

Biology III

017

18 Nov. 2005

8h30 – 11h30

RWANDA NATIONAL EXAMINATIONS COUNCIL



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

NATIONAL EXAMINATION 2005

SUBJECT : BIOLOGY III

LEVEL : TRONC-COMMUN

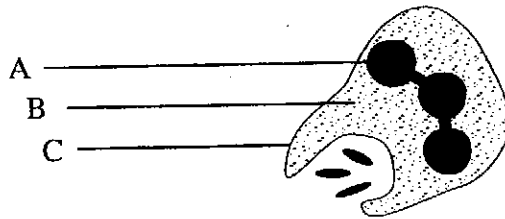
DURATION : 3 HOURS

INSTRUCTIONS :

Answer ALL questions in Section A, THREE questions in Section B. Section C is compulsory.

(55 Marks)

1. This is a white blood cell ingesting bacteria.



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

A _____

B -----

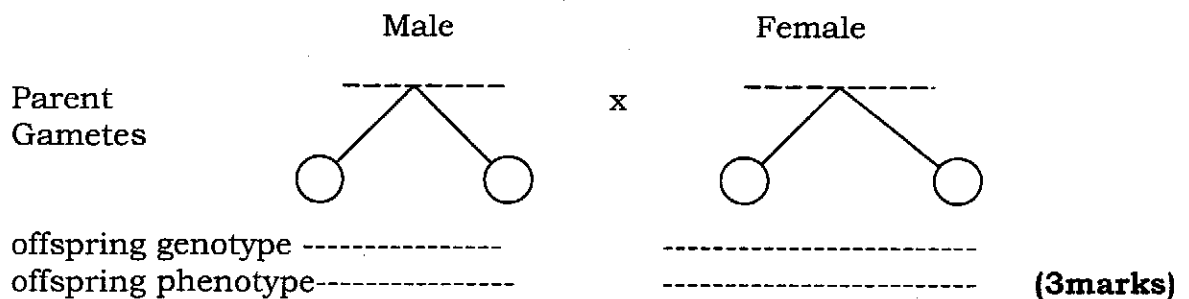
C -----

(3marks)

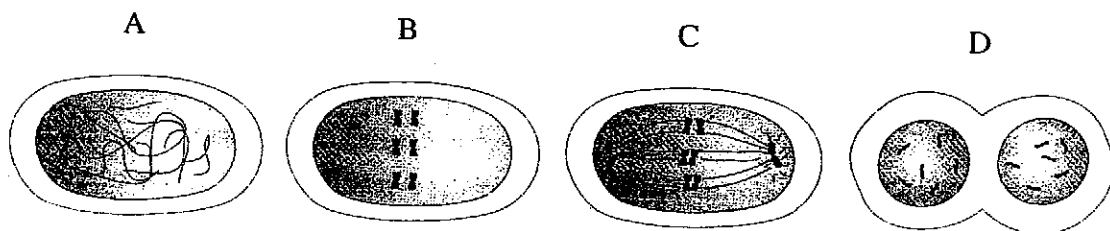
(b) Explain how a bacterial infection could give someone a sore throat.

(2marks)

2. (a) A pregnant woman asks her doctor the chances of her baby being a boy. The doctor says that there is equal chance 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.



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



- B -----
 C -----
 D ----- (6marks)

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

(a) (i) What is asexual reproduction ? (1mark)

(ii) Many plants can reproduce asexually. Explain why these plants still need to be able to cross-pollinate. (1mark)

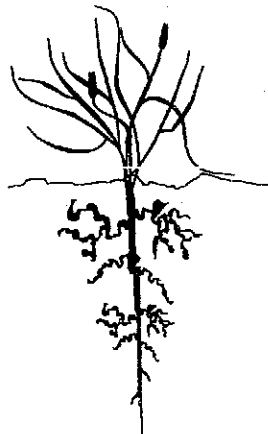
4. The plant in the diagram below gets its water from the soil in plant pot.



