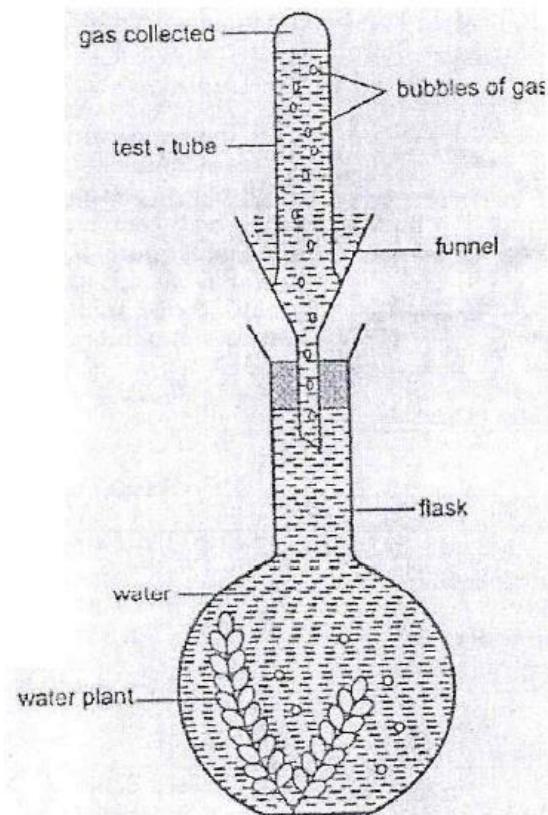
18. (a) Describe one method that can be used to prevent sexual transmission of HIV/aids. **(2 marks)**

(b) Give three (3) ways in which a woman who has HIV can pass the virus to her baby. **(3 marks)**

(c) Mention at least five (5) categories of people who are at risk of getting HIV. **(5 marks)**

SECTION C: THIS QUESTION IS COMPULSORY (15 marks)

19. Students carried out an experiment below to investigate how a gas is given out during a biological process.



- (a) Give the name of the gas that is collected in the test-tube? **(2 marks)**
- (b) Where does the gas in 19 (a) above come from? **(2 marks)**
- (c) During which process is the gas in 19 (a) above produced? **(2 marks)**
- (d) Write four conditions under which the mentioned gas in 19 (a) is produced? **(4 marks)**
- (e) What will happen if the apparatus used is kept in a dark place? **(2 marks)**
- (f) Explain why the process given in 19 (c) above may be reduced if there is a deficiency in magnesium ions? **(3 marks)**

Biology I

001

16 Nov. 2016 08.30am - 11.30am



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2016

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper consists of **THREE** sections: **A, B** and **C**.
 - **Section A:** Attempt **all** questions. **(55marks)**
 - **Section B:** Attempt any **three** questions. **(30marks)**
 - **Section C:** This section is **compulsory**. **(15marks)**
- 4) Use only blue or black pen.

SECTION A: ATTEMPT ALL QUESTIONS. (55 MARKS)

- 1) (a) Name two structures possessed by plant cells that are absent in the animal cell. **(2marks)**
(b) Name the processes by which plant cells obtain their:
 - (i) mineral salts
 - (ii) carbon dioxide
 - (iii) water.**(3marks)**
- 2) (a) Which organism :
 - (i) causes malaria?
 - (ii) transmits malaria?**(1mark)**
(b) How is AIDS transmitted?**(4marks)**
- 3) (a) State the name of the type of muscle found in the heart. **(1mark)**
(b) Name the blood vessels that:
 - (i) carry blood away from ventricles.
 - (ii) carry blood back to the ventricles.**(2marks)**
(2marks)
- 4) (a) State two features of a good gaseous exchange system. **(2marks)**
(b) Describe the route taken by the air as it is inhaled. **(2marks)**
(c) Name the air sacs in the lungs. **(1mark)**
- 5) Write T (true) or F (false) against the following statements. Anaerobic respiration in yeast
(a) produces carbon dioxide. **(1mark)**
(b) produces bread. **(1mark)**
(c) uses glucose. **(1mark)**
(d) needs oxygen. **(1mark)**
(e) liberates more energy than aerobic respiration. **(1mark)**

6) Pair organisms (A-H) with their structures of gaseous exchange (a-e).

One is done for you.

(7marks)

<u>Organism</u>	<u>Gaseous exchange structures</u>
-----------------	------------------------------------

- | | |
|------------------|----------------------|
| A. Earth worm | (a) Tracheoles |
| B. Amoeba | (b) Alveoli |
| C. Insect | (c) Gill lamellae |
| D. Mammal | (d) Cell membrane |
| E. Fish | (e) Skin capillaries |
| F. Frog | |
| G. Flowing plant | |
| H. Yeast | |

7) The table below gives the energy content Kcal/100g of some common foods together with the percentages of fat, carbohydrate, protein and water in each.

Food	Kcal/100g	% A	% B	% C	% D
Butter	745	0.7	16.8	—	82.5
Milk	68	3.3	88.3	4.4	3.6
Beef	318	23.5	55.0	—	20.5
Potato	88	1.9	81.0	15.1	—

(a) Which food has the

(i) highest energy value?

(1mark)

(ii) lowest energy value?

(1mark)

(b) Which of the following corresponds to A, B, C or D: proteins,

carbohydrates, fats, water?

(4marks)

- 8) Blood contains plasma, platelets, red cells and white cells. Each has one or more important functions. Copy the table below and match each part with its function.

Red cells	. Fight bacteria
Platelets	. Carry dissolved hormones
Plasma	. Carries dissolved urea
White cells	. Transport oxygen around the body
	. Helps blood to clot (4marks)

- 9) Describe how oxygen is transported around the body cells. **(3marks)**

- 10) Where are the following digestive substances produced?

- (a) Bile
- (b) Amylase
- (c) Lipase
- (d) Protease **(4marks)**

- 11) In mice the gene for black hair colour (a) is recessive to the gene for Agouti colour (A) in which hair colour is not evenly distributed.

- (a) Give the genotype of:

- (i) pure breeding agouti mouse. **(1mark)**
- (ii) a hybrid Agouti mouse. **(1mark)**

- (b) (i) Give the genotype of a black mouse. **(1mark)**

- (ii) Can a black mouse be produced by mating Agouti types?
Explain your answer. **(2marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 MARKS)

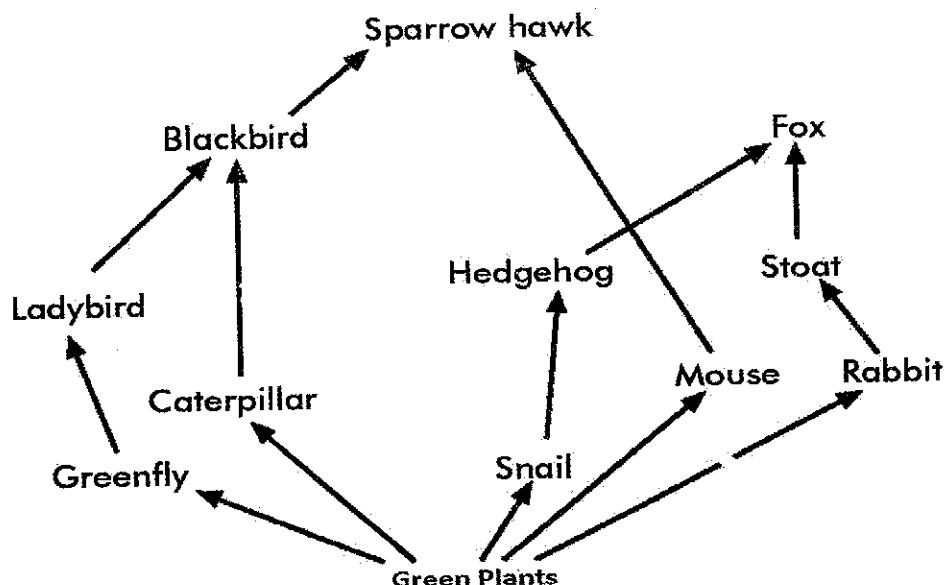
12) The Table below indicates the estimated life expectancy, as a result of a HIV/AIDS infection in three Sub-Saharan countries in 1982 and 1999.

COUNTRY	LIFE EXPECTANCY	
	1982	1999
A	59	39
B	54	50
C	58	48

(a) State which country had:

- (i) the smallest decrease in life expectancy between 1982 and 1999. **(1mark)**
 - (ii) the greatest decrease in life expectancy between 1982 and 1999. **(1mark)**
- (b) Calculate the percentage decrease of life expectancy for country B between 1982 and 1999. Show your working. **(4marks)**
- (c) Describe four ways in which HIV/AIDS infection can be prevented. **(4marks)**

13) Use your knowledge of ecology to answer the following questions:

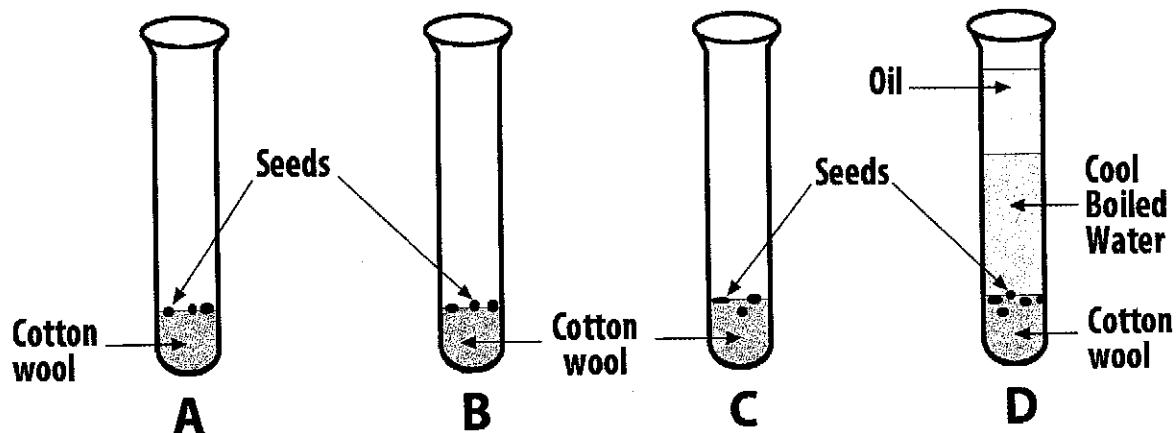


- (a) What name is given to the above diagram? **(1mark)**
- (b) What do the arrows on the diagram mean? **(2marks)**
- (c) Green plants are producers. What does this mean? **(2marks)**

- (d) Name two primary consumers from the above diagram. **(2marks)**
- (e) Name two carnivores from the above diagram. **(2marks)**
- (f) Which trophic level does the hedgehog belong to? **(1mark)**
- 14) (a) Name the structure in a cell on which the genes are located. **(1mark)**
- (b) In pea plants the allele for tall (T) is dominant over the allele for dwarf (t).
A heterozygous tall plant is crossed with a dwarf plant.
- (i) What are the genotypes of the parents? **(2marks)**
- (ii) What are the possible gametes each parent can produce? **(3marks)**
- (iii) Show the possible genotypes and phenotypes of the offsprings. **(4marks)**
- 15) (a) Name a flying mammal. **(1mark)**
- (b) A frog is not a reptile. Give two specific reasons. **(2marks)**
- (c) What is the difference between *cold-blooded* and *warm-blooded* animals? **(2marks)**
- (d) A student says, "Most warm-blooded animals take care of their young. Most cold-blooded animals do not."
Is this statement correct or not?
Explain. **(5marks)**
- 16) (a) What are the lichens composed of? **(2marks)**
- (b) Show how the following non-flowering plants are important:
- (i) Algae **(4marks)**
- (ii) Lichens **(4marks)**

SECTION C: THIS SECTION IS COMPULSORY. (15 MARKS)

17) Biology students carried out the following practical work to investigate the conditions necessary for seed germination.



- (a) Tube A has all the factors needed for germination. Tubes B, C and D lack one essential factor each. Name the three factors that are present in tube A. **(3marks)**
- (b) What is the purpose of putting oil in tube D? **(1mark)**
- (c) Why were many seeds added to each tube rather than using just one seed in each tube? **(2marks)**
- (d) Which tube acted as a control? **(1mark)**
- (e) State the results of their investigation
- For Tube A: **(2marks)**
- For Tube B: **(2marks)**
- For Tube C: **(2marks)**
- For Tube D: **(2marks)**

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Biology I

001

18/11/ 2015 08.30AM - 11.30AM



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2015

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your names and index number on the answer booklet as they appear on your registration form, and **DO NOT** write your names and index number on additional answer sheets of paper if provided.
2. Do not open this question paper until you are told to do so.
3. This paper consists of **THREE** sections: **A**, **B** and **C**.
 - **Section A:** Attempt **all** questions. **(55 marks)**
 - **Section B:** Attempt any **three** questions. **(30 marks)**
 - **Section C:** This section is **compulsory**. **(15 marks)**
4. Use only blue or black pen.

SECTION A: ATTEMPT ALL QUESTIONS. (55 MARKS)

- 1) The following are various sub-units into which species of plants or animals can be divided: cell, organ, organelle, organism, tissue, organ system.
 - (a) Arrange them in order starting with the simplest and ending with the most complex. **(3marks)**
 - (b) Which of them can be applied to the following:
 - (i) A cat? **(1mark)**
 - (ii) Amoeba? **(1mark)**
 - (iii) Leaf? **(1mark)**
 - (iv) Chloroplast? **(1mark)**
 - (v) Alimentary canal? **(1mark)**
- 2) Name the cells in a mammal that:
 - (a) Are sensitive to their environment. **(1mark)**
 - (b) Receive messages from sensory cells. **(1mark)**
 - (c) Transmit messages to effectors. **(1mark)**
- 3) Name the stage in the life cycle of flies and butterflies at which:
 - (a) Ecdysis occurs. **(1mark)**
 - (b) Feeding for growth occurs. **(1mark)**
 - (c) Wings appear. **(1mark)**
 - (d) A period of immobility occurs. **(1mark)**
- 4) Cholera is transmitted by food and water that is contaminated with faecal matter. Suggest three measures that might be used to limit the spread of this disease. **(3marks)**
- 5) (a) Define photosynthesis. **(2marks)**
(b) What conditions are necessary for photosynthesis to occur in a green plant? **(4marks)**
- 6) (a) List two chemical elements other than carbon, hydrogen, oxygen and nitrogen which are required by both plants and animals. **(4marks)**

(b) For each of the elements you have listed, give one reason why it is required:

(i) In green plants.

(1mark)

(ii) In mammals.

(1mark)

7) Match the following ecological terms with their definitions.

(a) Community - A place where an organism lives.

(b) Ecosystem - A number of species interacting in a locality

(c) Food web - A nutritional interrelationship of organisms

(d) Habitat - Interaction of organisms with each other and

with their abiotic environment.

(3marks)

8) (a) Why are enzymes frequently referred to as 'biological catalysts'?

(4marks)

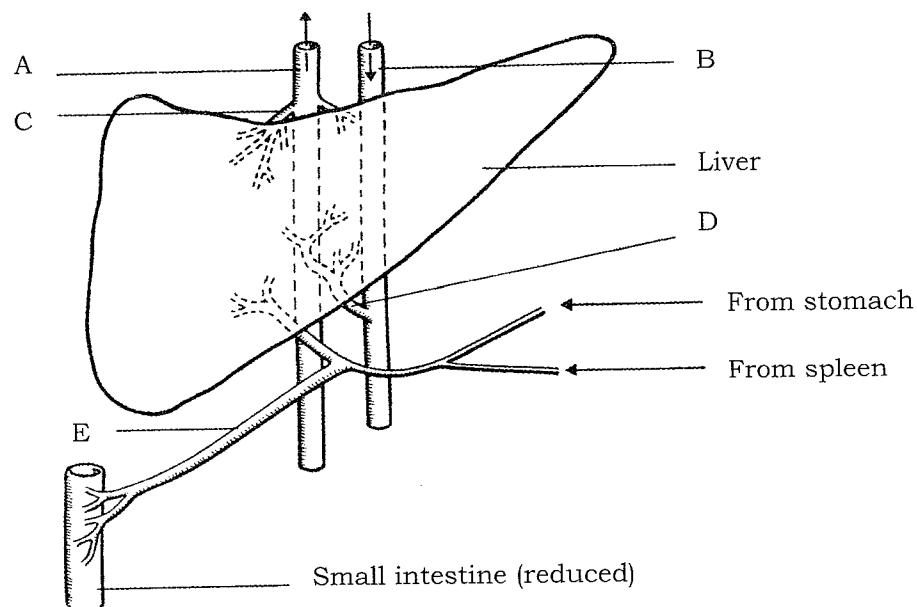
(b) What would be the effect of changing :

(i) pH?

(ii) Temperature upon the rate of action of any named enzyme?

(2marks)

9) The diagram below shows blood supply through the liver.



(a) Label the parts indicated A, B, C, D, E.

(5marks)

(b) Which two substances would be present in greater concentrations in vessel E after a meal?

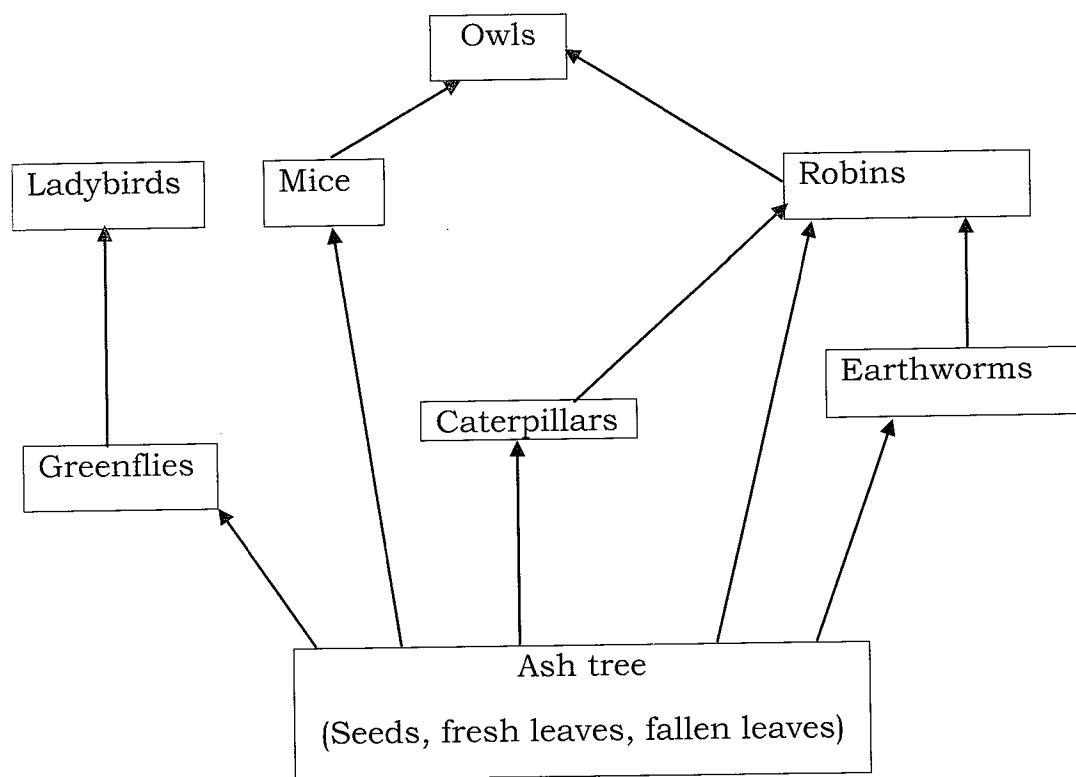
(2marks)

- 10) Give at least four functions of a human brain. **(4marks)**
- 11) When a person's hand accidentally touches a hot object it is quickly withdrawn. Explain what causes this response. **(3marks)**
- 12) (a) Define a gamete. **(1mark)**
(b) What are the male and female gametes in an animal (mammal)? **(2marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30MARKS)

- 13) (a) Explain the following terms that are used in genetics:
- (i) allele **(1mark)**
 - (ii) heterozygous **(1mark)**
 - (iii) phenotype **(1mark)**
- (b) In humans, brown eye (B) is dominant to blue eye (b).
Two parents, one heterozygous for eye colour and the other blue eyes, start a family.
- (i) What is the genotype of the brown-eyed parent? **(1mark)**
 - (ii) What are the possible gametes that each parent can produce? **(2marks)**
 - (iii) Show the possible genotypes of their children. **(4marks)**
- 14) (a) Explain the following terms that are used in ecology.
- (i) Biosphere **(1mark)**
 - (ii) Habitat **(1mark)**
 - (iii) Niche **(1mark)**
 - (iv) Producer **(1mark)**

(b) Answer the following questions in relation to the food web shown below.



(i) Write two food chains with four organisms in it.

(2marks)

(ii) Copy and complete the table below.

(4marks)

Autotrophic organism	
Secondary consumer	
Omnivore	
Carnivore	

15) (a) Describe the effects of the failure of the pancreas to produce sufficient insulin.

(2marks)

(b) The pituitary gland produces several hormones.

(i) Give any four (4) hormones it produces.

