

BIOLOGY I

002

09 Nov. 2010 8.30 – 11.30 am

RWANDA NATIONAL EXAMINATIONS COUNCIL



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ORDINARY LEVEL NATIONAL EXAMINATIONS 2010

SUBJECT : BIOLOGY I

DURATION : 3 HOURS

INSTRUCTIONS:

This paper consists of **two** sections: **A** and **B**

Attempt **all** questions in section **A**.

Answer **any Three** questions in section **B**.

Answer **only one** question in section **C**.

(55 marks)

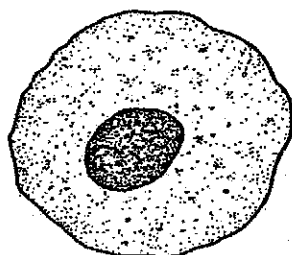
(30 marks)

(15 marks)

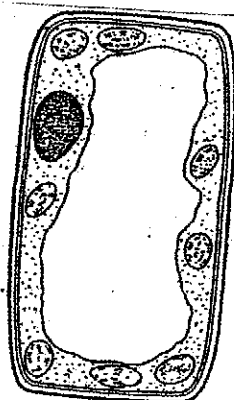
SECTION A: Answer all questions

(55 marks)

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



Cell A



Cell B

Using the diagrams, answer the following questions:

a) Name two structures found only in cell B.

- (i)
(ii)

(1 mark)

(1 mark)

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

- (i)
(ii)

(1 mark)

(1 mark)

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

(1 mark)

(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 results 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)**

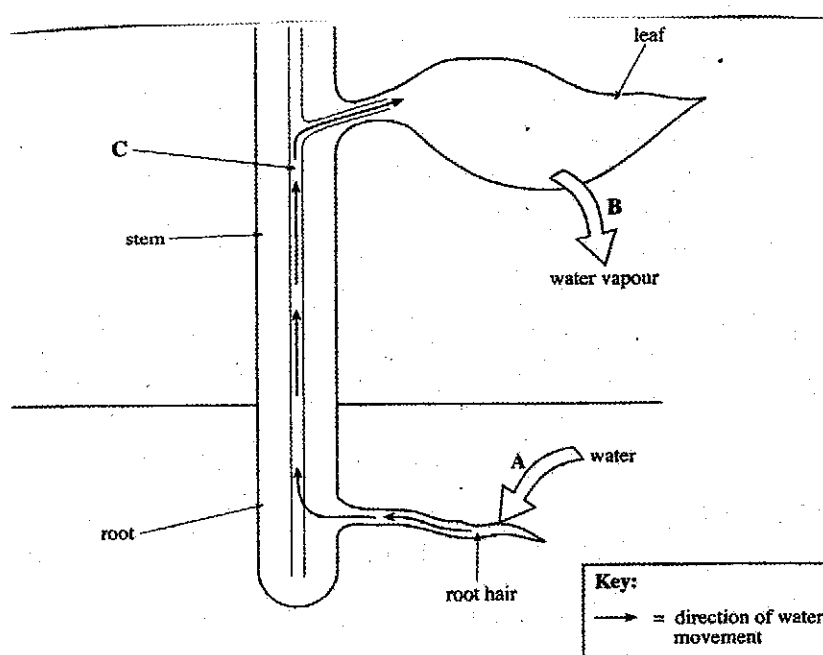
b) Using the results given above, give one reason to explain why a chocolate bar is not balanced meal. **(1 mark)**

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? **(3 marks)**

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



a) Name the process occurring at:

(i) A

(ii) B

(2 marks)

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 animals → Small fish → Large fish
 small plants 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)**