(a)(i) Which tissue in the plant stem carries water up the plant ? (1mark)

(ii) How does this plant lose water through its leaves. (1mark)

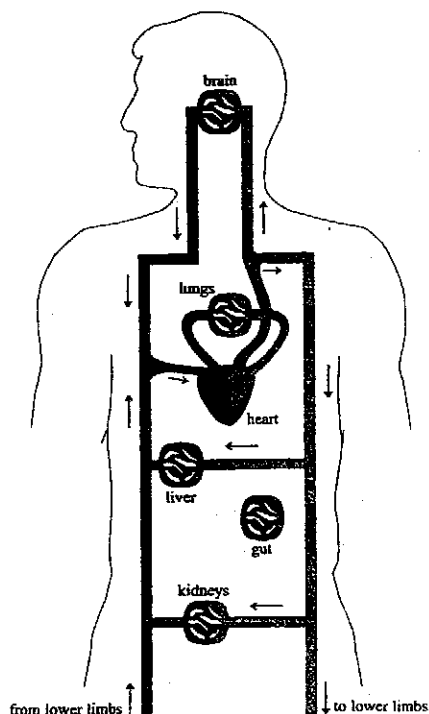
(b) The plant below is called marram grass. It can grow in very dry, sandy soil.



Explain how marram grass is well adapted to survive in dry conditions. (2marks)

(c) Why is it important for flowering plants to be cross-pollinated. (2marks)

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. **(2marks)**

- (ii) Draw on the diagram the blood supply to and from the gut. (Include arrows to indicate which direction the blood is flowing). **(3marks)**

- (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 ? **(1mark)**

6. The diagram shows a sperm cell.



- (a) (i) What is the function of this cell ? **(1mark)**

- (ii) How does the part labelled A help the sperm to carry out its function ? **(1mark)**

(b) Part B contains information which is passed from father to his children.

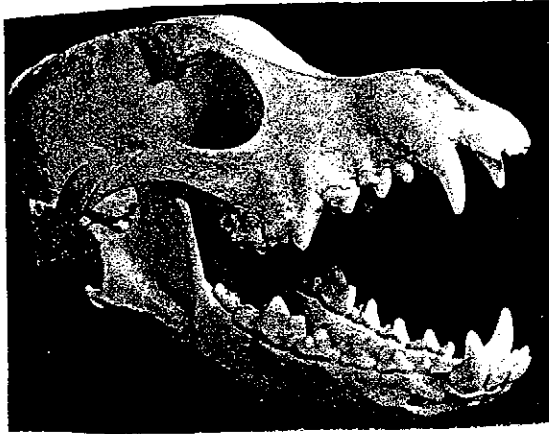
(i) Name the part labelled B.

(1mark)

(ii) What structures present in part B contain this information ?

(1mark)

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



Identify features that show this mammal is adapted for a carnivorous diet.

(2marks)

8. (a) The salivary glands in our mouth produce an enzyme called amylase. What does this enzyme do ?

(2marks)

(b) (i) Our stomachs release hydrochloric acid which helps to kill bacteria. Give other two functions of this acid.

(2marks)

(ii) Name at least two enzymes produced by our stomachs.

(2marks)

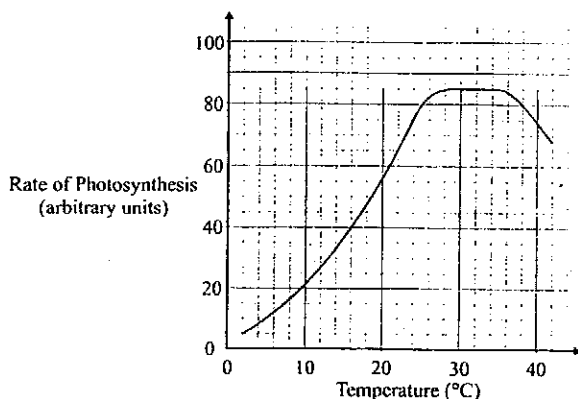
9. (a) How does a person's body react when their glucose level is high eg after a meal ?