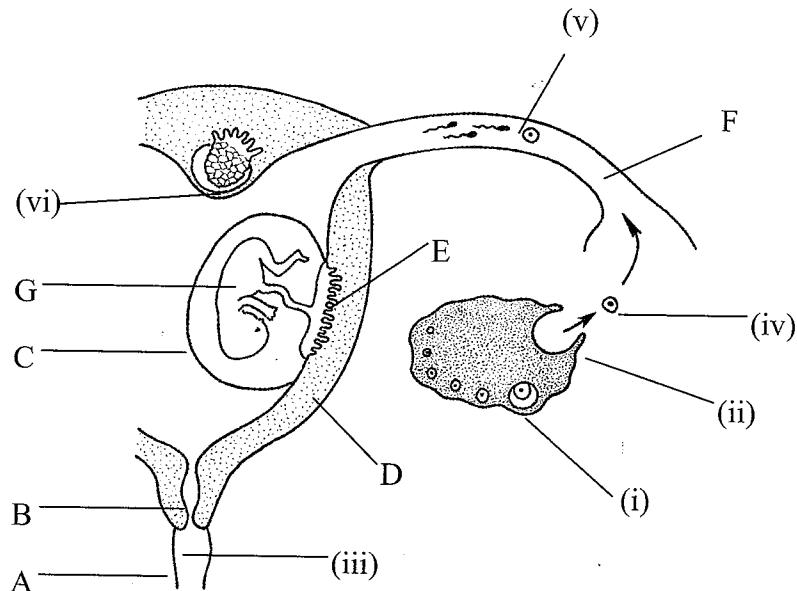
(4marks)

(ii) Give the functions of each hormone named in (b) (i) above.

(4marks)

16) The diagram below represents the events leading up to fertilization, implantation and development in human beings.

- (a) Name the structures labelled A, B, C, D, E, F, and G. **(4marks)**
(b) Briefly describe the process of fertilization in human beings, from (i) to (v). **(6marks)**



17) (a) State one function of each of the following parts of a flower:

- (i) Petal **(1mark)**
(ii) Sepal **(1mark)**

(b) What is the difference between self-pollination and cross-pollination? **(2marks)**

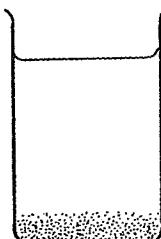
(c) Some species of plants are strongly adapted to pollination by certain insects.

State four characteristics which are regarded as adaptations to pollination by bees. **(4marks)**

(d) In dicotyledonous plants, the early stages of germination take place in the soil where there is little or no light for photosynthesis. How does the seedling obtain materials for its growth and energy during this time? **(2marks)**

SECTION C: THIS SECTION IS COMPULSORY. (15marks)

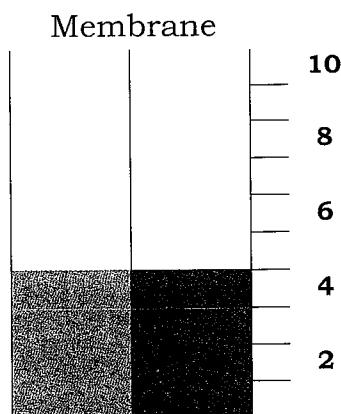
- 18) (a) The diagram below represents molecules of a salt dissolved in the bottom layer of water in a beaker.



Make two similar diagrams to the distribution of salt molecules :

- (i) After a few minutes. (2marks)
- (ii) After several hours. (2marks)
- (iii) By which transport mechanism (process) the salt molecules will move? (1mark)

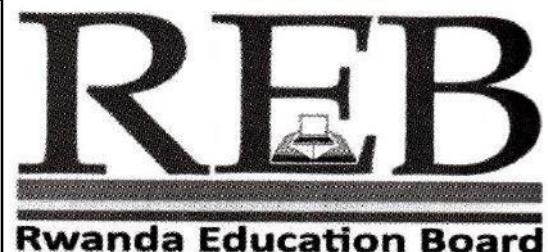
- (b) The diagram below shows a vessel which contains a concentrated (right) and a dilute (left) solution separated by a partially permeable membrane.



- (i) Draw a similar diagram to show the liquid levels after an hour or two hours. (2marks)
- (ii) Explain what has happened. (4marks)
- (iii) Name the process which is being investigated. (1mark)
- (iv) Define the process named in (iii) above. (3marks)

**BIOLOGY I
001**

04 Nov. 2014 08.30 am – 11.30 am



ORDINARY LEVEL NATIONAL EXAMINATIONS, 2014

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your name and index number on the answer booklet as written on your registration form.
2. Do not open this paper until you are told to do so.
3. This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

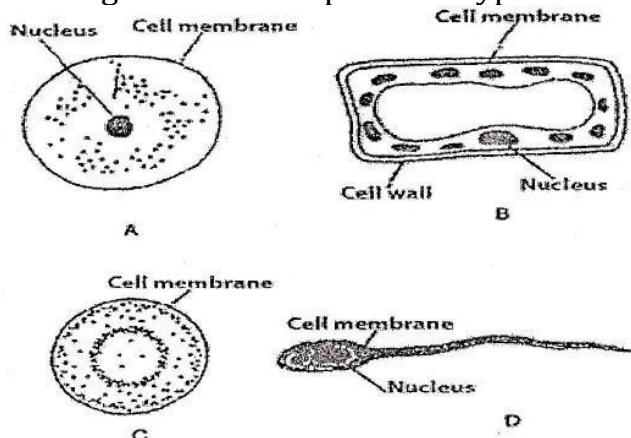
Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

Use only a **blue or black** pen.

SECTION A: Attempt all questions from this section. (55 marks)

1. The diagram below represents types of cells.



Which of these represents animal cells? Explain your answer. **(3 marks)**

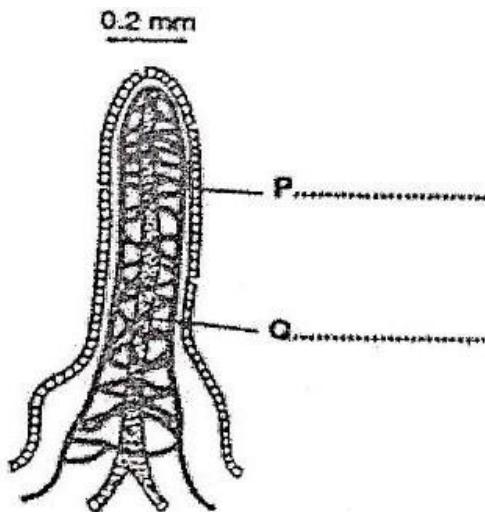
2. Using ✓ and X, indicate the parts of the cell found in a plant and animal cell. The first one has been done for you. **(5 marks)**

Part	Plant cell	Animal cell
Nucleus	✓	✓
Cell membrane		
Cytoplasm		
Cell wall		
Large vacuole		
Chloroplasts		

3. Blood contains plasma, red blood cells, white blood cells and platelets. Give the function of each:
- Plasma **(1 mark)**
 - Red blood cells **(1 mark)**
 - White blood cells **(1 mark)**
 - Platelets **(1 mark)**
4. a) Distinguish between saprophytes and parasites. **(2 marks)**
 b) i. Name a common disease in Rwanda caused by protozoa. **(1 mark)**
 ii. Suggest methods that can be used to control the disease you named in b (i). **(3 marks)**
5. What substances are transported by:
 a) The vascular systems of a flowering plant? **(2 marks)**
 b) The blood system of mammals? **(2 marks)**
6. (a) Why is mucus needed to protect the cell lining the gut from protein-digesting enzymes? **(2 marks)**
 (b) The pH in the stomach is very acidic about pH 2. Why would it be a problem if the pH in the small intestines was 2? **(2 marks)**

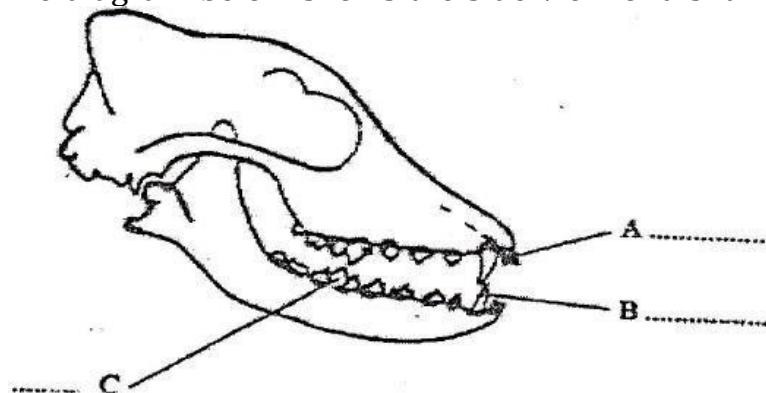
7. An experiment was done to investigate effects of bile on lipid digestion. Lipase enzyme and bile were added to a lipid test tube A. Test tube B only had the lipid and lipase enzyme. Explain why:
 a) The pH in test tube A became acidic. **(2 marks)**
 b) The reaction in test tube B was very slow. **(1 mark)**
8. Explain why the elimination of water by the kidney may be considered to be both excretion and osmoregulation. **(4 marks)**
9. Why is it more accurate to describe fish as a 'variable-temperatured' animal rather than cold-blooded? **(2 marks)**
10. (a) How is a zygote different from any other cell in the body? **(2 marks)**
 (b) Why is it difficult to decide whether viruses are living organisms? **(3 marks)**

11. The diagram below shows a villus in longitudinal section from ileum of a mammal.



- a) Name the parts labelled P and Q. **(2 marks)**
 b) What are the functions of P and Q? **(2 marks)**
 c) Explain how P is adapted to carry out its functions. **(2 marks)**

12. The diagram below shows the side view of a skull of a carnivore.



Label the teeth A, B and C. **(2 marks)**

13. Choose words from the list to complete the sentences that follow. Each word may be used once or not at all.

Cells; Chloroplast; Chromosomes; Genes; Organs; Organisms; Nucleus; Tissues.

Each body cell contains a (i) which controls the cell's activities and characteristics. This contains pairs of (ii) which are made up of a number of small units of inheritance called (iii) A collection of similar cells working together are called (iv) These make up (v) which work together as systems allowing (vi) to survive.

(6 marks)

SECTION B: ATTEMPT ANY THREE QUESTIONS.

(30 marks)

14. Briefly explain how:

- a) The flow of blood is maintained in a mammal. **(5 marks)**
b) The flow of water is maintained in a flowering plant. **(5 marks)**

15. a) (i) What are hormones? **(1 mark)**

(ii) Where are hormones produced? **(1 mark)**

b) Which hormones are produced by the pancreas? **(5 marks)**

c) Explain how the blood sugar level in blood is controlled. **(5 marks)**

16.a) How is AIDS transmitted from one person to another? **(4 marks)**

b) Suggest all possible methods that can be used to avoid the AIDS virus. **(6 marks)**

17. Identify the various modes of asexual reproduction in plants and animals.

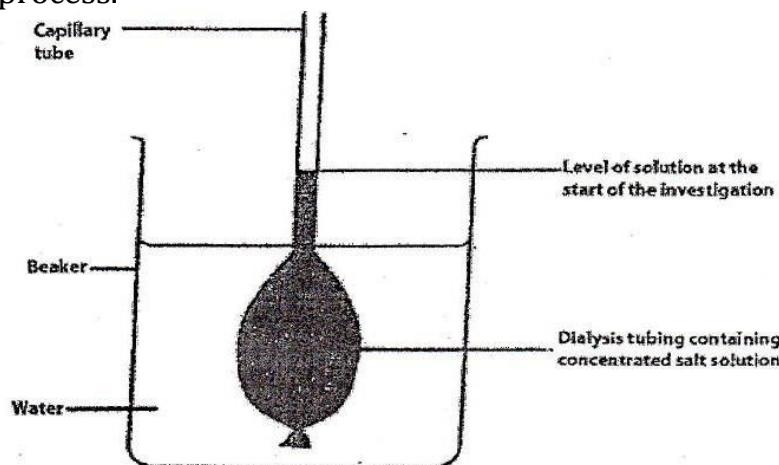
(10 marks)

18. a) Define pollination. **(1 mark)**

b) Name the types of pollination and characteristics of each. **(9 marks)**

SECTION C: COMPULSORY. (15 marks)

19. Some students set the experiment below to investigate a biological process.



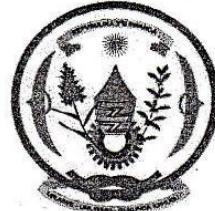
- a) (i) Name the process being investigated. **(1 mark)**
(ii) Define the process named in a(i) above. **(2 marks)**
- b) (i) What will happen to the water level in the capillary tube during this investigation? **(1 mark)**
(ii) Explain what has happened in b(i) above. **(5 marks)**
- c) Explain fully what happens when both animal and plant cells are put in beaker containing pure water. **(6 marks)**

BIOLOGY I

001

06th Nov. 2013 08.30 am – 11.30 am

REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD (REB)
P.O.BOX 3817 KIGALI

ORDINARY LEVEL NATIONAL EXAMINATIONS 2013

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

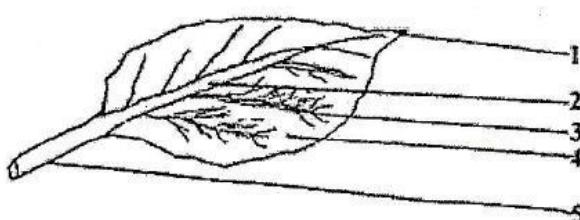
SECTION A: Attempt all questions from this section. (55 marks)

1. (a) Name ONE characteristic feature common to fish, reptiles and birds but not found in mammals **(1 mark)**
(b) Name the kingdom to which each of the following belongs:
i. Grass ii. Mould iii. Spirogyra **(3 marks)**

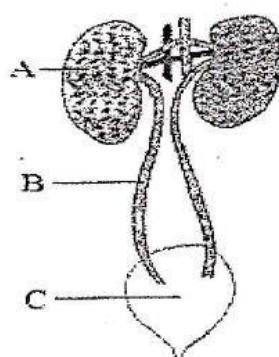
2. Copy and complete the table below: **(4 marks)**

ANIMAL	PHYLUM	CLASS
Cockroach		
Toad		
Centipede		
Elephant		

3. The diagram below shows the structure of a leaf.

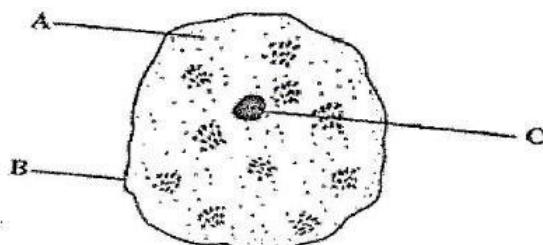


- a) Identify the parts labelled 1,2,3,4 and 5. **(5 marks)**
b) What are the functions of parts labelled 4 and 5? **(2 marks)**
c) State two ways in which the external structure of the leaf is modified to perform its function. **(2 marks)**
4. (a) Where in the body are red blood cells made? **(2 marks)**
(b) State three ways in which red blood cells are specialized to carry out their functions. **(3 marks)**
5. What is the difference between excretion and egestion? **(2 marks)**
6. Knowledge acquired through the study of BIOLOGY can help us to fight against HIV/AIDS and other sexually transmitted diseases. Explain how this can help you. **(4 marks)**
7. The diagram below shows part of the system that controls the amount of water in the body.



- a) Give the name and the function of each labelled part. **(5 marks)**
 b) This system also excretes a substance called urea. Why is it necessary in body? **(1 mark)**

8. The diagram below shows an animal cell.



Name each labelled part and explain its functions. **(6 marks)**

9. Animals and plants carry out common life processes like exchanging gases and excretion. Copy and complete the table to name or describe processes common to all animals and plants. **(6 marks)**

Name of the life process	Description
.....	Living things produce off springs
.....	Living things get bigger and develop
.....	Living things change the position of their body, or part of their body.
Respiration
Feeding or nutrition
.....	Detect and respond to changes in the environment.

10. (a) How does glucagon increase glucose level in the blood? **(2 marks)**
 (b) How does glucagon effect differ from that of insulin? **(2 marks)**

11. Give the functions of the following hormones in the human body.
 a) Follicle stimulating hormone. (FSH)
 b) Progesterone
 c) Antidiuretic hormone. **(3 marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 MARKS)

12. (a) Bile is produced by the gallbladder. It contains no enzymes. What is its function? **(2 marks)**
 (b) Give at least four enzymes present in the pancreatic juice and a function of each. **(8 marks)**

13. (a) Mice (rats) with black fur can have the genotype **BB** or **Bb**, while mice with brown fur have the genotype **bb**.
 i) Use a genetic diagram to show what fur colour you would predict in the F1 offspring produced by two mice which are both **Bb**. **(3 marks)**
 ii) Why might your predictions of fur colour in F1 generation NOT be proved right? **(1 mark)**

- b) i) What is the difference between dominant and recessive alleles? (2 marks)
 ii) What is the difference between alleles and genes? (2 marks)
 iii) Describe the difference between homozygous and heterozygous chromosomes. (2 marks)

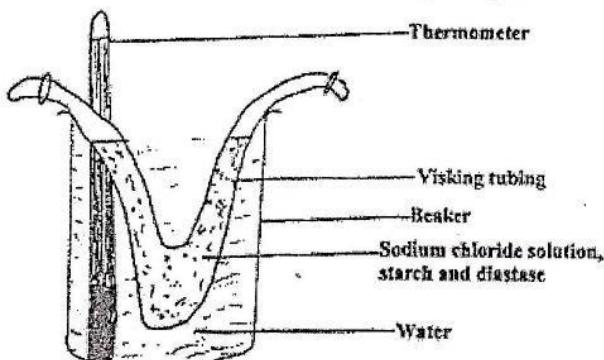
14. Use a table to show the differences between exocrine and endocrine glands. Give the similarities of these glands. (10 marks)

15. (a) Write STD's in full and give two examples of STDs. (3 marks)
 (b) Outline the general symptoms of STDs common to both men and women. (7 marks)

16. (a) What is the advantage to an animal of having capillaries which are:
 i. Very narrow? (2 marks)
 ii. Repeatedly branched? (2 marks)
 iii. Very thin walled? (2 marks)
 (b) How do you think microscopic animals can survive without having a circulatory system? (4 marks)

SECTION C: THIS SECTION IS COMPULSORY: (15 MARKS)

17. The experiment below is used to demonstrate a biological process.



Visking tubing is made of material which acts as a semi-permeable membrane. After some time water from the beaker entered the visking tubing and water in the beaker became salty. The temperature of the experiment was kept between 35°C and 40°C throughout the experiment.

- a) By what process has water entered the visking tubing? (1 mark)
 b) Give an example of the process in (a) above occurring in:
 i. Animal cell
 ii. Plant cell. (4 marks)
 c) By what process has salt entered water in the beaker? (1 mark)
 d) Give an example of the process in (c) above occurring in:
 i. Animal cell
 ii. Plant cell. (4 marks)
 e) i) Name one more substance, you think has entered the water in the beaker by the same process as salt. (1 mark)
 ii) How can you test for the presence of that substance? Give details of your test. (4 marks)

Biology I

001

21 Nov. 2012 08.30am - 11.30am

REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD (REB)

ORDINARY LEVEL NATIONAL EXAMINATIONS 2012

SUBJECT : BIOLOGY

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections: **A, B** and **C**.

Section A: Attempt **all** questions. **(55 marks)**

Section B: Attempt any **three** questions. **(30 marks)**

Section C: This section is **compulsory**. **(15 marks)**

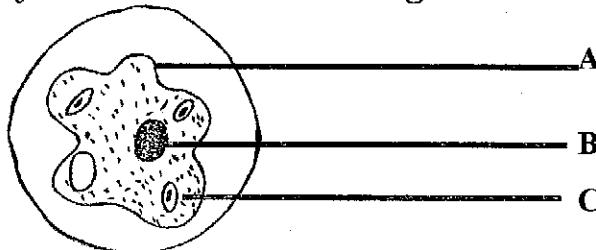
SECTION A : Attempt all questions. (55 marks)

01. Movement is a life process. Name FOUR other life processes that all plants and animals do.

(4 marks)

(I)
(II)
(III)
(IV)

02. Amoeba are single celled animals. The diagram below was drawn by students after observing the amoeba under microscope.



- (a) Name the parts labelled A, B and C.

A:
B:
C:

(3 marks)

- (b) Draw lines to link each part of the amoeba cell with its function.

PART

FUNCTION

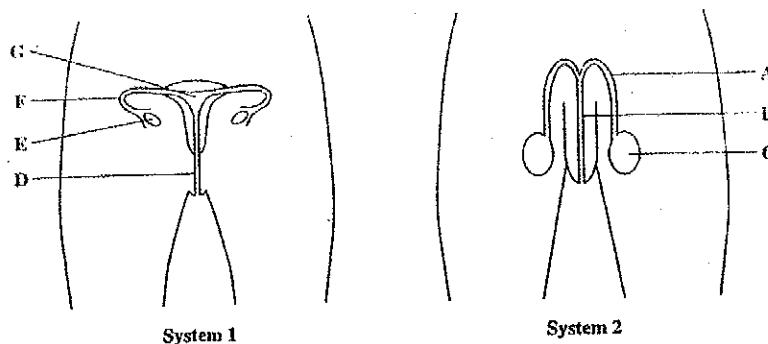
A	Where chemical reactions take place
B	Allows substances to move in and out of the cell
C	Controls the characteristics of the cell

(3 marks)

- (c) In which of these parts of amoeba would you find genes?

(1 mark)

03. (a) The diagrams below show the reproductive systems in humans.



