THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

133/1

BIOLOGY 1
(For Both School and Private Candidates)

Time: 2 Hours 30 Minutes ***Tuesday, March 08, 2005 p.m.***

Instructions

1. This paper consists of ***fifteen (15)*** questions in sections A and B.
2. Answer ***all*** questions in section A and ***two*** questions from section B.
3. Section A carries 70 marks and Section B carries 30 marks.
4. Read each question carefully before you start answering it.
5. Cellular phones are ***not*** allowed in the examination room.
6. Write your ***Examination Number*** on every page of your answer booklet(s).

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This paper consists of 4 printed pages.

SECTION A (70 marks)

Answer ALL questions in this section. You are advised to spend not more than 90 minutes on this section.

1. (a) Define a cell.

   (b) State **four (4)** structural differences between animal cell and plant cell. **(7 marks)**

2. The diagram below (figure 1) shows how organisms may be separated into five kingdoms.

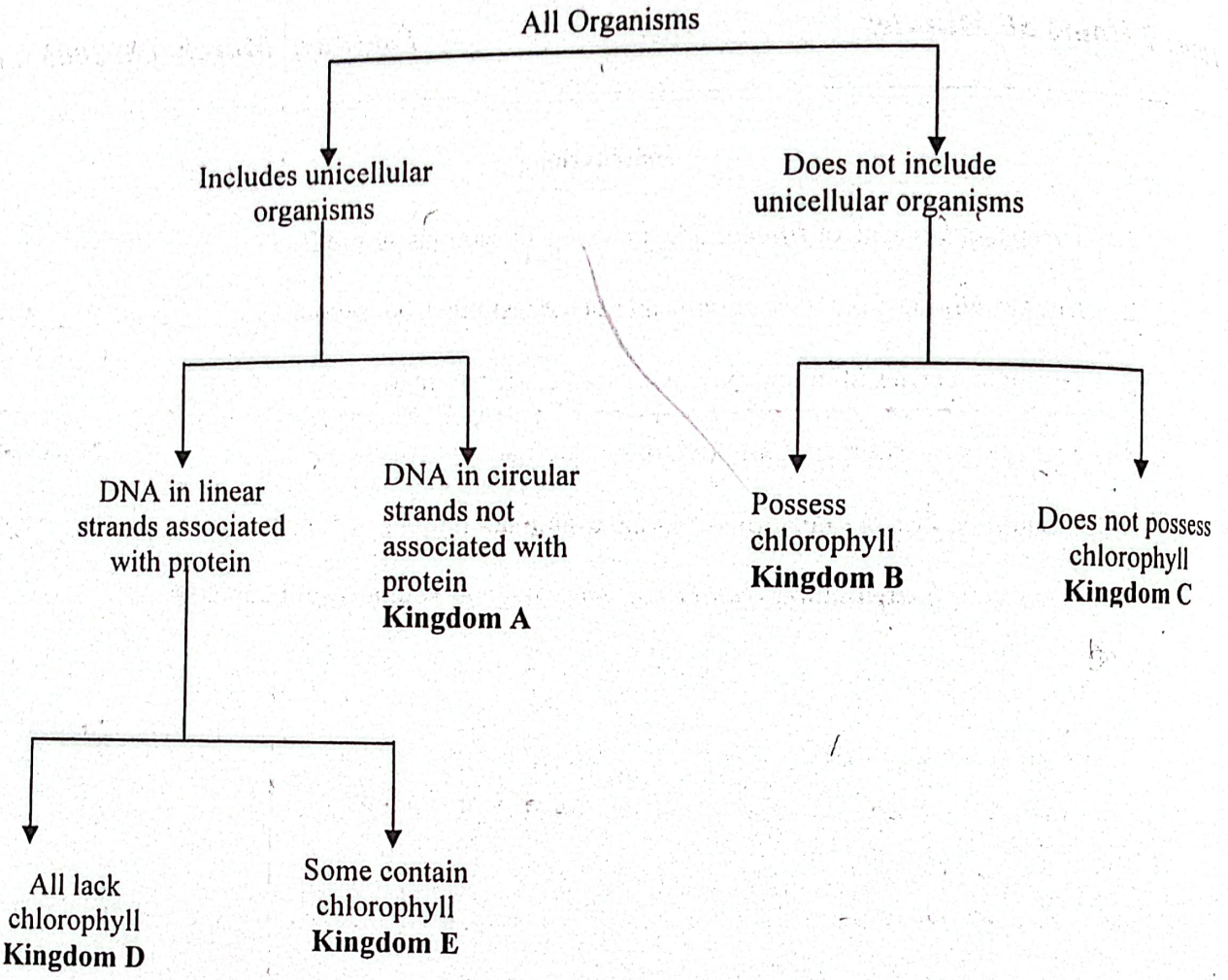


Fig. 1

   (a) (i) Name Kingdoms B and C.

   (ii) List down **two (2)** characteristics other than possession of chloroplasts which could be used to distinguish the cells of the organisms in Kingdom B from those in Kingdom C.

   (b) Which of the Kingdoms A, B, C, D and E represent Fungi? **(6 marks)**

3. Make a list of **six (6)** similarities (including biochemical ones) between photosynthesis and aerobic respiration. **(7 marks)**

4. (a) What do you understand by the term "respiratory quotient" (RQ) of a respiratory substrate?

