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: 2002**

Instructions

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

2. Each question carries ten marks.

1. a) Saitot is a curious form III student. He usually cleans his teeth after every meal to remove traces of leftover foods after eating rice and roasted beans. As a form four graduate, write down the instructions he must follow to identify the foods present in the washings he collected in a bowl after eating a similar meal, as shown in the table below.

Food tested	Procedure	Observation	Inference
Starch	Add iodine solution to the washings	Blue-black color appears	Starch is present
Proteins	Add Biuret reagent to the washings	Purple color appears	Proteins are present
Fats	Rub the washings on filter paper and let it dry	Translucent spot appears	Fats are present

b) What conclusion do you draw about the food substances present in these traces?

The washings contain starch, proteins, and fats, indicating the presence of carbohydrates from rice, proteins from beans, and possible fats from cooking oil.

c) What problems is he likely to suffer if he stops cleaning his mouth after every meal?

- Accumulation of food particles leads to bacterial growth, causing bad breath and cavities
- Increased risk of tooth decay due to acid production by bacteria breaking down carbohydrates
- Possible gum infections like gingivitis

d) Suggest a diet essential for well-formed and strong teeth of a growing child.

- Milk and dairy products for calcium and phosphorus
- Fruits like oranges for vitamin C, which strengthens gums
- Green leafy vegetables for essential minerals
- Fish and eggs for vitamin D, which aids calcium absorption

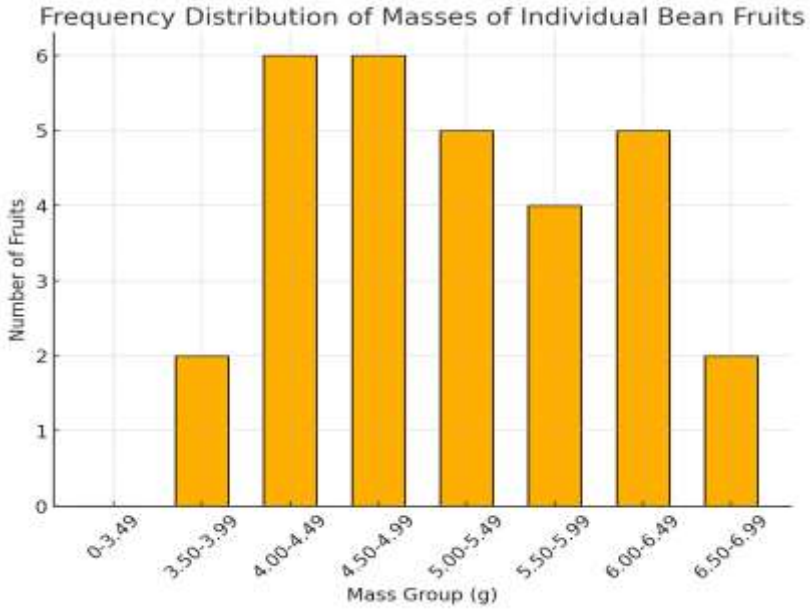
2. a) The mass of 30 individual bean fruits, from a kilogram of freshly collected fruits, was measured and recorded.

In the table form as shown below, record the number of fruits in each group of masses, using tally marks. One example has been completed for you.

Mass of individual fruits (g):
5.31, 4.61, 4.67, 4.67, 5.09
6.23, 4.94, 2.87, 4.41, 5.80
4.26, 5.10, 6.65, 4.39, 5.47
6.22, 3.94, 4.48, 3.94, 4.94
6.13, 5.13, 5.85, 5.36, 4.35
6.17, 5.23, 5.98, 4.43, 6.34

Group by mass (g)	Number of fruits
0 - 3.49	0
3.50 - 3.99	2
4.00 - 4.49	6
4.50 - 4.99	6
5.00 - 5.49	5
5.50 - 5.99	4
6.00 - 6.49	5
6.50 - 6.99	2

b) i) On the graph paper provided, present the data you have recorded to show the frequency distribution of masses.



ii) State the type of variation shown by the fruits.