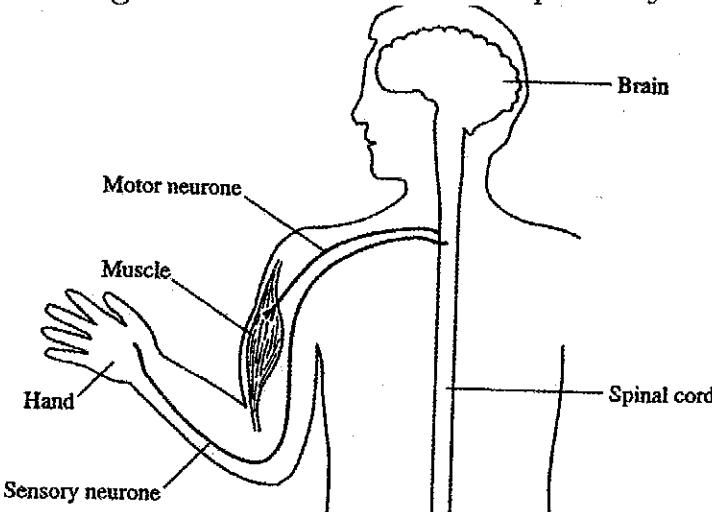
- (i) Which is the female reproductive system? **(1 mark)**
 (ii) Use the information in the diagram to complete the table below.

Letter	
The place where female gametes are formed.	
The place where the fetus develops.	
The place where male gametes are formed.	

(3 marks)

- (b) Give the name of the:
- (i) Female gamete **(1 mark)**
 - (ii) Male gamete **(1 mark)**
 - (iii) Process when the male and female gametes fuse together. **(1 mark)**

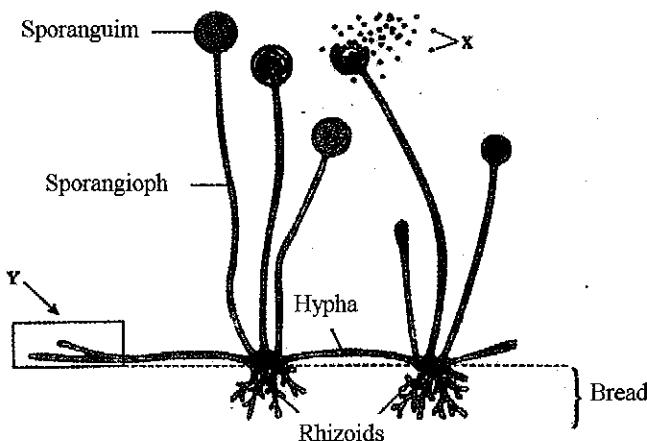
04. The diagram below shows a reflex pathway in a human.



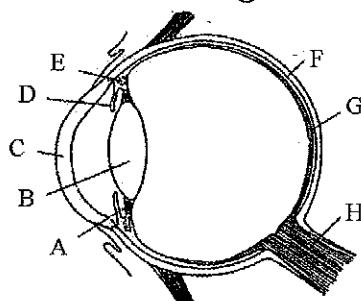
Draw this diagram and answer the following question.

- (a) Label the receptor on the diagram. **(1 mark)**
 - (b) Label the effector on the diagram. **(1 mark)**
 - (c) (i) Suggest a stimulus to the hand that could start a reflex response. **(1 mark)**
 (ii) Describe the response this stimulus would cause. **(1 mark)**
 - (d) Put arrows on the diagram to show the direction of the path taken by the nerve impulses. **(1 mark)**
05. (a) Name two things that happen to the glucose produced in plants during photosynthesis. **(2 marks)**
- (b) Plants need mineral salts.
 - (i) Through which part do mineral salts get into the plant? **(1 mark)**
 - (ii) Explain why water is important in this process. **(2 marks)**

06. The diagram below shows the structure of a fungi growing on some bread.



- (a) Give the name of the structure labelled X. **(1 mark)**
- (b) When the fungus is feeding, the tip of the hyphae labelled Y release enzymes. Explain why. **(2 marks)**
07. Describe the difference between each of the following pairs of biological terms.
 (a) Ureter and urethra. **(2 marks)**
 (b) Motor neuron and sensory neuron. **(2 marks)**
08. (a) Name at least one disease which is spread by houseflies. **(1 mark)**
 (b) Explain how houseflies can spread diseases. **(4 marks)**
 (c) Give one way by which we can lower the chances of disease being spread by houseflies, apart from killing the flies. **(1 mark)**
09. The diagram below shows a pyramid of energy for the following food chain.
 Grass → cow → man
- (a) Write the names of the organisms in the food chain on the correct lines next on the diagram. **(1 mark)**
 (b) Where does the grass get its energy from? **(1 mark)**
 (c) Explain why energy decreases from one trophic level to the next. **(1 mark)**
10. The diagram shows a section through the human eye.



(a) Label the parts A, B and C.

A: _____
B: _____
C: _____

(3 marks)

(b) Give the letter of part which:

- (i) Changes shape to help focus light rays.
(ii) Adjusts the amount of light entering the eye.

(1 mark)

(1 mark)

11. Sickle cell anaemia is caused by a change in the gene which controls haemoglobin production. Allele

H: represents the unaffected allele of the haemoglobin gene

h: represents the changed allele of the haemoglobin gene

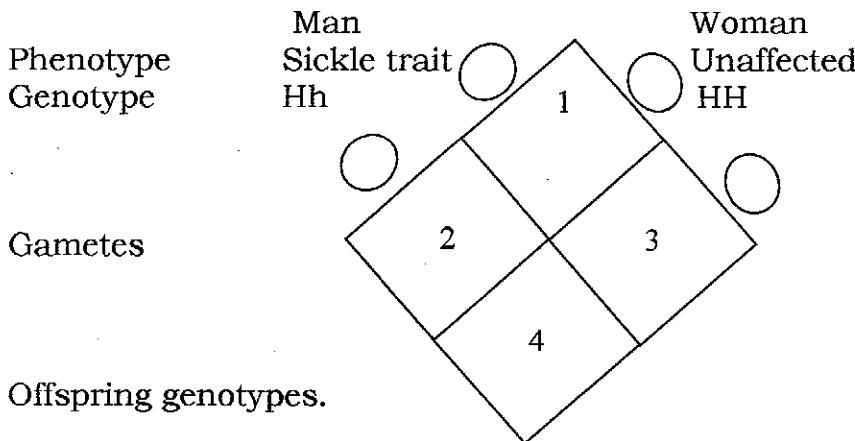
There are three possible genotypes:

HH: the person who is completely unaffected

Hh: the person is a carrier (sickle trait)

hh: the person who has sickle cell anaemia.

- (a) Complete the genetic diagram below to the production of children by a man with sickle cell anaemia and a woman who is completely unaffected by sickle cell condition.



- Offspring phenotypes: 1. _____
2. _____
3. _____
4. _____

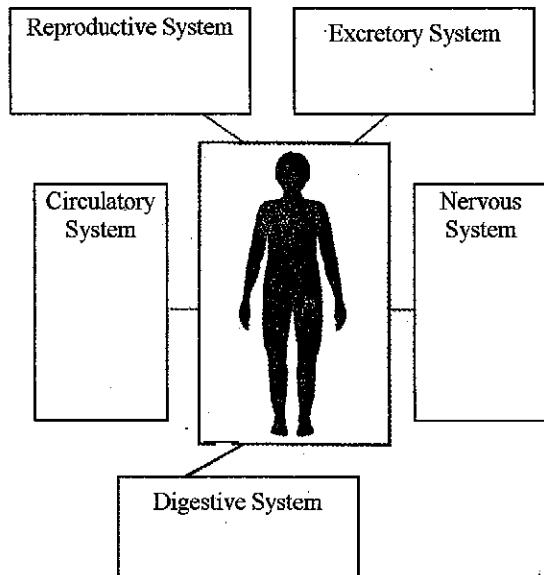
(4 marks)

- (b) Give a reason why it is impossible for this man and woman to produce any children with sickle anaemia. (1 mark)

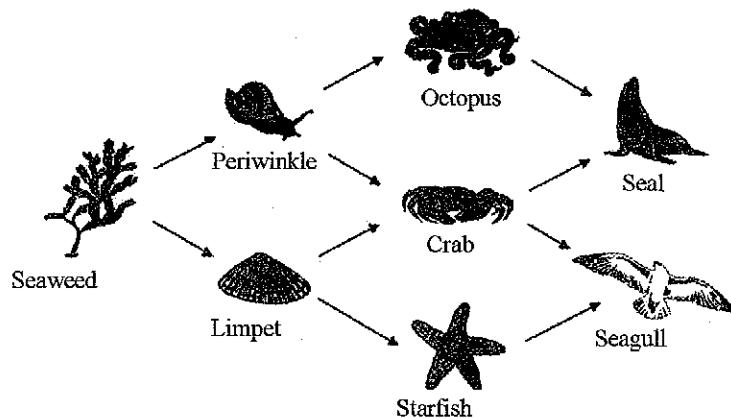
SECTION B: Attempt ONLY any THREE questions.(30 marks)

12. Put each part of the body listed below into a box to show which organ system it is in. (10 marks)

Bladder, Brain, Capillary, Heart, Kidney, Large Intestine, Ovary, Spinal cord, Stomach, Testis.



13. (a) The diagram shows part of a food web.



Use the organisms in this web to fill in the table.

FEEDING HABIT	ONE ORGANISM
Herbivore	
Producer	
Secondary consumer	
Top carnivore	
Primary consumer	

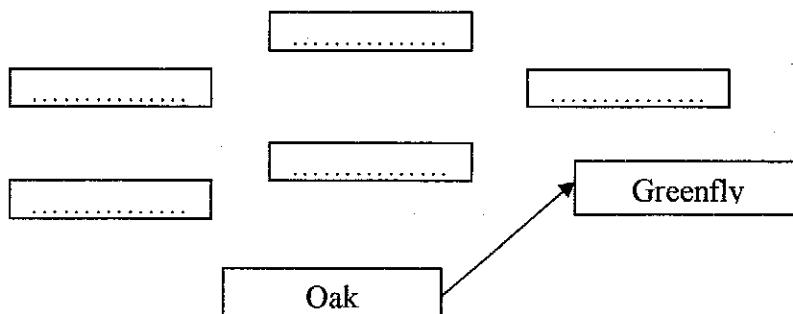
(5 marks)

(b) Some students made the notes below about feeding relationships in a wood.

- A greenfly got its food from Oak tree leaf.
- The ladybird ate the greenfly.
- A moth larva also ate parts of the oak tree.
- A spider ate a ladybird.
- The wood pecker ate the moth larva and the spider.
- A flueltit ate the moath larva and greenfly.

Complete the food web to show these relationships. One relationship is already done for you.

(5 marks)



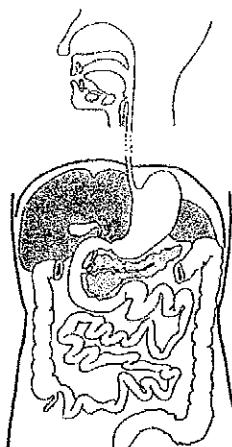
14. Plants absorb water and dissolved mineral salts from the soil.
(a) What do plants make from the following minerals?
(i) Magnesium
(ii) Nitrates
(b) Give two reasons why water is important for plants.
(c) Which plant vessels transport water and sugar?
(d) Explain how water rises up the plant.
15. (a) Give differences between asexual and sexual reproduction.
(b) Give one advantage of each type of reproduction above.
16. Malaria is the most killer disease in Africa.
(a) What causes malaria?
(b) How does it infect people?
(c) Describe all possible means you can recommend to prevent this killer disease.

(1 mark)
(1 mark)
(2 marks)
(2 marks)
(4 marks)
(8 marks)
(2 marks)

(1 mark)
(1 mark)
(8 marks)

SECTION C: This question is COMPULSORY. (15 marks)

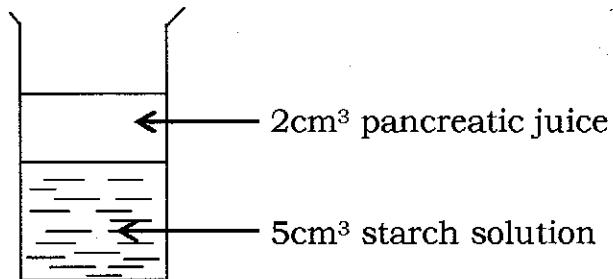
17. The diagram below shows the human alimentary canal.



Draw part of this diagram and answer the questions that follow.

- (a) On the diagram label the salivary glands and the pancreas.
(b) A mixture of starch and pancreatic juice as shown on the diagram below was kept at 37°C.

(2 marks)



Pancreatic juice contains enzymes.

- (i) Samples were taken from the mixture after one minute and after 10 minutes. The samples were tested for sugar and for starch.

The table below shows which test proved positive and which were negative. **(3 marks)**

	Sample 1 (1 minute)	Sample 2 (10 minutes)
Starch test	Positive	Negative
Sugar test	Negative	Positive

Explain what caused these changes in the mixture.

- (ii) The experiment was repeated using pancreatic juice which had been kept at 100°C for 10 minutes and cooled to room temperature before being added to the starch.
Complete the table below to show whether you would expect each test to be positive or negative in the 10 minutes samples. **(2 marks)**

	Sample 1 (1 minute)	Sample 2 (10 minutes)
Starch test	Positive
Sugar test	Negative

- (iii) How would you test the mixture for sugar? What would you observe if sugar were present? **(3 marks)**

- (c) The sugar produced during digestion are absorbed from the alimentary canal through the villi.

- (i) Where in the alimentary canal would find the villi? **(1 mark)**
(ii) State three features of the villi which help it to absorb sugar quickly. **(3 marks)**
(iii) Name one process by which sugars pass from the inside of the alimentary canal into the blood stream. **(1 mark)**

BIOLOGY I

001

07 Nov. 2011 08.30 am – 11.30 am

REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD (REB)
P.O.BOX 3817 KIGALI. TEL/FAX: 586871

ORDINARY LEVEL NATIONAL EXAMINATIONS 2011

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

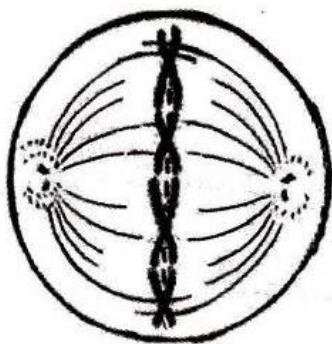
Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

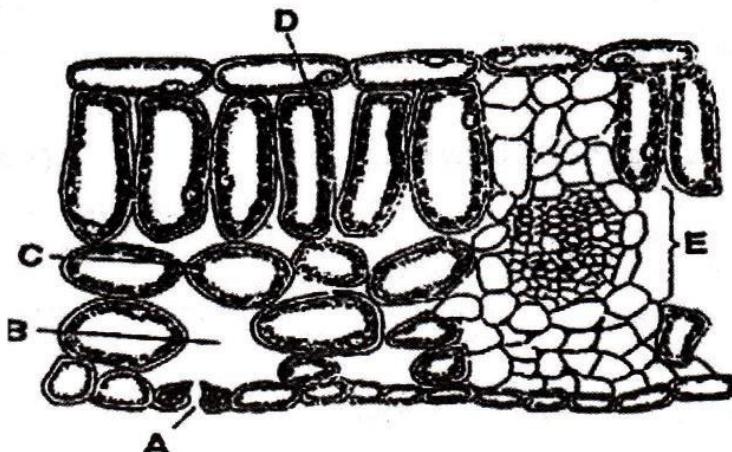
SECTION A: Attempt all questions from this section. (55 marks)

1. (a) Name any two diseases caused by a virus. **(2 marks)**
(b) A virus is described as a living and non-living organism. Explain why. **(2 marks)**
2. The following are parts of an organism: cell, organ, gene, tissue, chromosome, system. Arrange them in an increasing order of their size (i.e. from the smallest to the largest). **(6 marks)**
3. (a) What is the function of each of the following cell organelle?
(i) Mitochondrion. **(1 mark)**
(ii) Chloroplasts. **(1 mark)**
(iii) Golgi apparatus. **(1 mark)**
(iv) Endoplasmic reticulum. **(1 mark)**
(b) Give at least two similarities between an animal and a plant cell. **(2 marks)**
4. The figure below shows one of the stages of mitosis of cell division.



- (a) Which stage is represented in the figure? **(1 mark)**
(b) Describe the behaviour of chromosomes in this stage. **(2 marks)**
5. (a) Name different blood groups. **(2 marks)**
(b) What are the blood groups of:
(i) Universal donor? **(1 mark)**
(ii) Universal recipient? **(1 mark)**
6. (a) What are functions of the stomach in the digestion of man? **(2 marks)**
(b) Explain why carbohydrates are not digested in the stomach. **(2 marks)**
7. (a) Describe blood functions in a mammal. **(3 marks)**
(b) Give ONE reason why blood in arteries has high pressure than in veins. **(1 mark)**
8. (a) What features (adaptations) of fish enable it to live in water? **(2 marks)**
(b) Why does fish die immediately it is removed from water? **(2 marks)**

9. The figure below shows a cross section of a green leaf.



(a) Identify the structures labelled A, B, C and D.

(4 marks)

(b) What is the function of structures A and D respectively?

(2 marks)

10. Explain the following biological statements.

(a) Green plants manufacture their own food.

(1 mark)

(b) Animals are heterotrophic organisms.

(1 mark)

(c) There is no photosynthesis in plant roots.

(2 marks)

11. The chromosomes for determining the human sex are labelled X and Y.

		Parent 1	
		X	X
Parent 2	X

(a) Complete the punnett square to show the genotype of

(i) Parent 2

(ii) Of four offspring

(5 marks)

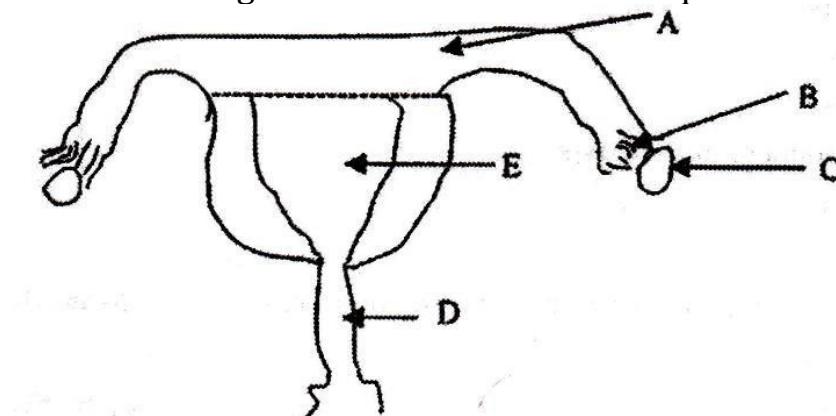
(b) Which parent is the mother?

(1 mark)

(c) What are chances of getting a baby girl?

(1 mark)

12. Examine the figure below and answer the questions that follow.



(a) What does this figure represent?

(0.5 mark)

(b) Name the parts labelled A, B, C, D and E.

(2.5 marks)

SECTION B: Attempt any THREE questions only.**(30 marks)**

13. The government of Rwanda has set up several organizations to fight against AIDS.
- (a) What is AIDS in full? **(1 mark)**
(b) What causes AIDS? **(1 mark)**
(c) How is AIDS spread from one person to another? **(3 marks)**
(d) Suggest at least five possible methods which you can use to prevent the spread of AIDS. **(5 marks)**
14. The following organisms were found abandoned in AKAGERA National Park in Rwanda:
- Green plants
 - Hawks
 - Lizards
 - Grasshoppers and locusts
 - Snakes.
- (a) Construct the food chain to show their feeding relations. **(4 marks)**
(b) Which organisms are:
(i) Herbivores? **(1 mark)**
(ii) Tertiary consumers? **(1 mark)**
(iii) Top carnivores? **(1 mark)**
(iv) Producers? **(1 mark)**
(c) What effect would the removal of grasshoppers and locusts have on other organisms? **(2 marks)**
15. (a) Draw a well labelled diagram of an external structure of a green plant leaf. **(5 marks)**
(b) One of the functions of a leaf is to carry out photosynthesis. How is a leaf adapted for this function? **(5 marks)**
16. (a) Define the term Photosynthesis. **(2 marks)**
(b) What are necessary conditions for photosynthesis to take place? **(4 marks)**
(c) What factors may affect the rate of photosynthesis? **(4 marks)**
17. (a) What are functions of the stomach in the digestion of man?
Define the term "Digestion". **(1 mark)**
(b) Name any three protein digesting enzymes. **(3 marks)**
(c) Mention any six healthy nutritional habits we are advised to practice. **(6 marks)**

SECTION C: Attempt only ONE question.**(15 marks)**

18. The government of Rwanda has established a parastatal body called RWANDA ENVIRONMENTAL MANAGEMENT AUTHORITY (REMA) to fight against the destruction of our environment.
- (a) In what ways is our environment being destroyed? **(5 marks)**

(b) Suggest all possible ways it has put forward to conserve our environment. **(10 marks)**

19. (a) (i) Define the term Osmosis. **(3 marks)**

(ii) Explain why osmosis is considered as a special case of diffusion. **(2 marks)**

(b) Senior three students in a Secondary School in Rwanda carried out an experiment to demonstrate (show) the process of osmosis.