   (b) Calculate the respiratory quotient of a fat, (tripalmitin) with the respiratory equation

$$2C_{51}H_{98}O_6 + 145O_2 \rightarrow 102CO_2 + 98H_2O.$$

   (c) If one complete oxidation of a molecule of glucose yields about 2830 kJ and one ATP molecule is equivalent to 33 kJ, what will the efficiency of glycolysis and Krebs cycles be for extraction of energy in one molecule of glucose? **(7 marks)**

5. The diagram below (figure 2) represents a transverse section of the cochlea of the mammalian ear.

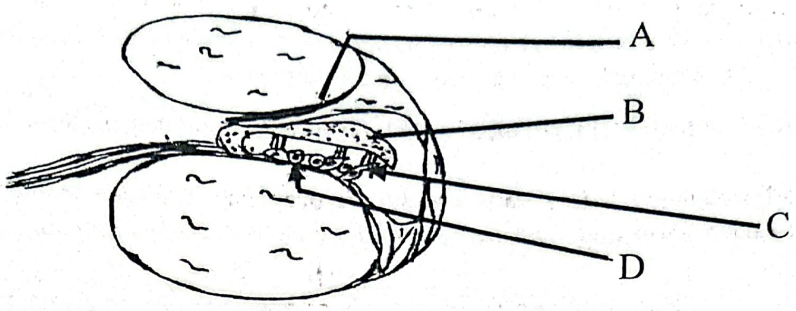


Fig. 2

(a) Label structures A, B, C and D.

(b) What is the role of the organ of corti in hearing? **(7 marks)**

6. (a) Explain briefly how the morulla is formed from the zygote.

(b) What do you understand by the statement "the formation of morulla from the zygote is radial and indeterminate". **(7 marks)**

7. Using relevant illustrations, explain the differences between limited and unlimited growth. **(8 marks)**

8. (a) Distinguish between sex limited and sex linkage.

(b) Define the terms

(i) Chromosomal mutation.

(ii) Codominance.

(iii) Polygenic inheritance. **(7 marks)**

9. What do you understand by the following terms as used in evolution?

(a) Law of use and disuse.

(b) Convergent evolution. **(7 marks)**

10. Below (figure 3) is a simple food web of five organisms P – T.

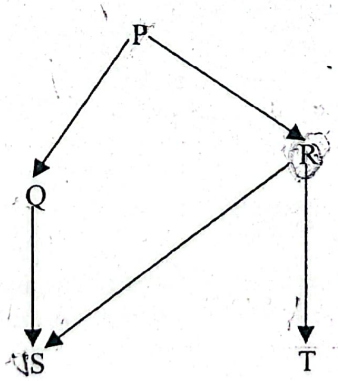


Fig. 3

Explain the effects of a sudden removal of organism R on the proportion of organisms P, S and T. **(7 marks)**

SECTION B (30 marks)

Answer *two* questions from this section.

11. (a) Give **two (2)** events of meiosis which account for the differences in genetic materials in the four daughter cells produced by the process.

(b) Why is it advised to breath air into the lungs through the nose and not through the mouth? **(15 marks)**

12. Two people X and Y, drank a glucose solution containing 100 grams of the solute. The blood sugar of each person was measured after 3 hours and the results obtained were as shown in table 1 below.

Time (minutes)	Blood sugar level mg/100 cm^3 blood	
	X	Y
O (glucose drunk)	81	90
20	136	131
40	181	142
60	213	89
90	204	79
120	147	74
150	129	86
180	113	89

Table 1

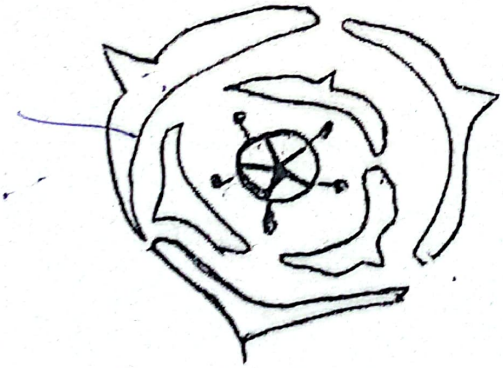
(a) Plot a graph of blood sugar (vertical axis) against time (horizontal axis) for X and Y.

(b) Suggest explanations for the changes in blood sugar levels of X and Y. **(15 marks)**

13. In mammals and birds, oxygenated blood flow to tissues is under high pressure but deoxygenated blood flow to the lungs is at a lower pressure. Outline the advantages of both cases. **(15 marks)**

14. (a) Write a brief description of the events which take place during fertilization in human beings.

(b) Write the floral formula of the hypothetical flower represented in figure 4 below.



(15 marks)

Fig. 4

15. (a) In certain plants, a cross between red flowered plants and yellow flowered plants produces offspring in the ratio 1:1(red to yellow). A cross between red flowered plants produces only red flowered plants.

(i) Which gene is dominant?

(ii) Write down the genotypes for red flowered and yellow flowered plants using suitable letters.

(b) Why are sex linked defects more common to male individuals than female ones? **(15 marks)**