(2marks)

(b) Explain how the body reacts when the glucose level is too low.

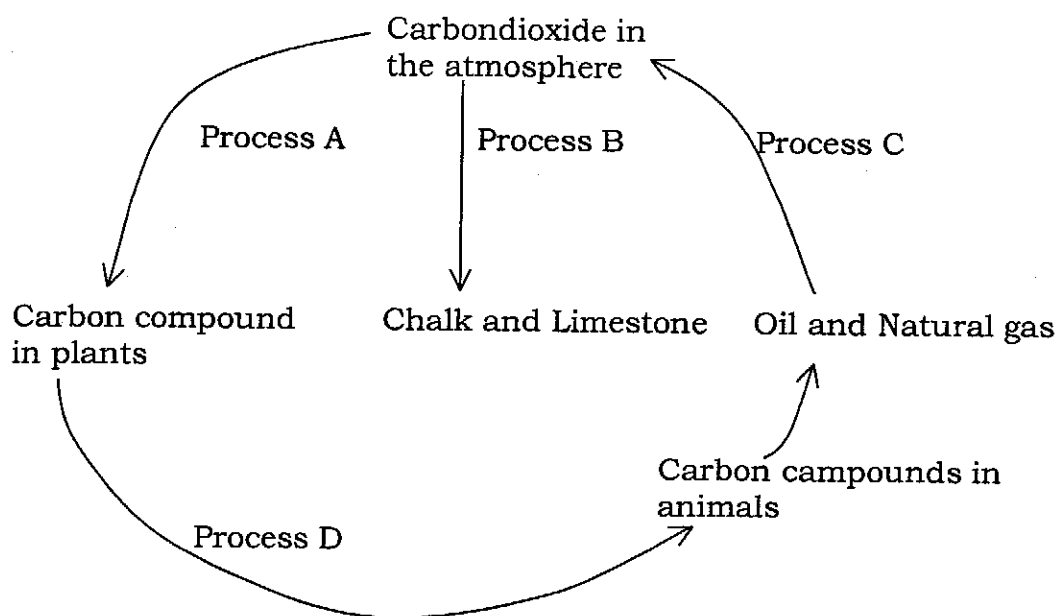
(2marks)

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

11. The diagram shows part of the carbon cycle.



(a) What are the processes shown as A, B, C and D

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

(4marks)

(b) Describe two human activities that are disrupting the natural carbon cycle.

(1mark)

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.

(1mark)

(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 ?

(2marks)

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

(2marks)

(ii) What is a recessive allele.

(1mark)

(c) A polydactylous man has one P allele and one p allele for this condition. 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.

(4mark)

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 ?

(1mark)

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

(2marks)

(c) Name one other group of microbes that frequently causes disease.

(1mark)

- (d) People crowded together in refugee camps are likely to catch the disease. Explain why. **(3marks)**
- (e) Explain how the body defends itself against bacteria. **(3marks)**
14. (a) What is the role of the following flower parts in the reproduction of the flower.
- (i) Petals
 - (ii) Stamens
 - (iii) Carpels
- (b) Briefly describe the process of fertilization in plants. **(5marks)**
15. An investigation was carried out into the effects of P^H on the action of the enzyme amylase on starch. Eight test tubes were set up at different P^H s and incubated in a water bath at $30^{\circ}C$ for one hour. The amount of reducing sugar (product) was then estimated. The Results are shown in the table.
- | P^H | 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. **(3marks)**
- (b) Explain the effect of P^H on the action of amylase in this investigation. **(3marks)**
- (c) What is the most suitable P^H for enzyme amylase in this investigation. **(1mark)**
- (d) Suggest other factors (Not in this investigation) that affect the action of an enzyme such as amylase. **(3marks)**
16. Describe the various excretory organs and their respective wastes in man. **(10marks)**

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 ?
 - (b) Suggest possible ways of conserving it.