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: 1992**

Instructions

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

2. Each question carries ten marks.

1. In a biology practical lesson, form four students were provided with sunflower fruits and asked to plan and carry out an experiment to identify the food substances present in them. Suppose you were in that lesson:

a) What food substances would you have suspected to be present in sunflower fruits?
- Sunflower fruits contain proteins, lipids (fats/oils), and carbohydrates.

b) How would you have prepared the sunflower fruits for the investigation?
- The sunflower fruits would be crushed and ground into a paste.
- The paste would be mixed with water to form a solution.
- The solution would then be filtered to obtain a testable extract.

c) What would have been the procedure, results, and inferences for your various tests to identify the food substances you have mentioned in (a) above? Tabulate your answer as in Table 1 below.
Table 1

Test for	Procedure	Results	Inference
Starch	Add iodine solution to the extract	Blue-black color appears	Starch is present
Proteins	Add Biuret reagent to the extract	Purple color appears	Proteins are present
Lipids	Perform the grease spot test on filter paper	Translucent spot remains	Lipids are present

2. Three different soil samples A, B, and C were each shaken up with water in a measuring jar and then left to settle. After some time, the different size particles of soil settled in layers. The proportions of the various soil particles in the three samples of soil were determined and the results were as shown in table 2 below.

Table 2

Soil Sample	% gravel	% sand	% silt	% clay
A	70	20	5	5
B	3	13	27	57
C	20	25	35	20

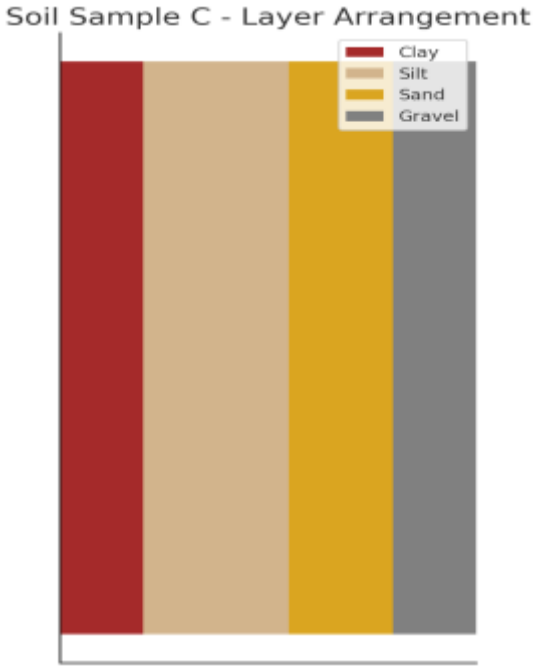
Percentage constituents of each of soil samples A, B, and C

a) i) What was the aim of the experiment?
- The aim of the experiment was to determine the composition of different soil samples based on particle size distribution.

ii) From what type of soils were samples A, B, and C taken? Give reasons.
- Sample A is sandy soil because it has a high percentage of gravel and sand with very little clay.
- Sample B is clay soil because it has a high percentage of clay (57 percent) and low amounts of sand and gravel.

- Sample C is loamy soil because it has a balanced proportion of sand, silt, and clay, making it ideal for agriculture.

b) i) Draw a well-labeled diagram to show the arrangement of the various layers formed in the measuring jar when soil sample C was being investigated.



ii) Briefly explain how one can determine the proportion of each type of particle in a soil sample.

- Shake the soil sample with water in a measuring jar and allow it to settle.
- Observe the layers that form after some time: gravel settles first, followed by sand, silt, and then clay at the top.
- Measure the thickness of each layer and calculate its proportion relative to the total height of the soil in the jar.

3. Study the diagrams in figures 1-9 and then answer the questions that follow.

a) Giving reasons based on observable features from the diagrams, state the feeding habits of the animals with structures like those shown in figures 1-3.

- Figure 1: The beak structure suggests that the bird is a seed eater (granivore). The short and strong beak is adapted for cracking seeds.
- Figure 2: The beak structure suggests that the bird is a filter feeder. It has a flat, broad beak adapted for straining food from water.
- Figure 3: The beak structure suggests that the bird is a carnivore. The sharp, curved beak is adapted for tearing flesh.

b) i) State the phylum and class to which the animal represented by figure 4 belongs.

- Phylum: Arthropoda
- Class: Insecta

ii) List the observable characteristics in figure 4 which have enabled you to place it in the class stated in 3(b)(i) above.

- The body is segmented into three main parts: head, thorax, and abdomen.
- It has three pairs of jointed legs.
- The presence of a pair of antennae.
- It has compound eyes.

c) i) Using common names, identify the fruits represented by figures 5-7.

- Figure 5: Orange
- Figure 6: Mango
- Figure 7: Avocado

ii) Name the edible part(s) of the fruits in figures 6 and 7.

- Figure 6 (Mango): The edible part is the mesocarp (fleshy part).
- Figure 7 (Avocado): The edible part is the mesocarp (fleshy part).

iii) To which group of fruits does each of the fruits in figures 5-7 belong?

- Figure 5 (Orange): Hesperidium
- Figure 6 (Mango): Drupe
- Figure 7 (Avocado): Drupe

d) i) Which classes of flowering plants do the structures in figures 8 and 9 represent?

- Figure 8 represents dicotyledonous plants (dicots).
- Figure 9 represents monocotyledonous plants (monocots).

ii) Distinguish the two classes using only those characteristics observable from the diagrams.

- Figure 8 (Dicots) has broad leaves with a network of veins.
- Figure 9 (Monocots) has long, narrow leaves with parallel veins.

iii) Give the names of the structures labeled 1 and 2 in figures 8 and 9.

- Structure 1 in figure 8: Leaf
- Structure 2 in figure 9: Leaf

4. The following is a longitudinal section of a hibiscus flower.

a) Name the structures labeled 1-13.

1. Stigma
2. Style
3. Anther
4. Filament
5. Petal
6. Petal
7. Sepal
8. Receptacle
9. Ovary
10. Ovule
11. Pedicel
12. Nectary
13. Placenta

b) Some of the structures you have labeled have functions similar to those of certain structures and organs found in a mammalian body. Identify such structures and compare their functions with those of their counterparts in mammals. Use a table as shown below (Table 3).

Structure in hibiscus flower	Function	Corresponding structure in mammal	Function
Stigma	Receives pollen for fertilization	Ovary	Receives sperm for fertilization
Ovary	Contains ovules that develop into seeds	Uterus	Supports embryo development
Anther	Produces pollen (male gametes)	Testes	Produces sperm (male gametes)
Style	Passage for pollen to reach ovary	Fallopian tube	Passage for sperm to reach egg
Sepal	Protects the flower bud before blooming	Skin	Protects internal organs