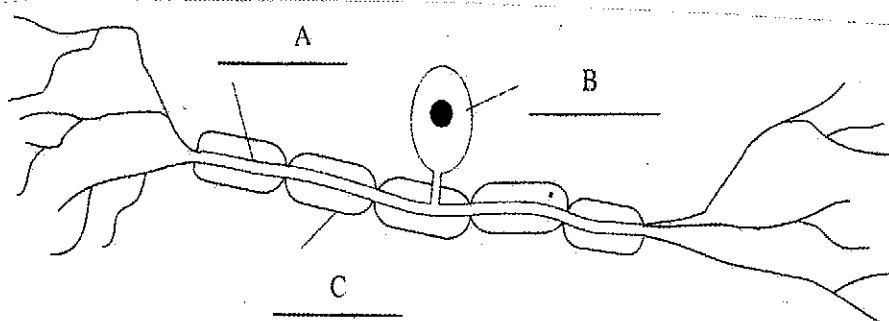
9. In humans, primordial germ cells undergo a process called Meiosis to produce egg cells and sperm cells. These cells have only half the normal number of chromosomes.

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 offsprings 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.

A
 B
 C

(3 marks)

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

Sensory:

Motor:

Relay:

(3 marks)

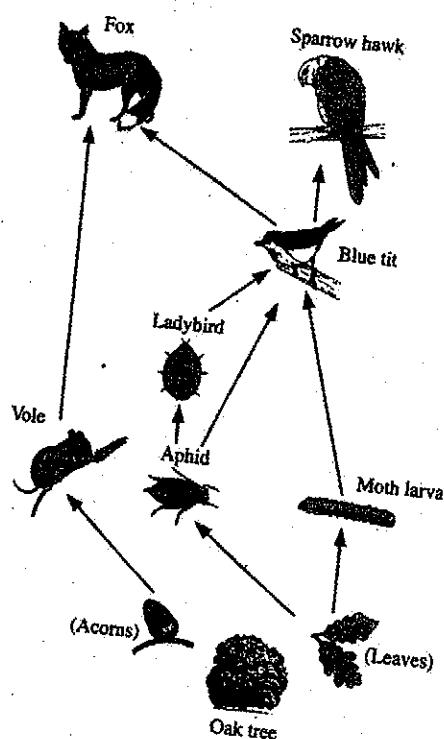
11. a) How do plants and animals differ in the way they obtain their food? (2 marks)
- b) Write a balanced chemical equation to represent the process by which plants obtain their food. (1 mark)
12. a) What is the essential difference between mitosis and meiosis? (2 marks)
- b) Predict what is likely 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.

(30 marks)

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:

(i) Name one herbivore.

(ii) Name one carnivore.

(2 marks)

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 offsprings (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

(1 mark)

b) Complete the following to show the two matings:

1st mating

Parents Male X Female

Phenotype

Genotype

F1

Gametes		
.....		
.....		

(2 marks)

(2 marks)

2nd mating (F1 Puppy X F1 Puppy)

F2

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:

(i) the heterozygous genotype.

(ii) the dominant allele.

(2 marks)

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

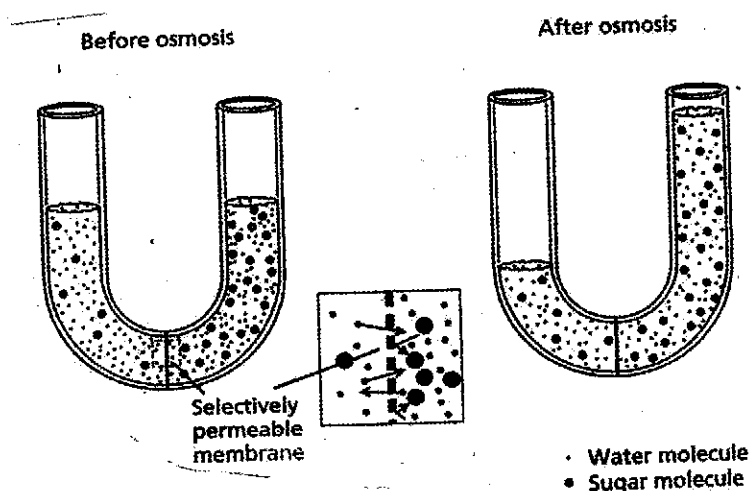
(ii) Diffusion

(4 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)