(i) Suggest possible apparatus and substances (chemicals) they are likely to have used. **(3 marks)**

(ii) What observations are they likely to have noticed at the end of the experiment? **(4 marks)**

(iii) Explain these observations. **(2 marks)**

BIOLOGY I

002

09 Nov. 2010 08.30 – 11.30 am

RWANDA NATIONAL EXAMINATIONS COUNCIL



P.O BOX 3817 KIGALI-TEL/FAX : 586871

ORDINARY LEVEL NATIONAL EXAMINATIONS 2010

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

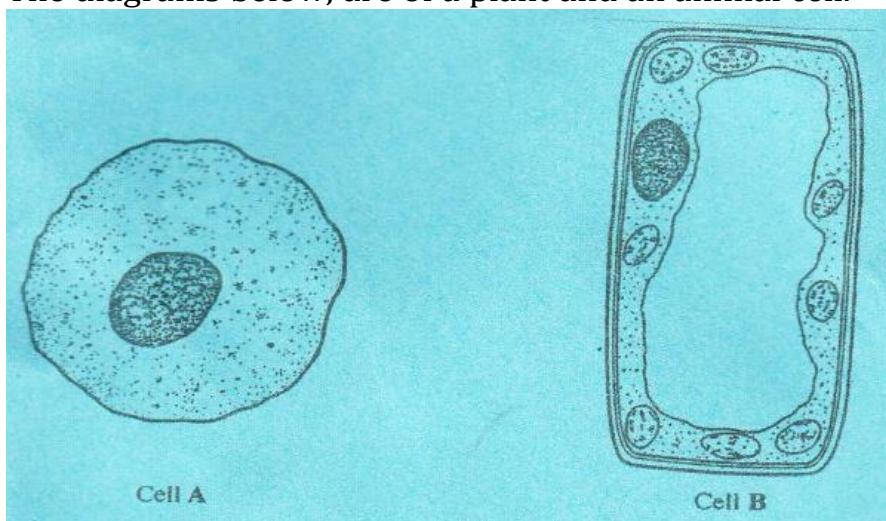
Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

1. The diagrams below, are of a plant and an animal cell.



Using the diagrams, answer the following questions:

- a) Name two structures found only in cell B.

(i) (1 mark)
(ii) (1 mark)

- b) Name two structures found in cells A and B.

(i) (1 mark)
(ii) (1 mark)

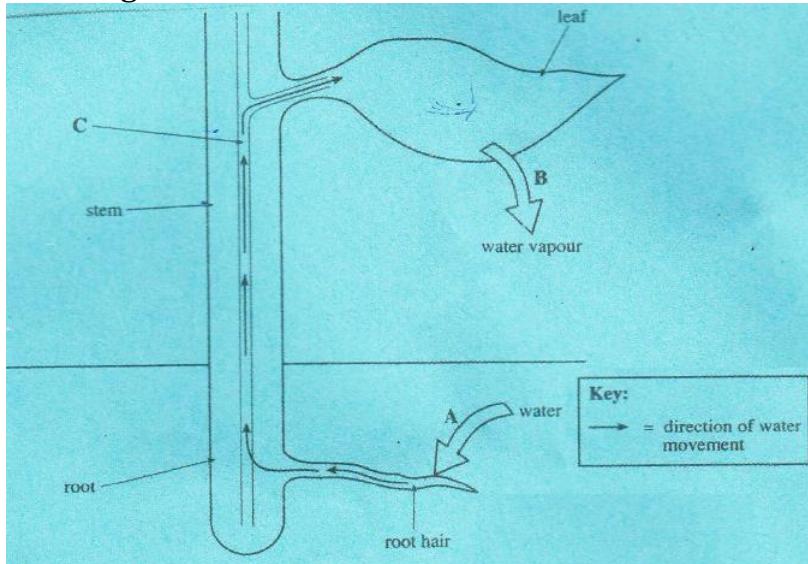
- c) (i) Which diagram shows a plant cell?

(ii) Give a reason for your answer in c (i). (1 mark)

2. a) State the region of the leaf which contains most chloroplasts. (2 marks)
b) What biological process occurs in the chloroplasts? (1 mark)
c) Explain the role of air spaces in the leaf. (2 marks)
3. The liver has an important function of maintaining balance in the amounts of nutrients in the blood of humans. It performs this function with the assistance of hormones.
a) Briefly outline how the liver adjusts the amount of proteins and carbohydrates present in the blood. (2 marks)
b) Describe ONE other function of the liver. (1 mark)
4. Proteins help in body building. Starch provides energy.
(a) Give one reason for a child's diet being rich in proteins. (1 mark)
(b) Give one reason for the diet of an elderly person requiring proteins. (1 mark)
c) Would a sugar cane cutter diet require more starch than that of a School teacher? Give a reason for your answer. (1 mark)
5. A student bought a chocolate bar and carried out several food tests on it. The following result were observed:
Benedict's test: an orange colour.
Biuret test: No colour change.
Iodine test: a blue-black colour.

- a) What two types of food are present in the chocolate bar? **(2 marks)**
- b) Using the results given above, give one reason to explain why a chocolate bar is not balanced meal. **(1 mark)**
- c) Eating this kind of chocolate bar regularly may lead to someone becoming overweight. Explain why. **(2 marks)**
6. a) Where in the digestive system is hydrochloric acid produced? **(1 mark)**
 b) What is the function of hydrochloric acid in the digestion of food? **(2 marks)**

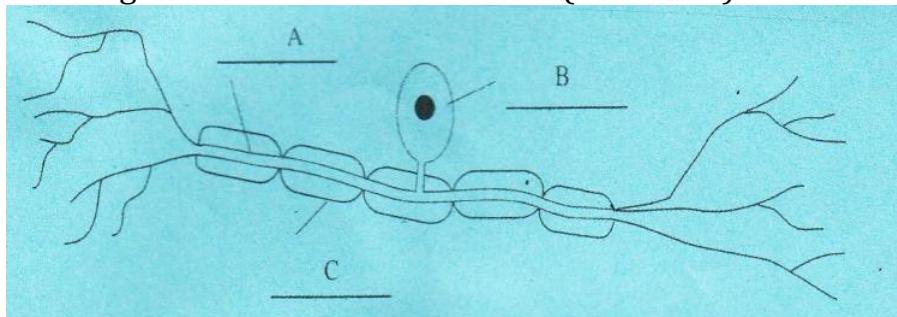
7. The diagram below shows the movement of water through the plant.



- a) Name the Process occurring at: **(2 marks)**
 i) A
 ii) B
- b) Name the tube labelled C. **(1 mark)**
- c) State ONE feature of root hairs that helps the process occurring at A. **(1 mark)**
- d) State TWO functions of water in the plant. **(2 marks)**
8. The figure below represents a food chain in the marine environment.
- | | | | |
|--------------------------|-----------------|--------------|--------------|
| A | B | C | D |
| Alga and
small plants | → Small animals | → Small fish | → Large fish |
| and larvae | | | |
- a) How would you call organisms labelled A and D? **(2 marks)**
 b) Discuss THREE possible effects on this food chain if the small fish at C are removed from it. **(3 marks)**
9. In humans, primordial germ cells undergo a process called Meiosis to produce egg cells and sperm cells. These cells have only half the normal number of chromosomes.
 a) What is the name given to a cell with only half the number of chromosomes? **(1 mark)**

b) Sometimes two eggs are fertilized, at the same time, producing non-identical twins. Explain why the offspring from this fertilization will not look exactly alike. **(2 marks)**

10. The diagram below shows a neuron (nerve cell).



a) Name the parts labelled A, B and C. **(3 marks)**

A:

B:

C:

b) There are three types of neuron: Sensory, Motor and. Relay. Describe the function of each type of neuron.

Sensory:

Motor:

Relay:

(3 marks)

11. a) How do Plants and animals differ in the way they obtain their food?

(2 marks)

b) Write a balanced chemical equation to represent the process by which plants obtain their food. **(1 mark)**

12.a) What is the essential difference between mitosis and meiosis? **(2 marks)**

b) Predict what is likely to happen to the chromosome numbers in successive generation if zygotic formation occurred from fusion of gametes formed by Mitosis rather than Meiosis? **(1 mark)**

c) The four blood groups found in man are A, B, AB and O. Consider the case of two parents who both belong to blood group A. What will be the possible genotypes and blood groups of their children? **(3 marks)**

Section B: Answer only THREE questions

13. a) Name two foods which are good sources of proteins. **(2 marks)**

b) Explain briefly why the human body needs proteins. **(2 marks)**

c) Describe an experiment you would carry out to test for proteins in a piece of food. Say what you would expect to see if protein was present. **(3 marks)**

d) Human Saliva can change a 1 % starch solution into a Maltose solution. Explain why digestive juice from the human stomach would not have this effect. **(3 marks)**

14. Cholera is a highly dangerous disease which is spread by bacteria. It is spread by eating or drinking food or water which is contaminated with the bacteria.

a) Which parts of the body are likely to be infected first when someone drinks water containing the cholera bacteria? **(1 mark)**

b) Explain how the cholera bacteria inside the body may cause disease. **(2 marks)**

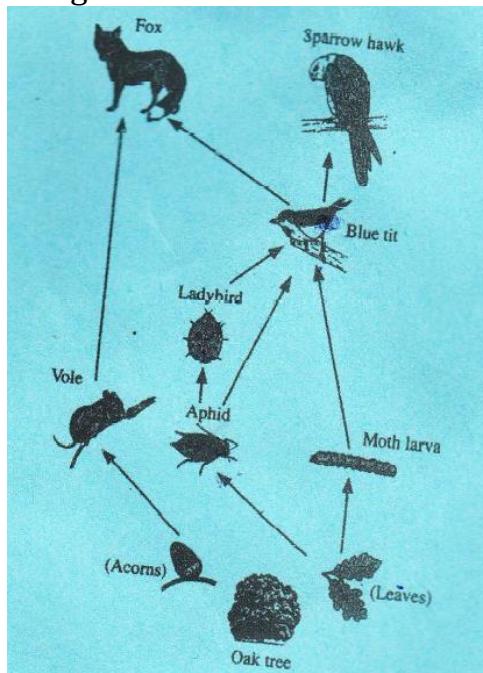
c) Name one other group of microbes that frequently cause diseases. **(1 mark)**

d) Cholera is very common in refugee camps where people live in crowded rudimentary accommodation. Explain why these people are likely to catch this disease. **(1 mark)**

e) Explain how the body defends itself against bacteria. **(3 marks)**

f) Smoking can cause diseases such as lung cancer. Explain why diseases caused by smoking are not infectious. **(2 marks)**

15. The diagram below shows a woodland food web.



a) Using the information in the food web, construct a food chain in spaces below. The producer has been included for you.

Oak tree leaves → → → → **(2 marks)**

b) What do arrows in the food chain indicate? **(1 mark)**

c) Why is the Oak tree called producer? **(1 mark)**

d) From the diagram: **(2 marks)**

(i) Name one herbivore.

(ii) Name one carnivore.

e) List **FOUR** effects that a large increase in the Ladybird population would have on the food web as a whole. **(4 marks)**

16. In Labrador dogs, the hair colour is controlled by a single gene which exists in two forms (alleles): black and yellow. A male dog with black hair is mated with female dog with yellow hair. All the F₁ offspring (puppies)

have black hair. When the puppies are old enough, two of them are mated together.

a) Complete the key to show the allele for yellow hair.

Key: B = Allele for black hair

..... = Allele for yellow hair

b) Complete the following to show the two matings:

1st mating

Parents: Male x Female

Phenotype:

(2 marks)

Genotype:

F1

Gametes
.....
.....

(2 marks)

2nd mating (F1 Puppy X F1 Puppy)

Gametes
.....
.....

(2 marks)

c) If eight puppies were born in the second mating, how many are likely to have yellow hair? (1 mark)

d) Using the information given above, state: (2 marks)

(i) The heterozygous genotype.

(ii) The dominant allele.

17. a) Define the term "Enzyme". (2 marks)

b) Describe the characteristics of enzymes. (8 marks)

Section C: Answer only ONE question. (15 marks)

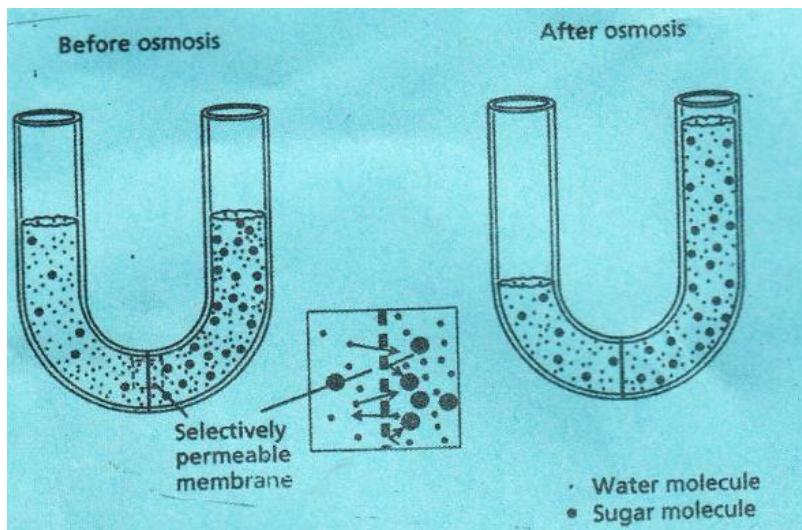
18.a) Define the following biological terms.

(i) Osmosis (2 marks)

(ii) Diffusion (2 marks)

b) Give two processes where Osmosis is used in living things. (2 marks)

c) Study the experiment below and answer the questions that follow.



(i) Why did the number of water molecules on each side of the membrane change, whereas the number of sugar molecules remained the same? **(5 marks)**

(ii) How does the plasma membrane of a cell compare with the membrane in the U-shaped tubes? **(4 marks)**

19. Describe an experiment you would carry out to test solutions suspected to contain.

- (i) Glucose
- (ii) Sucrose

In your description, name the reagents you would use and mention the results you expect. **(15 marks)**

BIOLOGY I

002

06th Nov. 2009 08.30 – 11.30 am

REPUBLIC OF RWANDA



NATIONAL EXAMINATIONS COUNCIL
P.O.BOX 3817 KIGALI

ORDINARY LEVEL NATIONAL EXAMINATION 2009

SUBJECT: BIOLOGY I

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

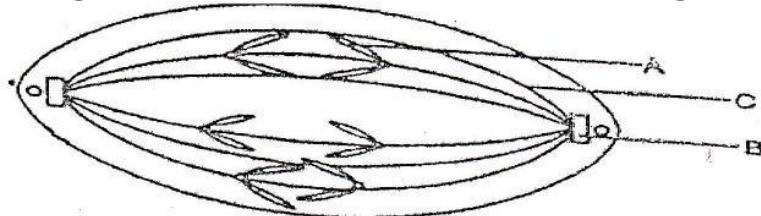
Answer only **one** question in section C **(15 marks)**

SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

1. Give three characteristics of class Amphibia. **(3 marks)**
2. What are the functions of the following structures?
 - i) Pancreas
 - ii) Muscles
 - iii) Gills**(3 marks)**
3. Match the structures with the organisms which possess them. **(4 marks)**

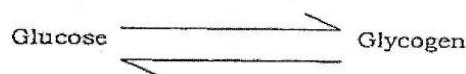
Structures	Organisms
Antennae	Fungus
Flagella	Snail
Spores	Housefly
Coiled shell	Euglena

4. Amoeba is a single celled organism which lives in water. Describe how it feeds. **(3 marks)**
5. (a) Describe four common features of a respiratory surface in animals. **(2 marks)**
(b) What advantage does aerobic respiration have over anaerobic respiration? **(2 marks)**
6. (a) Define osmosis. **(2 marks)**
(b) Explain why osmosis is considered a special case of diffusion. **(2 marks)**
7. The figure below shows an animal cell during a mitotic division.



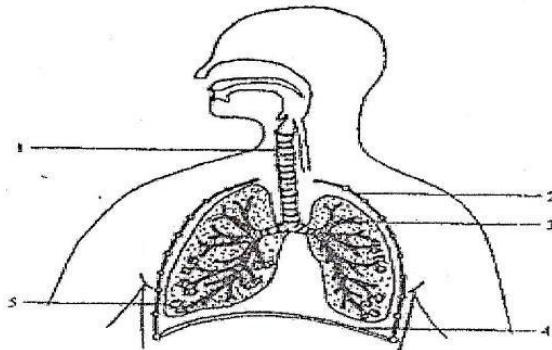
- i) Name the structures A, B and C. **(3 marks)**
- ii) What stage of mitosis is shown in the figure? **(1 mark)**
- iii) State two roles of mitosis. **(2 marks)**
8. (a) Explain why there is no digestion of starch in the stomach. **(2 marks)**
(b) Enzymes are specific. Explain this statement. **(2 marks)**
9. (a) Mammals have double circulation. What does this statement mean? **(2 marks)**
(b) Explain why large organisms need a circulatory system. **(2 marks)**

10. The following interconversions take place during metabolism of carbohydrates in a human body



- (a) In which organ does this reaction take place? **(1 mark)**
(b) Name two hormones that are involved in this reaction. **(2 marks)**
(c) What is the effect of excess glucose in the blood? **(2 marks)**

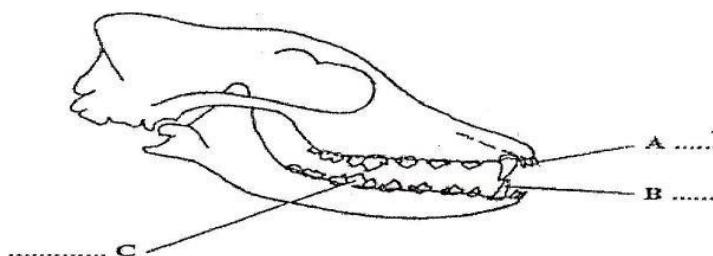
11. The diagram below shows some parts in the human thorax.



- a) Label the numerated parts in the thorax by completing the table below. **(5 marks)**

Numbers	Name of part
1	
2	
3	
4	
5	

12. The diagram below shows the side view of the skull of a carnivore.



- a) Label the teeth A, B, and C. **(3 marks)**
b) What function does each of the types of teeth mentioned in (a) above perform in helping this carnivore feed? **(3 marks)**
- A.....
B.....
C.....
- c) The jaw movement of carnivores and herbivores are different because they feed on different kinds of food.
i) Describe the jaw movement of a carnivore. **(1 mark)**
ii) Describe the jaw action of a herbivore. **(1 mark)**

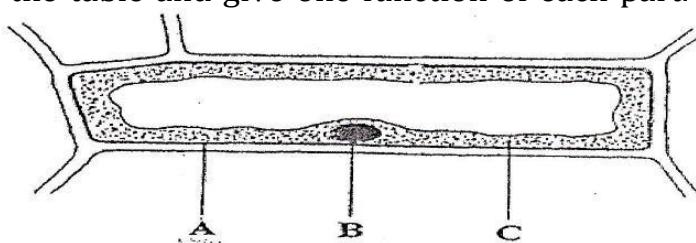
13. In mice, the gene for black fur is dominant over the gene for brown fur. The gene for black fur can be represented by "B" while "b" represents the gene for brown fur.

- a) What is the genotype of a brown mouse? **(1 mark)**
b) What are the possible genotypes of a black mouse? **(2 marks)**

SECTION B: Attempt any THREE questions in this section. (30 marks)

14. (a) Define photosynthesis. **(1 mark)**
(b) What are the raw materials of photosynthesis? **(2 marks)**
(c) Explain how a leaf is adapted to photosynthesis. **(4 marks)**
(d) Mention three factors that may influence the rate of photosynthesis. **(3 marks)**

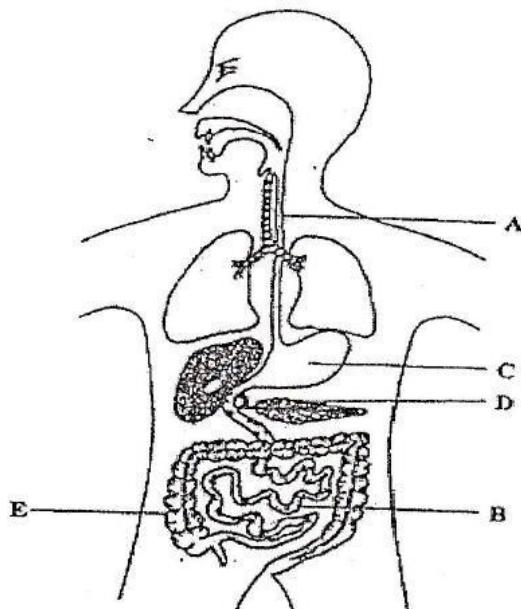
15. a) Plants are made of cells. The diagram below shows a plant cell. Complete the table and give one function of each part. **(6 marks)**



	Name	Function
A		
B		
C		

- b) Animals are made of cells. Describe two differences and similarities between plant and animal cells. **(4 marks)**

16. The diagram below shows several organs of a human body.



Complete the table below by naming each labelled organ and give one of its functions. **(10 marks)**

	Name	Function
A		
B		
C		
D		
E		

17. (a) Define pollination. **(2 marks)**
(b) Explain how the increased use of fossil fuels could be responsible for acid rain and global warming.
- Acid rain..... **(4 marks)**
Global warming..... **(4 marks)**
18. (a) Describe the process of fertilization in man. **(4 marks)**
(b) How can you prevent fertilization in man? **(6 marks)**

SECTION C: Attempt one question from this section. (15 MARKS)

19. a) Describe the different types of carbohydrates giving examples of each type. **(10 marks)**
b) You are provided with a solution which is suspected to contain reducing sugar. Describe the possible tests you can carry out to confirm that it is a reducing sugar. **(6 marks)**
- 20.a) Describe the composition of blood. **(4 marks)**
b) Explain how blood cells transport oxygen. **(4 marks)**
c) How are blood cells adapted to transport oxygen? **(4 marks)**
d) Explain why animal cells burst when in water but plant cells do not. **(3 marks)**

Biology III

002

07 Nov. 2008

8.30am-11.30am

RWANDA NATIONAL EXAMINATIONS COUNCIL



P.O.BOX 3817 KIGALI-TEL/FAX: 586871

ORDINARY LEVEL NATIONAL EXAMINATION 2008

SUBJECT : BIOLOGY III

TIME : 3 HOURS

INSTRUCTIONS:

This paper consists of **THREE** Sections A, B and C.

