THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2 **BIOLOGY 2**

ALTERNATIVE TO PRACTICAL

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 1993**

Instructions

1. This paper consists of sections Five questions. Answer all questions

2. Each question carries ten marks.

1. Suppose you were provided with solution X containing carbohydrates and you were asked to plan and carry out experiments to identify the carbohydrates present in it.

a) Outline how you would carry out a test and interpret the results of that test for each carbohydrate investigated. Tabulate your answer as shown below (Table 1).

Carbohydrate tested	Procedure	Observation	Inference
Starch	Add iodine solution to the sample	Blue-black color appears	Starch is present
Reducing sugar	Add Benedict's solution and heat	Color changes from blue to brick-red	Reducing sugar (e.g., glucose) is present
Non-reducing sugar	Boil with dilute HCl, neutralize with NaOH, then add Benedict's solution and heat	Color changes from blue to brick-red	Non-reducing sugar (e.g., sucrose) is present

b) Name one example of a food material which will give a positive result for each of the tests in (a) above.

- Starch: Potatoes or maize flour
- Reducing sugar: Honey or glucose solution
- Non-reducing sugar: Sucrose (table sugar)

2. Oyoko assembled the apparatus as in Figure 1 and then carried out the experiment described below.

i) While pinching the rubber tubing shown on the right side of Figure 1, he inhaled deeply through the stem of the T-tube.
ii) He released the hold on the right-hand tubing and pinched the tubing on the left side and exhaled.
iii) He repeated the above two steps a number of times until there was a marked change in the appearance of one of the flasks.
iv) He lit a wooden splint and placed the burning splint into an empty glass jar. He held it in the jar until the flame went out. He added a few cm^3 of solution Z (same as that in flasks A & B) to the jar and shook. A change similar to that observed in one of the flasks in step (iii) was produced.

a) What was the aim of the experiment?
The aim of the experiment was to investigate the presence of carbon dioxide in exhaled air.

b) i) What was solution Z?
Solution Z was limewater (calcium hydroxide solution).

ii) Which of the flasks A and B changed in appearance in step (iii) of the experiment?
Flask B changed in appearance because it contained the exhaled air, which has more carbon dioxide.

iii) What kind of gas produced a change in solution Z in steps (iii) and (iv) of the experiment?

Carbon dioxide produced the change in solution Z by reacting with limewater to form a white precipitate of calcium carbonate.

c) Explain the observations made in steps (iii) and (iv) of the experiment.
- In step (iii), limewater in flask B turned milky, indicating the presence of carbon dioxide in exhaled air.
- In step (iv), the burning splint went out in the jar, and when solution Z was added, it also turned milky, confirming the presence of carbon dioxide.

d) What three differences other than that investigated in Oyoko's experiment are there between inhaled and exhaled air?
- Inhaled air contains more oxygen, while exhaled air has less oxygen.
- Exhaled air contains more water vapor than inhaled air.
- Exhaled air is warmer than inhaled air due to body heat.

3. a) Figures 2 and 3 represent two plant parts.

i) Identify the plant parts represented by figures 2 and 3.
- Figure 2: Tuber (e.g., potato)
- Figure 3: Bulb (e.g., onion)

ii) Name the structures labeled L, M, N, O, P, and Q.
- L: Tuber
- M: Bud (eye of the tuber)
- N: Leaf base
- O: Stem base
- P: Roots
- Q: Fleshy leaves

iii) State two functions common to both plant parts (figures 2 and 3) in nature.
- Both store food for plant growth.
- Both help in vegetative reproduction.

iv) Which structure in Figure 3 serves the same function as structure M? Name the function served by these two structures.
- Structure N (Leaf base) serves the same function as structure M (Bud).
- The function of these structures is to allow vegetative propagation and regeneration of new plants.

(b) Figs. 4 and 5 represent two animals.

i) Identify the two animals using common names.

- Figure 4: Grasshopper
- Figure 5: Scorpion

ii) Name the parts labeled R, S, T, U, V, and W.

- R: Antenna
- S: Foreleg
- T: Hind leg
- U: Pedipalp
- V: Chelicerae
- W: Tail with venomous stinger

iii) Which distinguishing characteristics, observable from the diagrams, are used to place the organisms represented by figures 4 and 5 in their respective classes?

- Grasshopper (Figure 4):
  - Has three pairs of jointed legs.
  - Has a segmented body divided into head, thorax, and abdomen.
  - Has a pair of antennae.

- Scorpion (Figure 5):
  - Has four pairs of jointed legs.
  - Possesses pedipalps modified into pincers.
  - Has a segmented tail with a venomous stinger.

iv) Name the phyla and classes to which the organisms in figures 4 and 5 belong.

- Grasshopper: Phylum Arthropoda, Class Insecta.
- Scorpion: Phylum Arthropoda, Class Arachnida.

v) In the mammalian body, there are organs which have similar functions to those labeled R, S, and T in figure 4. Name the corresponding organs in mammals with functions similar to those of R, S, and T.

Name of structure on Fig.4	Corresponding organ in mammals
R (Antenna)	Nose (for detecting stimuli)
S (Foreleg)	Forelimb (for support and movement)
T (Hind leg)	Hind limb (for jumping and movement)

4. a) Fig. 6 represents a life cycle of an animal.

i) Name the animal whose life-cycle is represented in figure 6.

- The animal is a frog.

ii) Rearrange the stages, using the letters, so that they show the correct sequence in the life cycle of the animal.

Correct sequence: F ---> E ---> D ----> A -----> C ----> B

iii) What substance is responsible for the change from one stage to another? Where is it produced?

- The hormone responsible is thyroxine. It is produced by the thyroid gland.

b) Draw a large and well-labeled diagram of a quill feather.