Biology I

001

16 Nov. 2016 08.30am - 11.30am

Rwanda Education Board

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? **(1mark)**

(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. **(2marks)**

(ii) carry blood back to the ventricles. **(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)

Organism	**Gaseous exchange structures**
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:

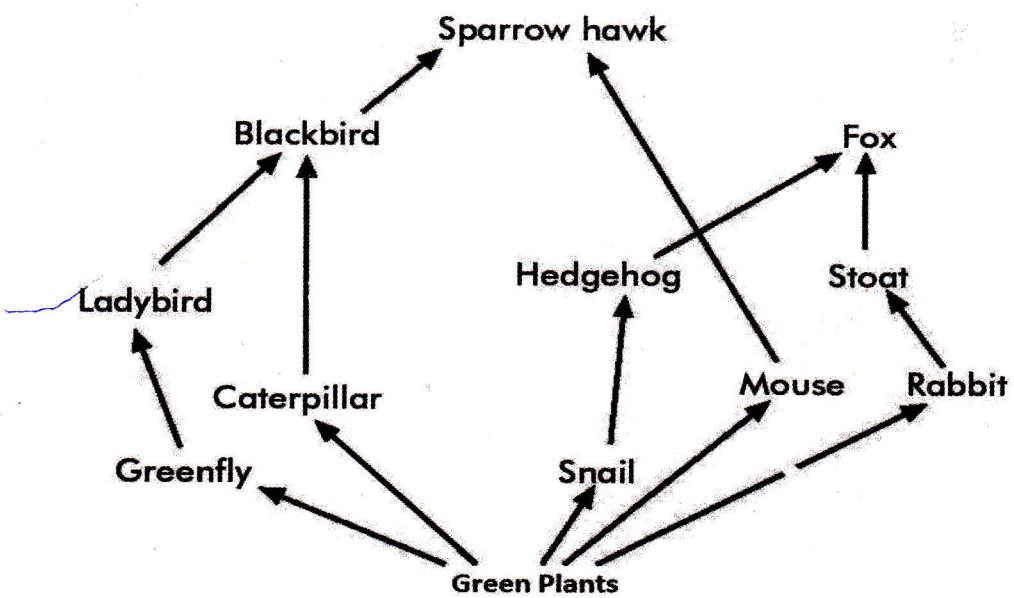
(i) the smallest decrease in life expectancy between 1982 and 1999. **(1mark)**

(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)**

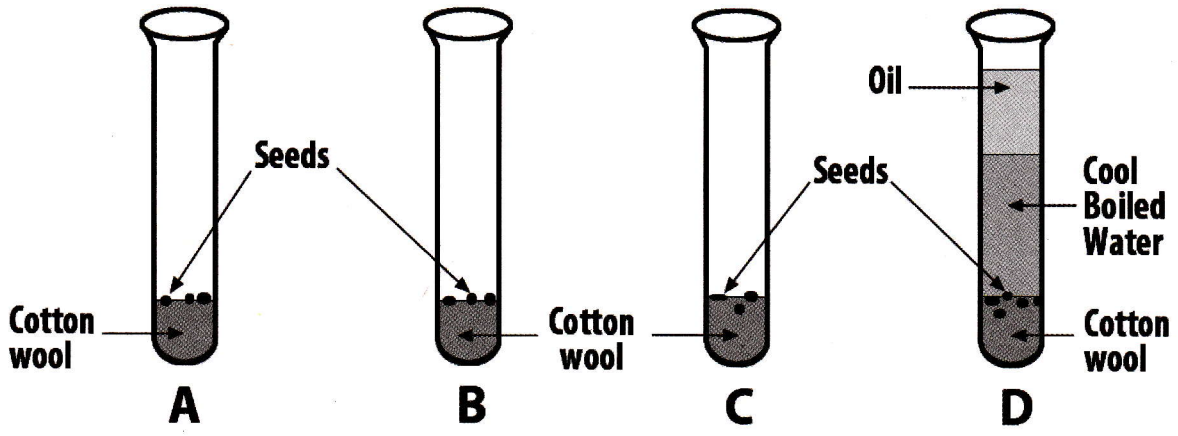
(d) A student says, "Most warm-blooded animals take care of their young. Most cold-blooded animals do not."
Is this statement correct or not?
Explain. **(5marks)**

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)**