- Answer **ALL** questions in section A. **(55 marks)**
- Answer **THREE** questions in section B. **(30 marks)**
- Answer only **ONE** question in section C. **(15 marks)**

Section A: Answer all questions. (55 marks)

1. (a) Explain what it means when a person is said to be HIV positive. **(1mark)**
(b) Name THREE common ways HIV/AIDS can be transmitted from one person to another. **(3marks)**

2. Explain why:
(a) Babies need a high proportion of protein in their diet than adults. **(2marks)**
(b) Marathon runners need a high proportion of carbohydrates. **(2marks)**

3. (a) What is the function of a root? **(1mark)**
(b) Explain the significance of root hairs. **(1mark)**
(c) Suggest why the proteins in cell membranes are globular rather than fibrous. **(2marks)**

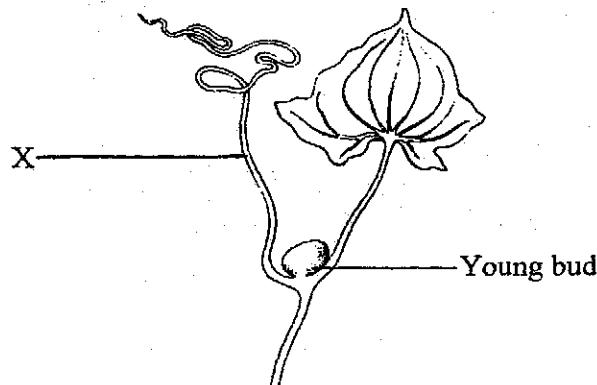
4. Name the primary nitrogenous excretory products in the following organisms.
(a) Man
(b) Lizard
(c) Fish
(d) Insects. **(4marks)**

5. (a) Define an ecosystem. **(1mark)**
(b) Explain the role of producers to the functioning of an ecosystem. **(3marks)**

6. The diagram below shows a bryophyllum leaf carrying out a biological process.

(a) Name this biological process. **(1mark)**
(b) Give one advantage and disadvantage of this process. **(2marks)**

7. (a) Briefly explain the role of the following in germination:
(i) Water
(ii) Oxygen
(iii) Gibberellic acid. (3marks)
- (b) An adult man needs about 60g of proteins per day.
Why does he gain nothing if he eats more than this? (2marks)
8. (a) Describe two ways in which plants manage to attract animal pollinators. (2marks)
- (b) Compare the efficiency (effectiveness) of wind and insect pollination. Give reason for your answer. (3marks)
9. The diagram below shows a leaf of a wild yam.



- (a) Label the structure X. (1mark)
- (b) What is the function of X? (1mark)
10. (a) Explain what is meant by the term:
i) diastole
ii) systole (2marks)
- (b) Explain how the body manages to increase the rate of blood flow during exercise. (2marks)

11. The diagram below shows a cactus plant.



What features does this plant have to show that it is a desert plant?

(3marks)

12. (a) The leaf surface is covered with the waxy cuticle. Explain why. **(1mark)**
- (b) Explain why the leaf epidermis is transparent. **(1mark)**
- (c) Explain why leaves are usually broad and flat. **(2marks)**
13. Define the following terms:
- (a) Metamorphosis
- (b) Moulting
- (c) Instar. **(3marks)**
14. (a) Diabetes insipidus is one type of diabetes caused by lack of ADH. Based on what you know of the role of ADH in Kidney function, describe the symptoms of this disease. **(2marks)**
- (b) Suggest how this disease might be treated. **(1mark)**
- (c) Explain why alcohol consumption in excess causes dehydration and thirst. **(2marks)**

15. The table below shows the diploid number of chromosomes in the cells of some organisms.

Organism	Diploid number
Human	46
Pea	14
Mouse	40
Maize	20

(a) Define the terms:

- (i) Diploid
- (ii) Haploid

(2marks)

(b) What is haploid number of chromosomes in a mouse?

(1mark)

(c) How many chromosomes would you find in leaf cell of a pea?

(1mark)

Section B: Answer only THREE questions. (30 marks)

16. (a) Although Ebola is dangerous disease, it is probably less likely to cause as many death as the HIV/AIDS pandemic. Explain why AIDS has greater potential to kill a large proportion of the world population.

(6marks)

- (b) Suggest ways in which people in your village could reduce the occurrence of Malaria carrying mosquitoes in their immediate area.

(4marks)

17. (a) The xylem and phloem of the root are continuous with the xylem and phloem of the stem and leaves. Explain why this continuous system of tubes is necessary for the plant.

(7marks)

- (b) Explain why it is necessary for root tip to be covered by a protective cap of cells.

(3marks)

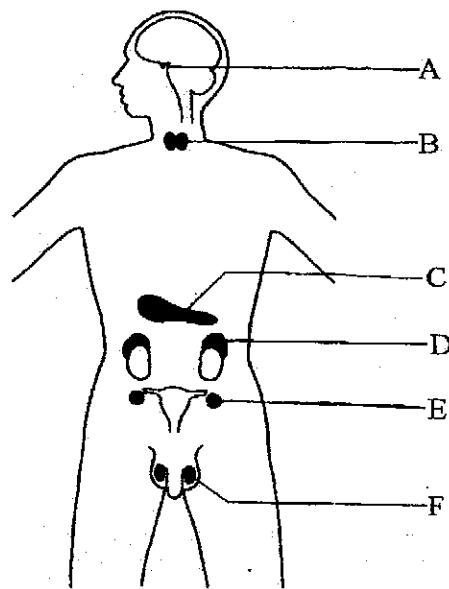
18. (a) Describe some of the potential disadvantages of reproducing asexually and advantages of reproducing sexually.

(8marks)

- (b) What is parthenogenesis?

(2marks)

19. The diagram below show the position of Endocrine glands in humans.

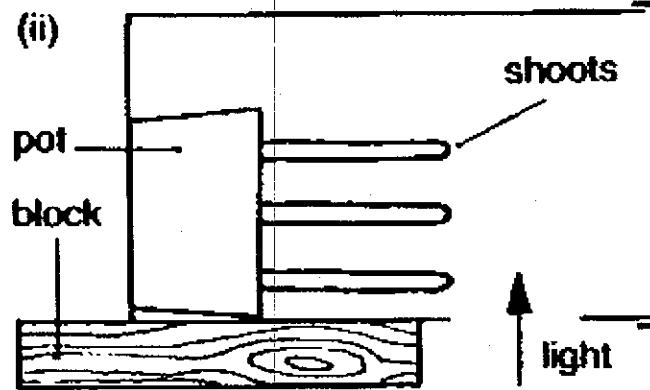
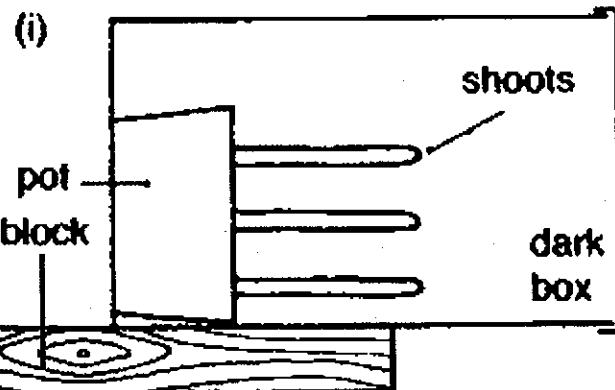


(a) Name the glands A-F. (6marks)

(b) Name some of the hormones produced by gland A. (2marks)

(c) What are functions of Insulin hormone? (2marks)

20. Two containers were set up as shown below.



(a) Describe why they are set up as they are. (5marks)

(b) Describe what will happen in each case. (5marks)

Section C: Answer only ONE question. (15 marks)

21. The following table gives data for the rate of blood flow to various parts of the body at rest and during heavy exercise.

ORGAN OR TISSUE	AT REST		HEAVY EXERCISE	
	Cm³ min⁻¹	% of total	Cm³ min⁻¹	% of total
Brain	700	14%	750	4.2%
Heart	200	- %	750	- %
Lung tissue	100	- %	200	- %
Kidney	1.100	- %	600	- %
Liver	1350	- %	600	- %
Skeletal muscle	750	- %	12.500	- %
Bone	250	- %	250	- %
Skin	300	- %	1900	- %
Thyroid gland	50	- %	50	- %
Adrenal gland	25	- %	25	- %
Other tissues	175	- %	175	- %
Total	5000	100%	17800	100%

(a) Calculate the percentage of the total blood flow that each organ or tissue receives under each regime of activity.

(10marks)

(b) Compare the blood flow to the Kidney, liver and skeletal muscle and skin during both activities. Explain your answer.

(5marks)

22. (a) Why are enzymes important?

(5marks)

(b) List characteristics of enzymes. For three characteristics describe controlled experiments which you can perform to demonstrate the characteristic.

(10marks)

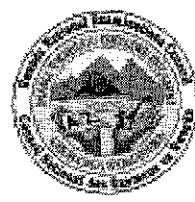
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Biology III

002

02 Nov. 2007

8h30 -11h30



P.O.BOX 3817 KIGALI-TEL/FAX : 586871

ORDINARY LEVEL NATIONAL EXAMINATION 2007

SUBJECT : BIOLOGY III

TIME : 3 HOURS

INSTRUCTIONS :

This paper consists of THREE Sections: A, B and C.

- Answer ALL questions in section A. (55 marks)
- Answer THREE questions in section B. (30 marks)
- Answer ONE question in section C. (15 marks)

Section A : Attempt all questions in this section. (55 marks)

1. a) What is a cell ?
b) What are the main requirements of a cell if it is to survive ?

(1mark)
(4marks)

2. a) Complete the classification of man below.

Kingdom : Animalia
Phylum : Chordata
Mammalia
Order : Primates
Family : _____
Genus : _____
Species : Homo sapiens

(3marks)

- b) Define the term species.

(1mark)

3. What is meant by each of the following ecological terms ?

- (i) a community
(ii) a population
(iii) a niche

(3marks)

4. a) Define the term pollination.
b) What are the characteristics of wind pollinated flowers ?

(1mark)
(3marks)

5. a) What is birth control ?
b) Name any 4 methods used in birth control.

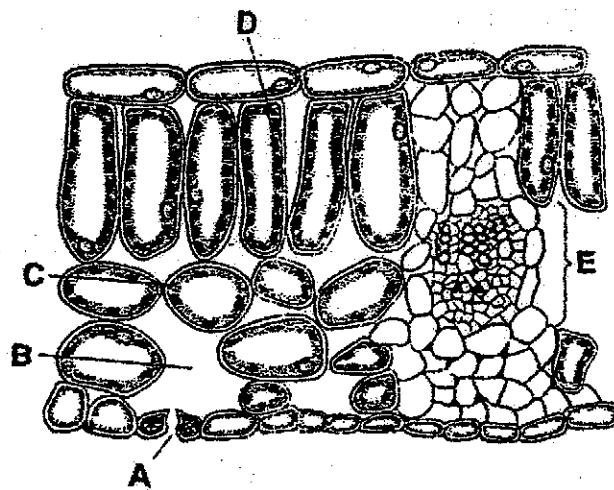
(1mark)
(4marks)

6. The table below refers to features of certain vitamins. Copy and complete the table with **✓** if the feature is correct and **X** if the feature is not correct.

Features	Vitamin A	Vitamin B
Fat soluble		
Present in wheat germ		
Present in green vegetables		
Promotes proper vision (right)		
Can be synthesized from Carotene in intestine		

(5marks)

7. a) The diagram below shows a cross section through a green leaf.



(i) Identify the structures labelled A, B, C and D.

A-----

B-----

C-----

D-----

(4marks)

(ii) What is the function of A and D ?

(2marks)

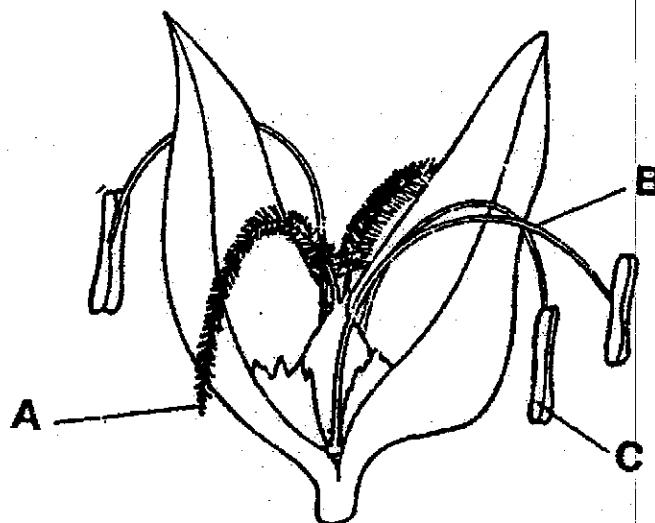
8. a) Distinguish clearly between complete dominance and codominance. (2marks)

b) Explain how a man with blood group A and a woman with blood group B can have a child with blood group O. (2marks)

9. a) How does the skin of mammals help them to maintain a constant body temperature in cold conditions ? (2marks)

b) Outline the advantages to a mammal of having a constant body temperature. (2marks)

10. The diagram below shows the structure of a flower.



- (i) Identify structures A, B and C.
(ii)

A-----
B-----
C-----

(3marks)

- (iii) Describe the process of pollination that is most likely to take place. (2marks)

11. The blood of a normal person contains between 80-90mg of glucose per 100cm^3 . However, glucose level will rise. Where are the sources of glucose in the body ?

(3marks)

12. The table below shows the number of organisms obtained at each trophic level in a sampling study of an acacia tree.

Trophic level	Number of organisms
Producer	1
Primary consumer	260.000
Secondary consumer	40
Tertiary consumer	3

- a) Draw a pyramid of Biomass to represent this food chain.

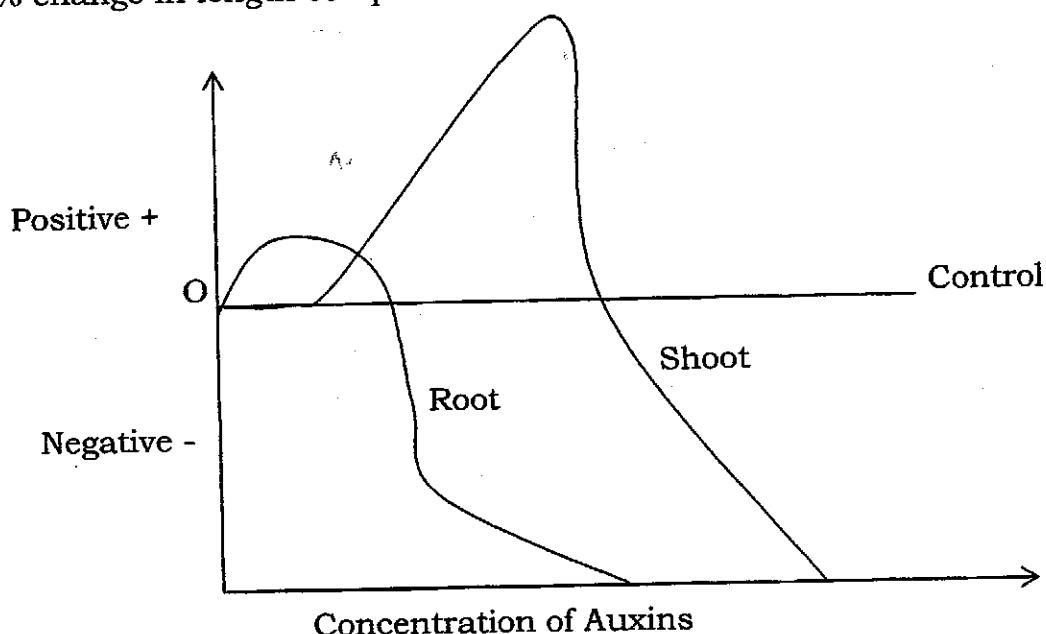
(2marks)

- b) Suggest reasons why there is such a large difference between the numbers of primary and secondary consumers.

(2marks)

13. The graph shows the effect of applying different concentrations of auxin to roots and shoot of a plant. Use the graph to describe ways in which the responses of the root to auxin differs from the responses of the shoot.

% change in length compared with untreated control.



(2marks)

14. The table below refers to features of arteries, veins and capillaries.
Copy the table. If the statement is correct, place a tick in the appropriate box and if the statement is not correct place a cross in the appropriate box.

Features	Arteries	Vein	Capillaries
Walls permeable			
Collagen fibres present in walls			
Series of valves present			

(3marks)

Section B : Attempt any THREE questions in this section. (30 marks)

15. Describe how water transport in a flowering plant takes place:

- a) From its uptake from soil by root hairs.
- b) Its transport up the stem to the leaves
- c) Its evaporation from leaves into the atmosphere.

16. Xerophytic plants are adapted to live dry conditions. What features do these plants possess to enable them survive in such conditions ? Explain the role of each feature.

(10marks)

17. a) What are AIDS and HIV in full ?

(2marks)

b) What are differences between AIDS and HIV ?

(2marks)

c) (i) Describe how AIDS is spread from one person to another.

(2marks)

ii) Suggest any 2 methods of how the disease can be reduced.

(4marks)

18. a) (i) What are the main excretory organs ?

(ii) What are their respective excretory products in animals ?

(5marks)

b) Plants do not have excretory system as in animals. Explain.

(5marks)

19. a) What are the differences between vegetative and sexual reproduction in plants ?

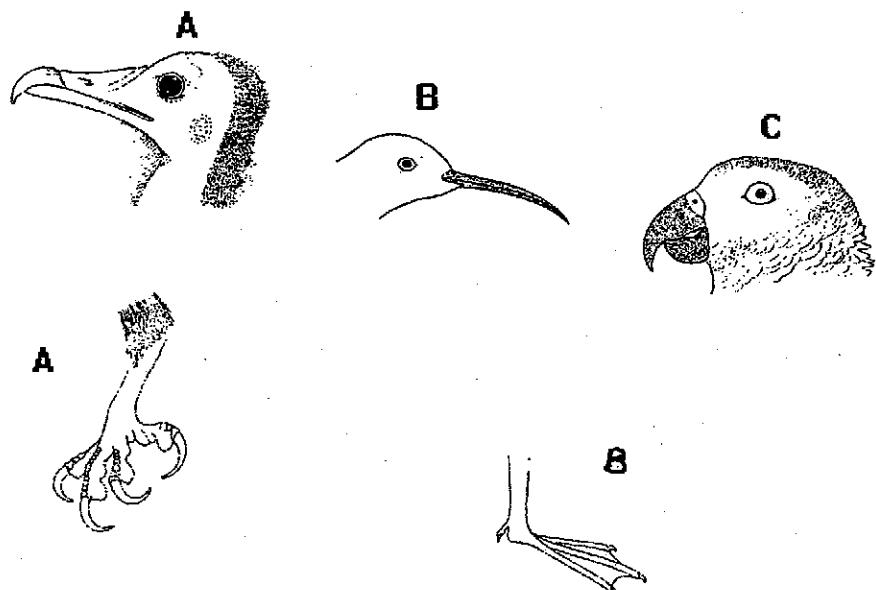
(5marks)

b) What advantage does each type have over the other ?

(5marks)

Section C : Answer only one question. (15 marks)

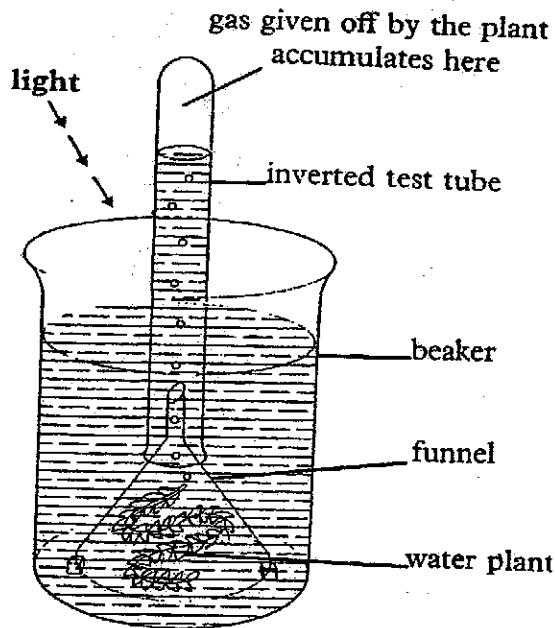
20. a) For each of the bird's beak and feet describe their adaptation to the methods of feeding and locomotion of foot B.



b) Which features adapt birds for flying ?

(10marks)

21. A group of students carried out the experiment below to investigate that oxygen is given by plants during a biological process.



- (i) Name the biological process being investigated. **(2marks)**
- (ii) What conditions are necessary for that process you have named in (i) above. **(5marks)**
- (iii) Describe in detail how the process works until its final products are formed. **(8marks)**

RWANDA NATIONAL EXAMINATIONS COUNCIL

Biology III

017

09 Nov. 2006

8.30 a.m -11.30 a.m



P.O. BOX: 3817 KIGALI-TEL/FAX : 586871

ORDINARY LEVEL NATIONAL EXAMINATION 2006

SUBJECT : BIOLOGY III

DURATION : 3 HOURS

INSTRUCTIONS :

This paper consists of THREE Sections: A, B, and C.

Section A : Attempt ALL questions in this section (55 marks)

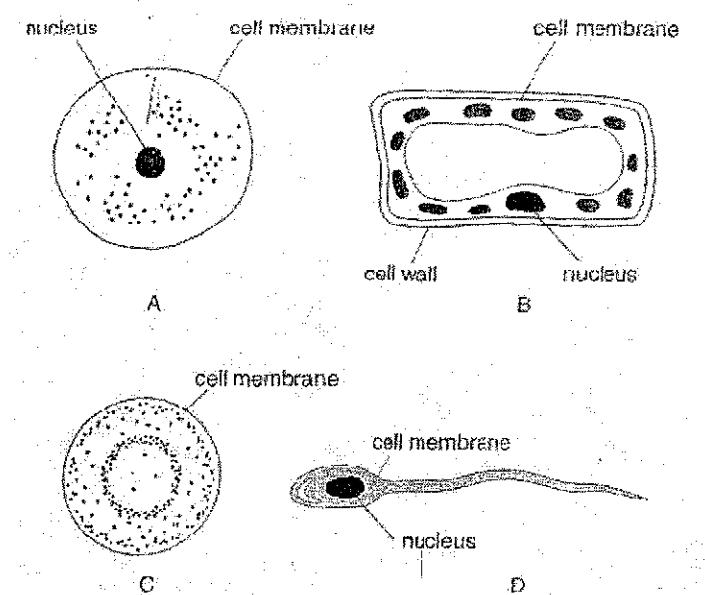
Section B : Attempt any THREE questions in this section (30 marks)

Section C : This section is compulsory (15 marks)

SECTION A (55 marks)

Attempt all questions in this section.

1. The diagrams below represent types of cells.



- a) Which diagram : A, B, C or D shows a plant cell ? Explain your answer.

3marks

2. Using ✓ and X, show the parts of the cell found in a plant cell and animal cell. The first one is done for you.

Part	Plant cell	Animal cell
a nucleus	✓	✓
a cell membrane		
Cytoplasm		
a cell wall		
a vacuole		
Chloroplast		

5marks

3. Photosynthesis takes place in cells containing chlorophyll.

- What colour is chlorophyll ?
- Where in a cell is chlorophyll found ?
- What is the function of chlorophyll ?

3marks

4. Plants need mineral salts.

- a) Through which part do mineral salts get into the plant ?
b) Explain why water is important in this process.

1mark

2marks

5. Copy and complete the table below

Mineral ions	Why needed by a plant	Effect if missing in soil
Nitrate		
Phosphate		
Potassium		

6 marks

6. Blood contains plasma, platelets, Red cells and white cells. Each has one or more important functions. Copy the table below and draw a line from each part to its function.

- | | |
|---------------|------------------------------------|
| . Red cells | . Fight bacteria |
| . Platelets | . Carries dissolved hormones |
| . Plasma | . Carries dissolved urea |
| . White cells | . Transport oxygen around the body |
| | . Help blood to clot. |

5 marks

7. For each of the following digestive substance, name the site of its production.

Digestive substance	Site of Production
Bile	
Amylase	
Lipase	
Protease	

4 marks

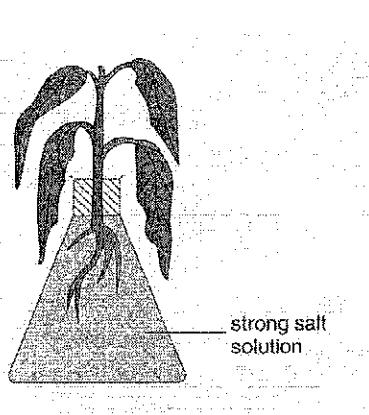
8. Describe how the liver helps to digest fats.

2marks

9. Red blood cells contain haemoglobin. Explain how this enables red blood cells to pick up oxygen from the alveoli and release it to the cells in other parts of the body.

4marks

10. The thickest muscular wall in the heart is that of the left ventricle.
Why is this wall so thick ? **2marks**
11. Give THREE functions of the human skeleton. **3marks**
12. a) What is a synovial joint ? **1mark**
- b) What function does each of the following have in a joint.
(i) a tendon
(ii) a ligament
(iii) synovial membrane
(iv) synovial fluid
(v) a cartilage **5marks**
13. In a pea plant the allele for being tall plant (T) is dominant over the allele for being a dwarf plant (t).
a) Explain using a genetic diagram what would be produced if
(i) A homozygous tall plant is crossed with a homozygous dwarf plant. **2marks**
(ii) Two plants from the crossing in (i) above were crossed. **2marks**
- b) Why is it impossible to have a heterozygous dwarf plant. **2marks**
14. The diagram below shows what happens to a plant after 6 hours in strong salt solution.



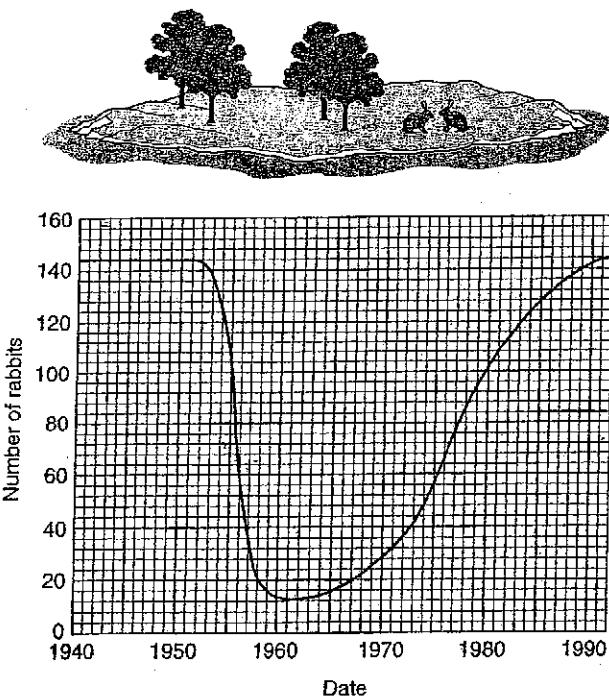
Why has this plant wilted ? **3 marks**

SECTION B. (30 marks)

Attempt any THREE questions in this section

15. a) What draws water all the way from the roots to the leaves of a plant ? **4 marks**
- b) What is transported along the xylem tissues ? **2 marks**
- c) What is transported along the phloem tissue ? **2 marks**
- d) Describe how cells become turgid but do not burst. **2 marks**

16. A population of rabbits lived on a small island. The graph below shows their population over the last 50 years.



- a) (i) How many rabbits were there on the island in 1950 ? **1 mark**
(ii) Give one year when there were 88 rabbits on the island. **1 mark**
- b) (i) Calculate the decrease in rabbit population between 1950 and 1960. **1 mark**
ii) Suggest reason (s) why the rabbit population fell in these years. **3marks**

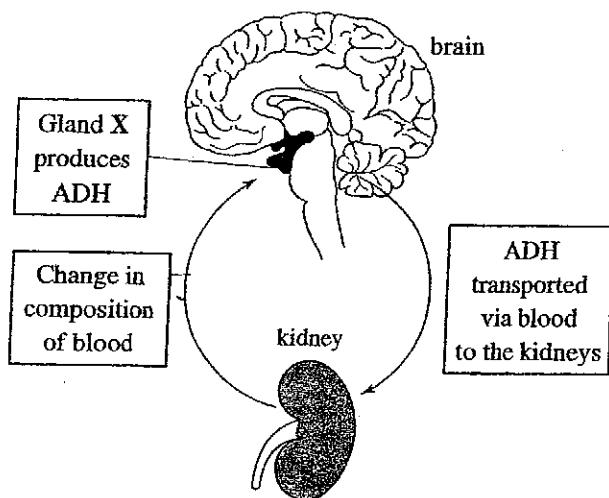
c) (i) The population of rabbits increased after 1960. Suggest reasons.

2marks

(ii) The highest number of rabbits on the island is always about 140. Suggest reason (s) for this.

2 marks

17. The diagram below shows some of the processes which control the composition of blood.



a) (i) Name gland X

1 mark

(ii) What is the stimulus which causes gland X to produce ADH ?

2 marks

(iii) What is ADH and write it in full.

2 marks

b) Describe the effect of an increase in ADH production on the kidney and on composition of urine.

2 marks

18. a) i) Where are hormones produced ?

1 mark

ii) How do hormones move around the body?

1 mark

b) (i) Insulin and glucagons are hormones. Where are they produced ?

2 marks

(ii) Explain the roles of insulin and glucagons in controlling blood sugar levels.

6 marks

19. a) (i) In hot weather the diameter of the blood vessels supplying the capillaries in the skin changes. Explain how this change keeps us cool.

4 marks

(ii) Give other ways how the skin keeps us cool.

3 marks

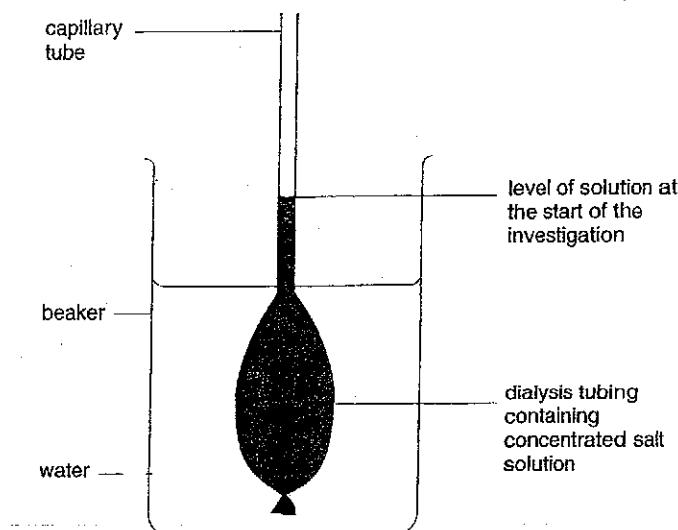
(iii) Give other functions of the skin.

3 marks

SECTION C (15 marks)

This section is compulsory

20. Some students set up the equipment below to investigate osmosis.



a) Define osmosis.

3 marks

b) (i) What will happen to the water level in the capillary tube during investigation of osmosis.

1 mark

d) Use your Knowledge of osmosis to explain why this happens

5 marks

d) A red blood cell when put in a beaker containing pure water eventually bursts but a plant cell never bursts in pure water. Using your Knowledge of osmosis explain why this happens.

6 marks

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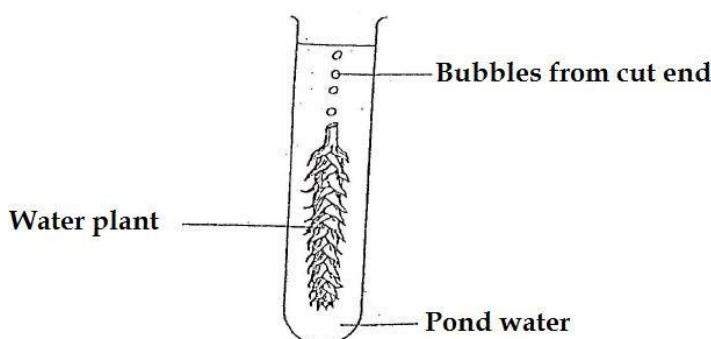
15. (a) Name the component of gastric juice produced in the stomach.
(b) Give their main functions. **(10 marks)**

16. A plant with Red flowers was crossed with one with white flowers. All the F₁ offspring had red flowers.
(a) Explain why there were no white flowers in F₁ offspring.
(b) Using suitable genetic symbols, show the genotype and phenotypes of crossing F₁ offspring among themselves. **(10 marks)**

17. Describe the main functions of the liver. **(10 marks)**

SECTION C: This section is compulsory. **(15 marks)**

18. Students in a certain school performed the experiment below.



A stream of bubbles is given off from the cut end of the water plant when it is put outside in the open. The rate at which bubbles were given off was counted at noon on different days. The results are shown in table below.

Weather / light	Number of bubbles per minute
Day 1 very cloudy	4
Day 2 light cloudy	10
Day 3 sunny	13
Day 4 sunny	15
Day 5 cloudy	7

- (i) What gas is given off? **(2 marks)**
(ii) What process is being investigated? **(2 marks)**
(iii) From observation, what can you say about the effect of weather conditions on the process? **(3 marks)**
(iv) Name the factors that may be affecting the rate of bubbling. **(3 marks)**
(v) Describe how you would investigate the effect of light intensity on the rate of bubbling. (Assume that a meter for measuring light intensity is available). **(5 marks)**

MARKING SCHEME OF ORDINARY LEVEL BIOLOGY NATIONAL EXAMINATION 2003/2004

Section A: Answer all questions

1. *Reproduction, irritability, growth, nutrition, respiration and excretion.*
2. (a) *Some of the diseases spread by flies are: typhoid, cholera, diarrhoea, amoebic dysentery...*
(b) *Ways to prevent such diseases are: cover the food, cover the toilets.*
3. *Organisms and their respective groups:*

Organisms	Groups
<i>Trichomonas</i>	<i>Flagellata</i>
<i>Amoeba</i>	<i>Rhizopoda</i>
<i>Paramecium</i>	<i>Ciliata</i>
<i>Plasmodium</i>	<i>Sporozoa</i>

4. (i) *Millipede*
(ii) *Is a herbivore (primary consumer). This means that it feeds on plant material.*
5. A: *Left kidney*
Function: it filters blood to form urine; removal of metabolic waste products such as urea; elimination of excess water and salts; regulation of blood PH.
B: *Left ureter*
Function: it conducts urine from the kidney to the bladder.
C: *Urinary bladder*
Function: it stores urine temporarily before it is removed from the body.

6. *Adaptations of the leaf for photosynthesis*
 - *A large surface area that collects as much sunlight as possible.*
 - *A thin lamina (leaf blade), as most light is absorbed in the first few millimetres of the leaf and the diffusion distance is kept short.*
 - *A transparent cuticle and epidermis that let light through to the photosynthetic palisade cells beneath.*
 - *Numerous stomata for gaseous exchange that open and close in response to changes in light intensity.*
 - *Many air spaces, especially in the spongy mesophyll, to allow diffusion of carbon dioxide and water.*

- A network of vascular tissue made up of xylem that brings water to the leaf cells and phloem that carries away the sugars produced in photosynthesis.
7. (a) (i) Dominant: an allele that is expressed in the heterozygous state.
(ii) Recessive: an allele that is expressed in the homozygous state only. Or an allele that is not expressed in the heterozygous state.
(b) Phenotypic ratio in The F₂ generation: 3 Round : 1 wrinkled
Round seeds = $\frac{7524 \times 3}{4} = 5643$
Wrinkled seeds = $\frac{7524 \times 1}{4} = 1881$
8. Pollination may occur without fertilization taking place because the pollen grains can be transferred from anthers to the stigma and could not germinate to the stigma along the style in order to reach the micropyle of the ovule.
Fertilization cannot take place without pollination because the pollen grains must be deposited on the stigma from the pollen grains and grow along the style until when fertilization occurs.
9. (i) The type of reproduction shown is asexual reproduction or vegetative reproduction.
(ii) Advantages of asexual reproduction:
Only one parent is required.
Rapid reproduction
Offspring are identical to their parents, so they share good characters
10. Common characteristics of insects: body divided into three parts; have three pairs of legs; have one pair of antennae.
- 11.
- | Trophic level | Organism |
|--------------------|----------------------------|
| Herbivore | Periwinkle |
| Producer | Seaweed |
| Secondary consumer | Starfish, crab and octopus |
| Top carnivore | Seal, seagull |
| Primary consumer | Limpet, periwinkle |
12. (a) A: stomach; B: pancreas; C: Large intestine (colon).
(b) Secretion and absorption
(c) The function of fiber in the human diet is to facilitate the passage of food in the digestive system.

(d) Secretion of digestive enzymes and secretion of hormones.

Section B: Answer only three questions

13. (a) The components of blood are the white blood cells (leucocytes), red blood cells (erythrocytes), platelets (thrombocytes) and plasma.

Plasma: transports nutrients, urea, hormones, blood cells...

Red blood cells: transports oxygen and carbon dioxide.

White blood cells: body defence, production of antibodies.

Platelets: blood clotting.

(b) Unicellular organisms such as amoeba do not need a transport system because they have a large surface area to volume ratio. Diffusion alone is enough to carry nutrients and to remove metabolic waste products from the cell.

14. (a) Organisms and their trophic (feeding) level

Organisms	Trophic level
A	Secondary consumer
B	Primary consumer
D	Producer (autotroph)
E	Tertiary consumer since it consumes A. Secondary consumer since it consumes C.
F	Primary consumer (herbivore)

(b) Removing organism G from this food web results into:

Increase of E.

Decrease of A, B and C.

Increase of D and F.

15. (a) The main components of gastric juice are: hydrochloric acid, mucus, rennin and pepsin.

(b) **Functions of HCl:** kills bacteria present in the food; inactivates salivary amylase (ptyalin); activates pepsin (converts inactive pepsinogen into active pepsin); provides a suitable PH for the functioning of pepsin and renin.

Function of pepsin: converts proteins into small peptides.

Functions of mucus: to prevent the digestion of the walls of stomach by pepsin; to stop the acidic action on the walls of the stomach.

Function of rennin: coagulates milk (converts a soluble protein called caseinogen present in the milk into an insoluble protein called casein).

16. (a) The allele for red flower is **dominant** over the allele for white flowers because the F_1 offspring have red flowers.

The allele for white colour is recessive because it is not expressed in the heterozygous individual.

(b) R: red flower; r: white flower

The genotype of red flower: RR

The genotype of white flower: rr

Parents: RR X rr

Gametes: R and r

F_1 : Rr

F_2 : Interbreeding of F_1 generation ($F_1 \times F_1$)

Rr X Rr

Gametes: R, r and R, r

Gametes	R	r
R	RR	Rr
r	Rr	rr

Offspring genotypes: 25 % RR; 50 % Rr; 25% rr

Offspring phenotypes: 75 % Red; 25% white.

17. The main functions of the liver

- Production of bile
- Detoxification
- Production of heat
- Production of red blood cells in the foetus
- Regulation of nutrients
- Storage of blood
- Storage of minerals
- Storage of glucose in the form of glycogen
- Destruction of old red blood cells
- Elimination of sex hormones after they have performed their functions.
- Storage of vitamins...

SECTION C: THIS QUESTION IS COMPULSORY

18. (i) Oxygen

(ii) Photosynthesis

(iii) Weather conditions have minimal effect on this process, this is because the water weed is in water which has a stable temperature. Also, changes such as wind would not affect the rate of photosynthesis.

(iv) Sunlight intensity, Number of leaves, Carbon dioxide concentration.

(v) You place a bulb at some long distance away from the experimental setup.

You then observe the rate at which the bubbles are formed. You then move the light source (bulb) nearer and still observe the rate with which bubbles are formed. You further reduce the distance between the bulb and the setup and compare the rate of bubble formation. Finally when the distance is too small in between, you observe the rate of bubbles formed.

A table is then drawn showing the rate of bubbles formed and the distance in between.

A table showing the rate of bubble formation and distance in between

Distance in between	Rate of bubbles formed
100 cm	No bubbles
50 cm	Few bubbles
25 cm	More bubbles
5 cm	Very many bubbles

Conclusion:

The higher the light intensity, the faster the rate of photosynthesis and hence the more bubbles are produced. The reverse is also true.

BIOLOGY III

002

18th Nov. 2005 08.30am -11.30am

REPUBLIC OF RWANDA



**NATIONAL EXAMINATIONS COUNCIL
P.O.BOX 3817 KIGALI**

ORDINARY LEVEL NATIONAL EXAMINATION 2005

SUBJECT: BIOLOGY III

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

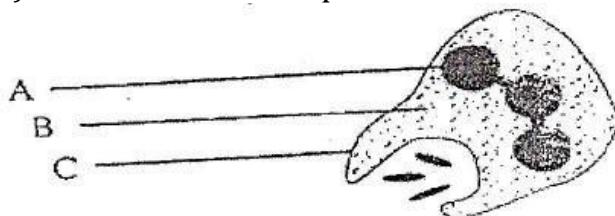
Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

1. This is a white blood cell ingesting bacteria.

(a) Name the labelled parts of the white blood cell.



A:

B:

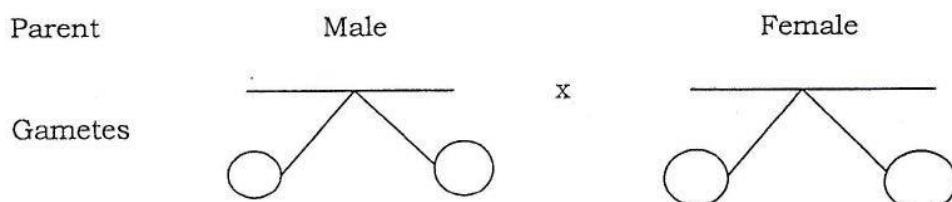
C:

(3 marks)

(b) Explain how a bacterial infection could give someone a sore throat.

(2 marks)

2. (a) A pregnant woman asks her doctor the chances of her baby being a boy. The doctor says that there are equal chances of the baby being a boy or a girl. Complete the diagram below to explain why the doctor said this. Use X and Y to represent the sex chromosomes.

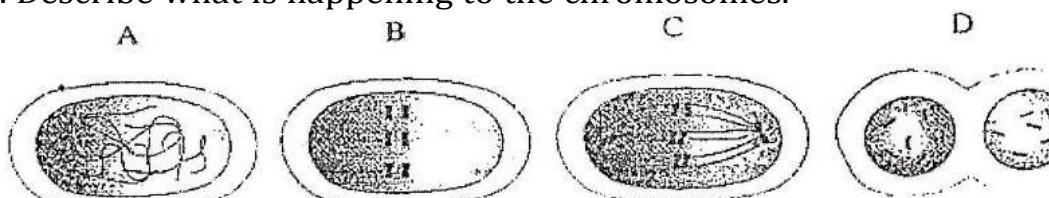


Offspring genotype.....

Offspring phenotype.....

(3 marks)

(b) Cells divide by mitosis. The stages are shown below for stages B, C and D. Describe what is happening to the chromosomes.



A:

B:

C:

(6 marks)

3. The potato plant reproduces asexually by producing stem tubers.

(a) (i) What is asexual production?

(1 mark)

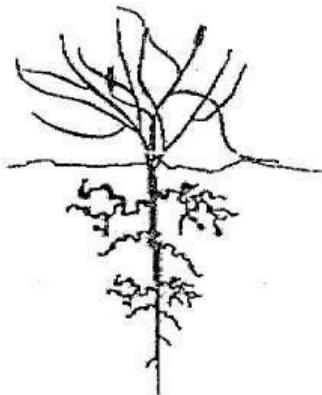
(ii) Many plants can reproduce asexually. Explain why these plants still need to be able to cross-pollinate.

(1 mark)

4. The plant in the diagram below gets its water from the soil in a plant pot.

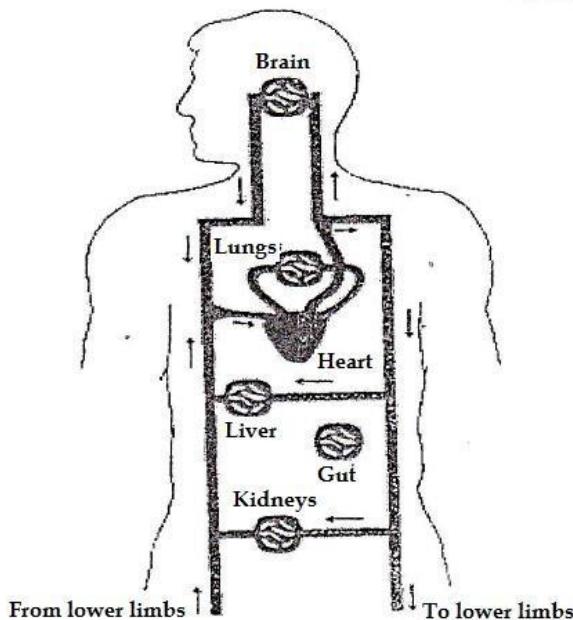


- (a) (i) Which tissue in the plant stem carries water up the plant? **(1 mark)**
(ii) How does this plant lose water through its leaves? **(1 mark)**
(b) The plant below is called marram grass. It can grow in very dry sandy soil.



- Explain how marram grass is well adapted to survive in dry environments. **(2 marks)**
(c) Why is it important for flowering plants to be cross-pollinated? **(2 marks)**

5. (a) The diagram below shows the direction of blood flow around the body



- (i) Label on the diagram the pulmonary vein and the Aorta. **(2 marks)**
(ii) Draw on the diagram the blood supply to and from the gut (include arrows to indicate which direction the blood is flowing). **(3 marks)**

(b) Red blood cells contain haemoglobin. As the blood passes through the lungs, the haemoglobin undergoes a chemical change which makes it more red. Which gas causes the chemical change? **(1 mark)**

6. The diagram shows a sperm cell.



(a) (i) What is the function of this cell? **(1 mark)**
(ii) How does the part labelled A help the sperm to carry out its function? **(1 mark)**
(b) Part B contains information which is passed from father to his children.
(i) Name the Part labelled B. **(1 mark)**
(ii) What structures present in part B contain this information? **(1 mark)**

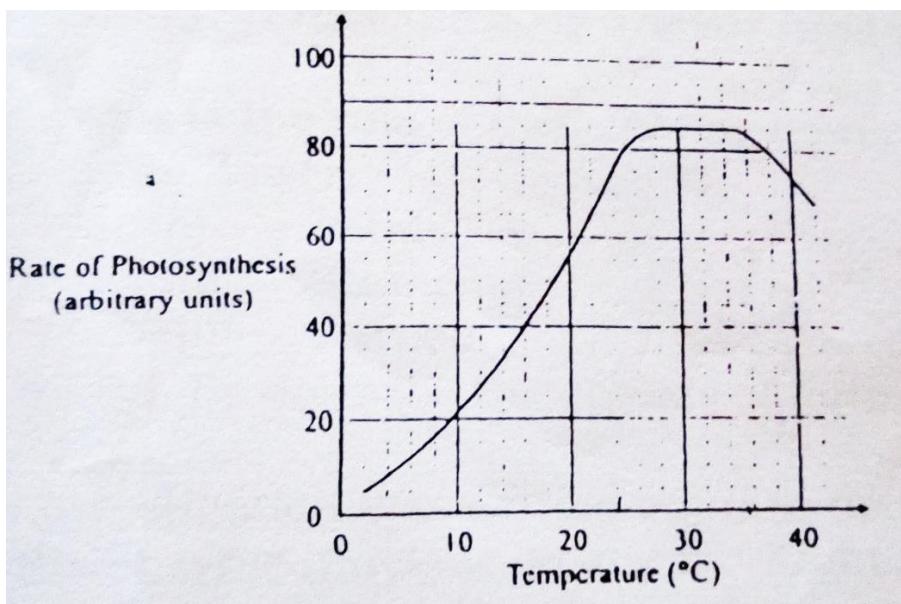
7. The diagram shows a skull of a carnivorous mammal.



Identify the features that show that this mammal is adapted for a carnivorous diet. **(2 marks)**

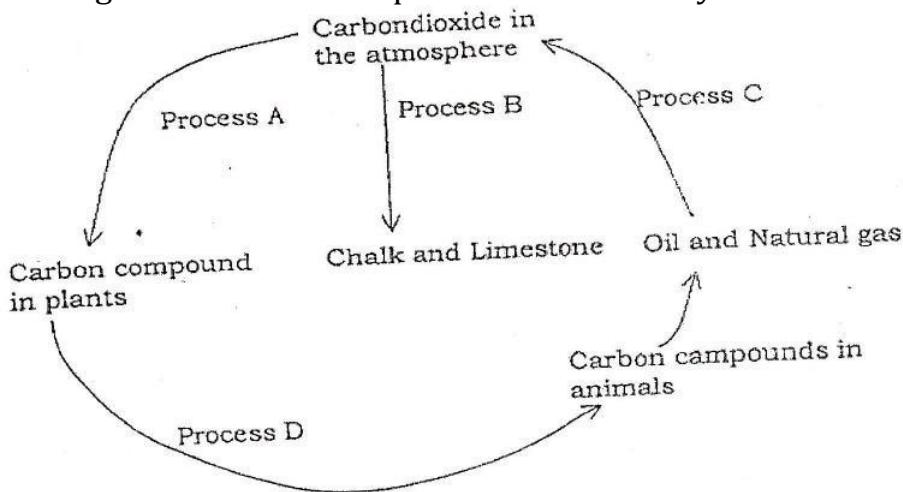
8. (a) The salivary glands in our mouth produce an enzyme called amylase. What does this enzyme do? **(2 marks)**
(b) (i) Our stomachs release hydrochloric acid which helps to kill bacteria. Give other two functions of this acid. **(2 marks)**
(ii) Name at least two enzymes produced by our stomachs. **(2 marks)**
9. (a) How does a person's body react when their glucose level is high? E.g. after a meal? **(2 marks)**
(b) Explain how the body reacts when the glucose level is too low. **(2 marks)**

10. A florist has started a business of growing his own flowers all year round. This graph shows how the rate of photosynthesis within a leaf is affected by temperature.



- (a) In order to grow them as quickly as possible, the florist has installed a thermostat in his green house.
- (i) At what temperature should he set the thermostat? **(1 mark)**
 - (ii) Explain why you have chosen that temperature. **(2 marks)**
- (b) Why does the rate of photosynthesis decrease below 35°C? **(1 mark)**
- (c) Give two reasons why the rate of photosynthesis remains constant between 28°C and 35°C. **(2 marks)**

11. The diagram below shows part of the carbon cycle.



- (a) What are the processes shown as A, B, C and D? **(4 marks)**
- A:
B:
C:
D:
- (b) Describe two human activities that are disrupting the natural carbon cycle. **(1 mark)**

SECTION B: Answer any THREE questions only**(30 marks)**

12. Ann is polydactylous; this is a condition which means she has six fingers on each hand and six toes on each foot. Polydactyly is controlled by one pair of genes, and is caused by a dominant allele, P.

(a) (i) What is a dominant allele? **(1 mark)**

(ii) Ann has two dominant P alleles for polydactyly. What is the term for a person who has two identical alleles for a particular gene? **(2 marks)**

(b) (i) Ann is married to a man with two recessive alleles (pp) for the condition. A fertilized egg produced by the couple divides by mitosis to form two cells. Which allele would the two cells contain? **(2 marks)**

(ii) What is a recessive allele? **(1 mark)**

(c) A polydactylous man has one P allele and one p allele. He is married to a woman who has two recessive alleles (pp) for the condition. They plan to have a baby. What are the chances that their child will be polydactylous? **(4 marks)**

13. Cholera is a highly dangerous disease which is spread by bacteria. It is spread by eating or drinking food or water which is contaminated with the bacteria.

(a) Which part of the body is likely to be infected first when someone drinks water containing the cholera bacteria? **(1 mark)**

(b) Explain how the cholera bacteria inside the body may cause disease. **(2 marks)**

(c) Name other groups of microbes that frequently cause disease. **(1 mark)**

(d) People crowded together in refugee camps are likely to catch the disease. Explain why. **(3 marks)**

(e) Explain how the body defends itself against bacteria. **(3 marks)**

14. (a) What is the role of the following flower parts in the reproduction of the flower?

- (i) Petals
- (ii) Stamens
- (iii) Carpels **(5 marks)**

(b) Briefly describe the process of fertilization in plants. **(5 marks)**

15. An investigation was carried out into the effects of PH on the action of the enzyme amylase on starch. Eight test tubes were set up at different PH and incubated in water at 30°C for one hour. The amount of reducing sugar (product) was then estimated. The results are shown in the table below.

PH	4.0	5.0	6.0	6.5	7.0	8.0	9.0	10.0
Amount of reducing sugar products	1	12	26	32	33	27	13	5

- (a) Plot a graph to show these results. **(3 marks)**
(b) Explain the effect of PH on the action of amylase in this investigation. **(3 marks)**
(c) What is the most suitable PH for the enzyme amylase in this investigation? **(1 mark)**
(d) Suggest other functions (Not in this investigation) that affect the action of an enzyme such as amylase. **(3 marks)**

16. Describe the various excretory organs and their respective wastes in man. **(10 marks)**

SECTION C: This section is compulsory. (15 marks)

17. The government of Rwanda is very much concerned about the destruction of our environment.

- (a) In what ways is the environment being destroyed? **(5 marks)**
(b) Suggest possible ways of conserving it. **(10 marks)**

BIOLOGY III

017

08th Oct. 2004 08.30am -11.30am

REPUBLIC OF RWANDA



**NATIONAL EXAMINATIONS COUNCIL
P.O.BOX 3817 KIGALI**

ORDINARY LEVEL NATIONAL EXAMINATION 2003/2004

SUBJECT: BIOLOGY III

LEVEL: TRONC COMMUN

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

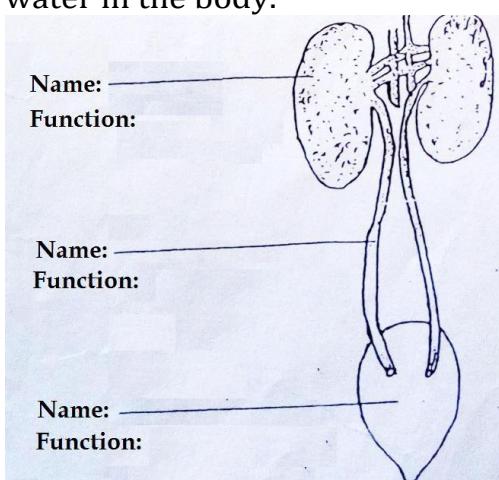
1. Movement is a life process. Name four other life processes that all plants and animals do. **(4 marks)**
2. (a) Name at least three diseases spread by flies. **(3 marks)**
(b) How can you prevent the spread of such diseases? **(3 marks)**
3. Match the following organisms against their respective groups.

<u>Organisms</u>	<u>Groups</u>	
Trichomonas	Sporozoa	
Amoeba	Ciliata	
Paramecium	Rhizopoda	
Plasmodium	Flagellata	(4 marks)

4. Identify the organism shown below:



- (a) Name **(1 mark)**
(b) What is its feeding habits (trophic level) **(2 marks)**
5. The diagram below shows part of the system that controls the amount of water in the body.



6. What features enable a leaf to be adapted for photosynthesis? **(6 marks)**
7. The following results were obtained by a student who crossed the F₁ generation of pure breeding parents for normal and wrinkled seeds.

Dominant trait	Recessive trait	Numbers of F ₂ offspring.
Round seeds	Wrinkled seeds	7524

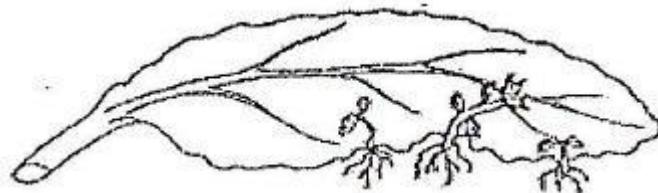
- (a) Define the following terms.

- i) Dominant **(1 mark)**
ii) Recessive **(1 mark)**

(b) Calculate the number of Round and Wrinkled seeds. Show your working. **(2 marks)**

8. Pollination may occur without fertilization taking place but fertilization will not occur without pollination. Explain. **(3 marks)**

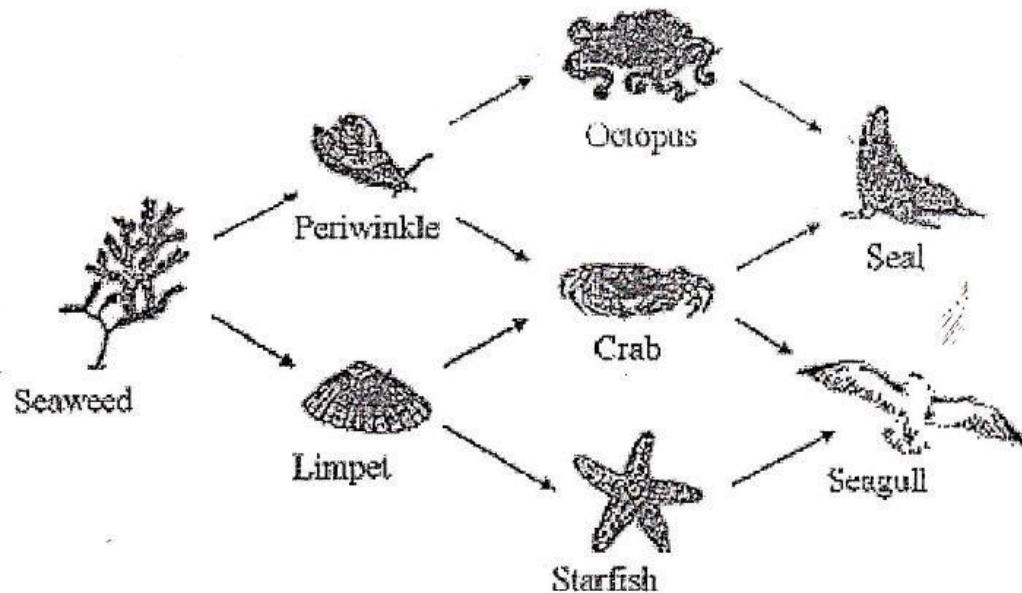
9. The diagram below shows a leaf developing buds and adventitious roots along its margin.



(i) What type of reproduction is shown by this leaf? **(2 marks)**
(ii) What advantage does this leaf have over other leaves? **(2 marks)**

10. Which characteristics distinguish insects from other animals? **(3 marks)**

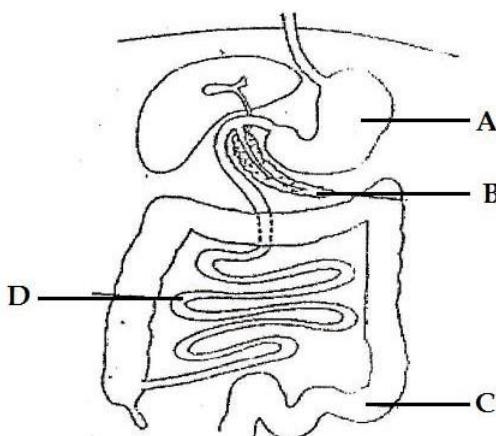
11. The diagram below shows part of a food web.



Use the organism in this web to fill in the table. **(5 marks)**

FEEDING HABIT	ONE ORGANISM
Herbivore	
Producer	
Secondary consumer	
Top carnivore	
Primary consumer	

12. The diagram below shows the structure of the human gut.

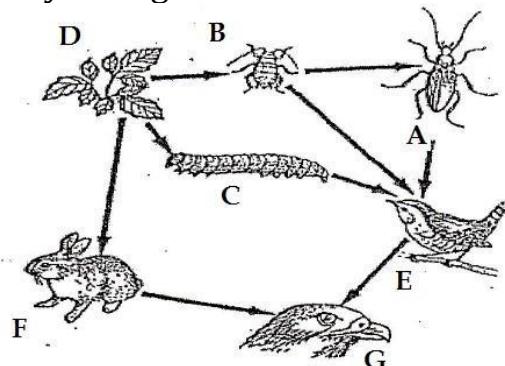


- (a) Name the parts labelled A, B and C. **(3 marks)**
A:
B:
C:
- (b) Name two processes carried out in structure D. **(2 marks)**
1:
2:
- (c) Humans require in their diet. State one function of fibre in their diet. **(1 mark)**
- (d) Give two main functions of structure B. **(2 marks)**
1:
2:

SECTION B: Answer any THREE questions only **(30 marks)**

13. a) Name FOUR components found in human blood. For each named component, give one function that it carries out. **(8 marks)**
b) Explain why unicellular organisms such as Amoeba do not need a transport system. **(2 marks)**

14. Study the figure below and answer the questions that follow:



- (a) Suggest the feeding level (trophic level) of organisms A, B, D, E and F. **(5 marks)**
- (b) Explain the effect on each organism of removing organism G from the food web. **(5 marks)**

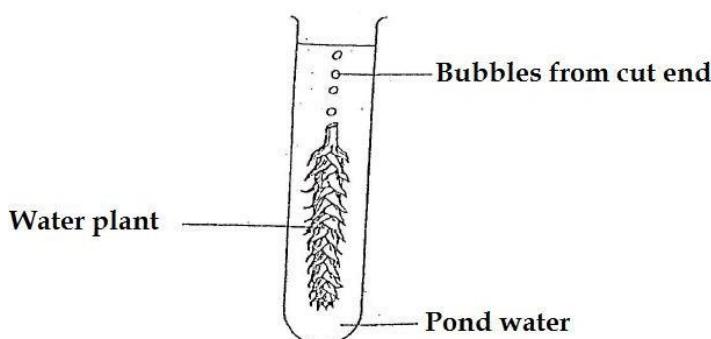
15. (a) Name the component of gastric juice produced in the stomach.
(b) Give their main functions. **(10 marks)**

16. A plant with Red flowers was crossed with one with white flowers. All the F₁ offspring had red flowers.
(a) Explain why there were no white flowers in F₁ offspring.
(b) Using suitable genetic symbols, show the genotype and phenotypes of crossing F₁ offspring among themselves. **(10 marks)**

17. Describe the main functions of the liver. **(10 marks)**

SECTION C: This section is compulsory. **(15 marks)**

18. Students in a certain school performed the experiment below.



A stream of bubbles is given off from the cut end of the water plant when it is put outside in the open. The rate at which bubbles were given off was counted at noon on different days. The results are shown in table below.

Weather / light	Number of bubbles per minute
Day 1 very cloudy	4
Day 2 light cloudy	10
Day 3 sunny	13
Day 4 sunny	15
Day 5 cloudy	7

- (i) What gas is given off? **(2 marks)**
(ii) What process is being investigated? **(2 marks)**
(iii) From observation, what can you say about the effect of weather conditions on the process? **(3 marks)**
(iv) Name the factors that may be affecting the rate of bubbling. **(3 marks)**
(v) Describe how you would investigate the effect of light intensity on the rate of bubbling. (Assume that a meter for measuring light intensity is available). **(5 marks)**

BIOLOGY III
017

11th Nov. 2003 08.30am -11.30am

RWANDA NATIONAL EXAMINATIONS COUNCIL



P.O.BOX, 3817 KIGALI-TEL/FAX : 86871

ORDINARY LEVEL NATIONAL EXAMINATION 2002/2003

SUBJECT: BIOLOGY III

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

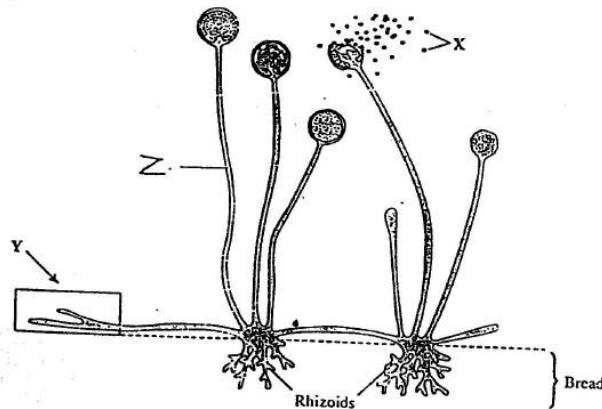
Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

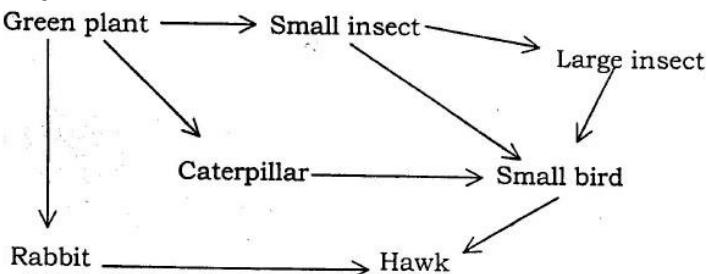
SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

1. (a) Write AIDS in full. **(1 mark)**
(b) What is the difference between AIDS and HIV? **(2 marks)**
2. The diagram shows part of the structure of a fungus growing on some bread.



- (i) Name structures labelled X
Z **(2 marks)**
- (ii) When the fungus is feeding, the tips of hyphae labelled Y release enzymes. Explain why? **(2 marks)**
3. Give differences between a butterfly and a moth. **(3 marks)**
4. What are main stages of incomplete metamorphosis? **(3 marks)**
5. Give at least three functions of blood. **(3 marks)**
6. (a) Sportsmen are normally given glucose and not sucrose after exercise. Explain why. **(2 marks)**
(b) What are the products of glucose oxidation? **(1.5 marks)**
7. (a) Describe three ways in which plant cells are different from animal cells. **(1.5 marks)**
(b) Name structures that are common to both animal and plant cells. **(3 marks)**
8. Name excretory organs and their respective waste products. **(4 marks)**
9. What are functions of the skin? **(3 marks)**
10. Which hormones are produced by the pancreas gland? What are the functions of these hormones? **(4 marks)**
11. (a) What is the initial organism in any food chain? Explain your answer. **(2 marks)**

(b) Study the food web below:



- (i) Which organisms are (i) Primary Consumer?
(ii) Secondary consumer?

(2 marks)

- (ii) What would happen if small insects died?

(2 marks)

12. Plants need water which often has mineral salts dissolved in it.

- (a) What do plants make from the following minerals?

(i) Nitrates

(ii) Magnesium

(2 marks)

- (b) Give two reasons why water is important to plants.

(2 marks)

- (c) (i) in which vessels does water travel up through the plant?

(1 mark)

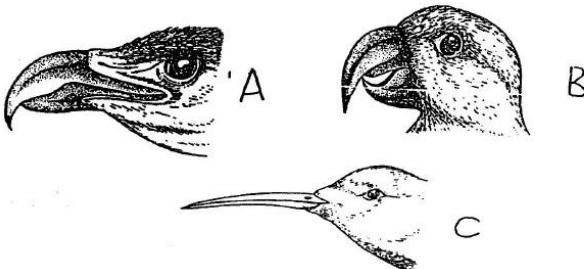
- (ii) In which vessel does sugar travel through the plant?

(1 mark)

13. What are the main classes of phylum arthropoda.

(3 marks)

14. Study the beaks below.

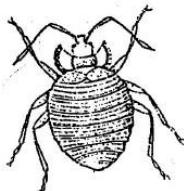


Suggest the feeding habits of these birds.

Explain your answer.

(3 marks)

15. The organism below belongs to the class insect.



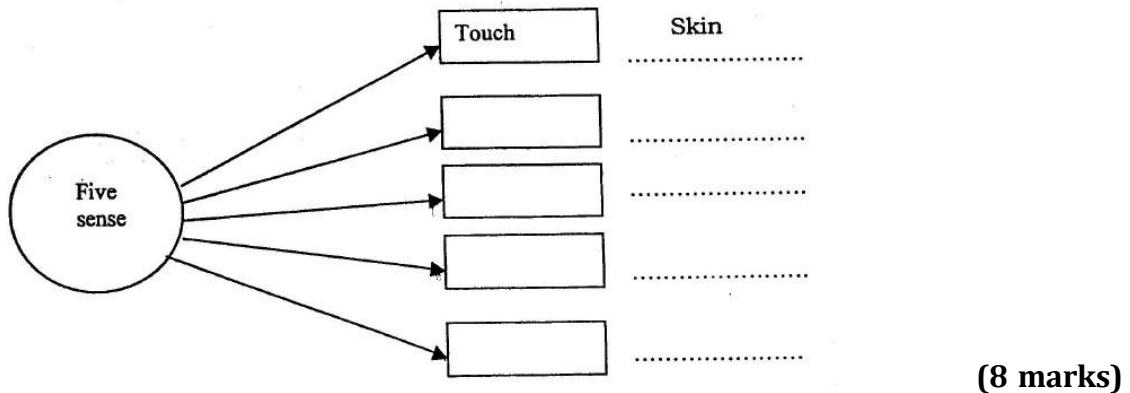
Suggest reasons why.

(3 marks)

SECTION B: Answer any THREE questions only

(30 marks)

16. (a) Humans have a number of senses, for example touch. Senses are detected by receptors for example the skin detects touch. In the box write the names of other senses. By each box write the name of the receptor.

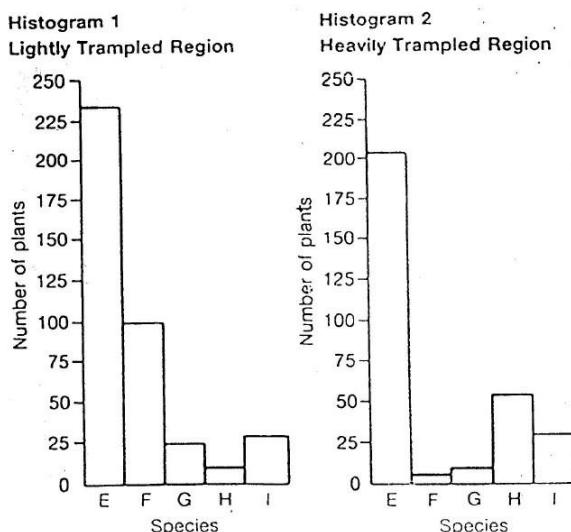


(b) When your hand is touched, the information is passed to your brain. Describe how the information gets from your skin to your brain. **(2 marks)**

17. (a) Name the organs in which mitosis occurs in mammals. **(2 marks)**
 (b) What is the importance of mitosis in living organisms? **(2 marks)**
 (c) In a breeding experiment with garden peas, a sample of plants with white flowers and breed true was crossed with a sample of plants which produce red flowers and breed true. When the seeds produced were grown all the resulting F₁ generation produced red flowers.
 (i) Why were no white flowers produced by plants belonging to the F₁ generation? **(2 marks)**
 (ii) Using genetic symbols, explain what would result from interbreeding the F₁ generation? **(4 marks)**
18. (a) What is an enzyme? **(2 marks)**
 (b) Describe the characteristics of enzymes? **(6 marks)**
 (c) What part is played by enzymes in the germination of maize? **(2 marks)**
19. (a) Give examples of microorganisms. **(2 marks)**
 (b) Describe the importance of microorganisms to man. **(8 marks)**
20. Malaria is a killer disease in Africa especially South of the Sahara.
 (i) What causes Malaria? **(2 marks)**
 (ii) Suggest possible methods you would use to eradicate Malaria in your village. **(5 marks)**
 (iii) What steps has the government of Rwanda taken to reduce the infection of Malaria? **(3 marks)**

SECTION C: This section is compulsory. (15 marks)

21. (a) A group of students studied two areas of grassland. One lightly trampled and the other heavily trampled. The histograms below show the numbers of plants of five different species found in random samples taken within each region.



- (i) How many of species E were found in each region? **(2 marks)**
(ii) What is the effect of increased trampling on species G and H? **(1 mark)**
(iii) Which species are most affected by trampling? **(1 mark)**
(iv) Which species are least affected by trampling? **(1 mark)**

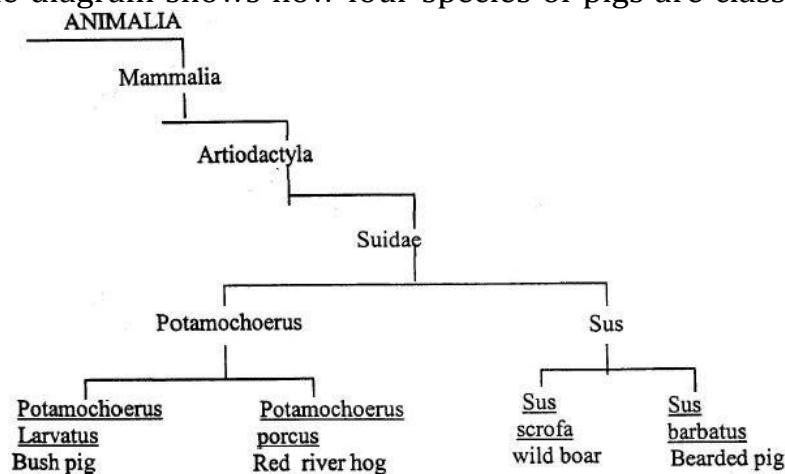
(b) The following organisms were found on abandoned farm.

- Green plants
- Hawks
- Lizards
- Grasshoppers and
- Snakes

(i) Construct a pyramid of numbers to show their relationship. **(3 marks)**

(ii) Which organism(s) are:
Tertiary consumers
Top carnivores
Herbivores **(3 marks)**

(c) The diagram shows how four species of pigs are classified.



- (i) To which class do these pigs belong? **(1 mark)**
(ii) To which family does the red river hog belong? **(1 mark)**
(iii) To which genus does the bearded pig belong? **(1 mark)**
(iv) Give the species name of Bush pig. **(1 mark)**

BIOLOGY III

017

07th Nov. 2002 08.30am -11.30am

RWANDA NATIONAL EXAMINATIONS COUNCIL



P.O.BOX, 3817 KIGALI-TEL/FAX : 86871

ORDINARY LEVEL NATIONAL EXAMINATION 2001/2002

SUBJECT: BIOLOGY III

LEVEL: TRONC COMMUN

DURATION: 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B and C**

Answer **ALL** questions in section A. **(55 marks)**

Answer **THREE** questions in section B. **(30 marks)**

Answer only **one** question in section C **(15 marks)**

SECTION A: ANSWER ALL QUESTIONS**(55 MARKS)**

1. What materials are to be supplied to cells if they are to survive? **(2 marks)**
2. What features are (a) Possessed by both plants and animals? **(2 marks)**
(b) Possessed by plants only? **(2 marks)**
3. A motor car can move, takes in oxygen and gives out carbon dioxide, consumes fuel but nevertheless is not a living organism. In what ways does it not qualify as a living organism? **(2 marks)**
4. How do roots and leaves obtain oxygen for respiration? **(2 marks)**
5. a) Where does respiration occur? **(1 mark)**
b) What is the importance of respiration? **(1 mark)**
c) What are the products of respiration? **(1 mark)**
6. a) Draw a line to link the name of the life process with its meaning. One is done for you. **(3 marks)**

Life process	Meaning
Reproduction	changing the position of a part or all of the body.
Growth	Responding to the environment
Movement	Producing fertile off springs
Sensitivity	Getting larger or more developed.

- b) The following are parts of an organism: Cell, organ, chromosome, system, gene, tissue. Arrange them in decreasing order of size.

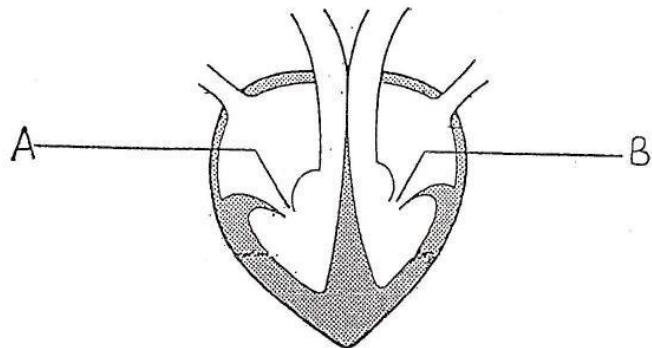
Largest

Smallest

(3 marks)

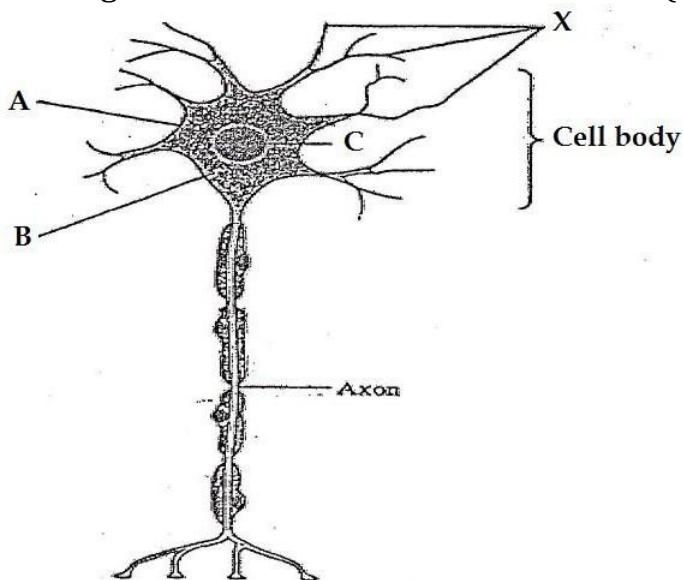
7. In what ways does a dicotyledonous leaf adapt itself to its function? **(2 marks)**
8. What are the requirements for photosynthesis? How are the requirements met in land plant? **(3 marks)**
9. What is the importance of bacteria to man? **(2 marks)**

10. The diagram below represents the structure of the heart.



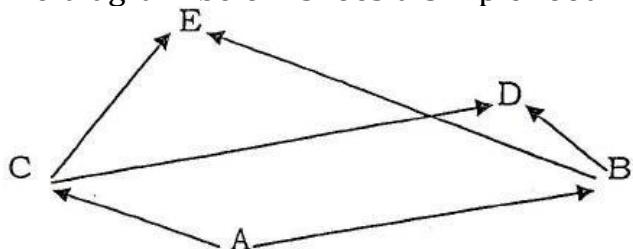
- a) Use an arrow to indicate the direction of blood flow through the heart. (1 mark)
b) What are the functions of parts A and B? (2 marks)
c) Why do ventricles have thicker muscular walls than atria? (2 marks)

11. The diagram below shows a motor neurone (a nerve cell)



- a) Name structures A, B and C. (3 marks)
b) Suggest the function of X. (1 mark)
c) Draw an arrow on the diagram to show the direction of a nerve impulse. (1 mark)

12. The diagram below shows a simple food web.



- a) Use the diagram to name.
i) A Herbivore (1 mark)
ii) An Omnivore (1 mark)

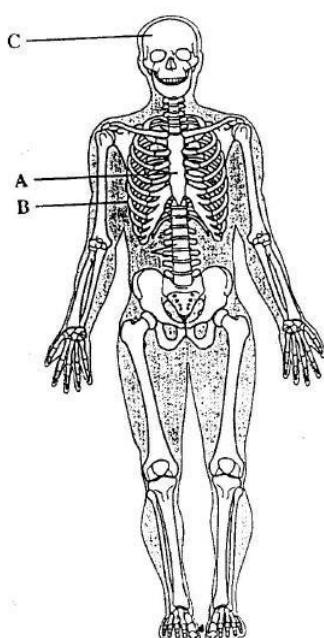
- iii) A producer (1 mark)
 b) i) The animals in the food web get their energy from the food they eat.
 From where does A get its energy? (1 mark)
 ii) Draw a pyramid of energy for the following food chain. (2 marks)



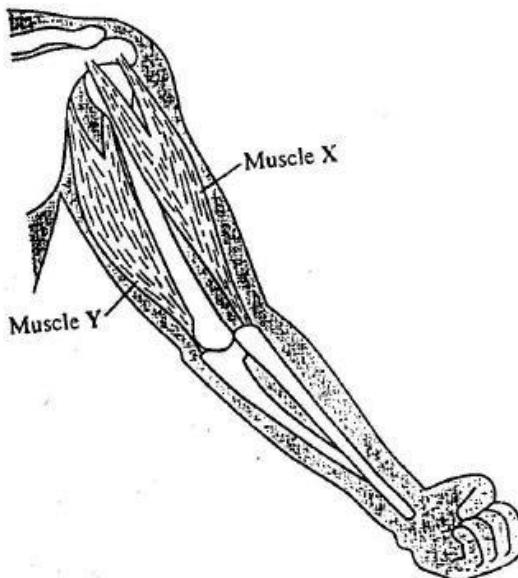
13. The chromosome for determining the gender or sex of a person are labelled X and Y.

		PARENT 1 X	
X PARENT 2		—	—
	—	—	—
	—	—	—

- a) Complete the Punnett square to show the genotype of parent 2 and of the offspring. (3 marks)
 b) Which parent is the mother? (1 mark)
 c) What are the chances of getting a baby boy? (1 mark)
- 14.a) The diagram below shows the human skeleton. Humans have a bonny endoskeleton.



- i) Name the structures labelled A and B. (2 marks)
 ii) What is the function of Part C? (1 mark)
 b) Give the name of one animal which has an exoskeleton. (1 mark)
 c) The diagram below shows bones and some of the muscles in a human arm.



- i) Describe what will happen to the arm when X contracts. **(2 marks)**
 ii) What is the function of muscle Y? **(2 marks)**

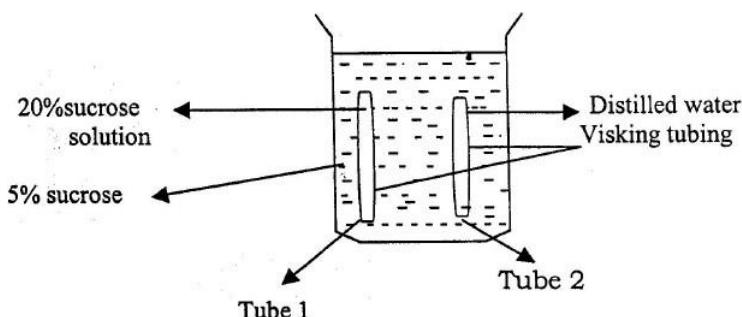
SECTION B: Answer any THREE questions only **(30 marks)**

15. a) Name any one disease caused by bacteria. **(1 mark)**
 b) How can you prevent the disease you have named from infecting other people? **(9 marks)**

16. Give five differences between vegetative and sexual reproduction. **(10 marks)**

17. a) What are digestion, absorption, assimilation and egestion? **(4 marks)**
 b) Where does each of these functions take place in the body? **(4 marks)**
 c) Why must food be digested before the body can use it? **(2 marks)**

18. A student set up this experiment to investigate osmosis. The student filled two pieces of dialysis (Visking tubing) with different liquids and left them both in a beaker of 5% sucrose solution for one hour.

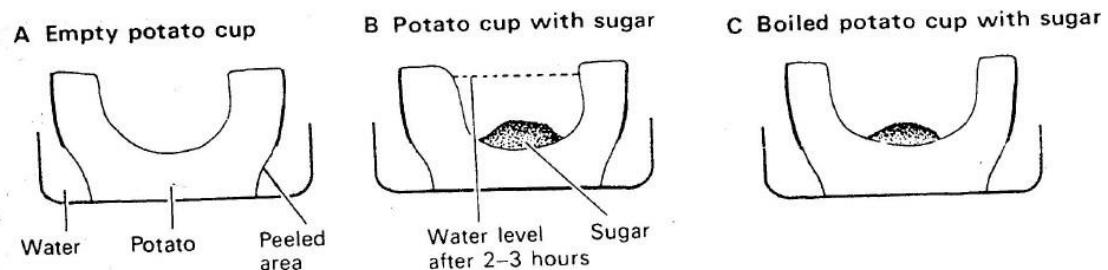


- a) Describe and explain the likely result after one hour. **(5 marks)**
 b) Describe two examples where osmosis is used in living things. **(5 marks)**
- 19.a) Photosynthesis is a process that takes place in green leaves.
 i) What type of energy is needed for this process? **(1 mark)**

- ii) What substance(s) in the plant absorbs this energy? **(1 mark)**
 iii) In which part of the plant cell does photosynthesis take place? **(1 mark)**
 iv) Write the chemical equation for photosynthesis. **(3 marks)**
 b) Describe two ways you would use to speed up photosynthesis. **(4 marks)**

SECTION C: This section is compulsory. (15 marks)

20. a) The students performed the experiment illustration below.



- i) Explain in details why water gathers in the hollowed portion of potato B. **(5 marks)**
 ii) Explain why water does not gather in the hollowed portion of potato A and C. **(5 marks)**
 iii) Why is potato A necessary in the experiment? **(5 marks)**