The variation shown is continuous variation because the mass of the fruits varies gradually within a range.

3. The diagrams in Figure 1 below show an experiment set up by four students using four glass jars. The glass jars A, B, and C were maintained at 30°C for 7 days while jar D was maintained at 0°C for the same period of time.

a) Suggest the aim of the experiment.

The aim of the experiment is to investigate the conditions necessary for seed germination, including oxygen, temperature, and moisture.

b) Why was pyrogallol acid included in glass jar A?

Pyrogallol acid was included in jar A because it absorbs oxygen, creating an oxygen-free environment to test whether oxygen is necessary for germination.

c) Explain why gas jars C and D were included in the experiment.

- Jar C had dry cotton wool to test if moisture is necessary for germination.
- Jar D was kept at 0°C to test if temperature affects germination.

d) What result would you expect in glass jars A and B at the end of the experiment?

- In jar A, no germination will occur because of the absence of oxygen.
- In jar B, seeds will germinate because it has all necessary conditions: warmth, oxygen, and moisture.

4. A leafy shoot was cut under water and fitted with a rubber cork which was then fitted into a graduated test tube containing water. The experiment was set up as shown in Figure 2 below. The experiment was placed near an open window for forty minutes.

a) What was the aim of the experiment?

The aim of the experiment was to investigate the process of transpiration in plants and how water is lost through the leaves.

b) i) Write down the expected results for the experiment and give reasons for your answer.

The water level in the graduated test tube will decrease after 40 minutes. This occurs because the plant loses water through transpiration, creating a pull that draws water up from the test tube.

ii) Why was the shoot cut under water?

The shoot was cut under water to prevent air bubbles from entering the xylem vessels, which could block water uptake and affect the accuracy of the experiment.

c) Write down the conclusion from the experiment.

The experiment demonstrates that plants lose water through transpiration, and this water is drawn up through the stem to replace the lost moisture.

d) What is the importance to life of the phenomenon investigated in this experiment?

- Transpiration helps in the uptake and transport of minerals from the roots to other parts of the plant.
- It cools the plant by releasing water vapor.

- It maintains a continuous flow of water necessary for photosynthesis.
- It helps in maintaining water balance in plants.

5. Identify the organisms represented by diagrams A, B, C, and D in Figure 3 below.

a) i) Identify the organisms represented by diagrams A, B, C, and D by their common names.

- A: Tapeworm
- B: Earthworm
- C: Wheat plant
- D: Paramecium

ii) Name the kingdom to which each organism belongs.

- A: Kingdom Animalia
- B: Kingdom Animalia
- C: Kingdom Plantae
- D: Kingdom Protista

b) Name the two (2) features used to place the organisms represented by diagrams A and D in their respective kingdoms.

- Tapeworm (A):
  - It is multicellular.
  - It lacks a cell wall and is heterotrophic.

- Paramecium (D):
  - It is unicellular.
  - It moves using cilia and reproduces asexually by binary fission.

c) i) State the mode of nutrition for the organisms represented by diagrams A and B.

- A (Tapeworm): Parasitic nutrition
- B (Earthworm): Saprophytic or detritivorous nutrition (feeds on decaying organic matter)

ii) Name the habitats for organisms C and D.

- C (Wheat plant): Terrestrial (found in soil)
- D (Paramecium): Aquatic (found in freshwater ponds and lakes)

d) Write down the economic importance of organism B.

- Earthworms help in soil aeration by burrowing into the soil.

- They improve soil fertility by decomposing organic matter into humus.
- They are used as bait for fishing.
- They are an essential component in vermiculture (composting).

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a) What was the aim of the experiment?

The aim of the experiment was to investigate the process of transpiration in plants and how water is lost through the leaves.

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The water level in the graduated test tube will decrease after 40 minutes. This occurs because the plant loses water through transpiration, creating a pull that draws water up from the test tube.

ii) Why was the shoot cut under water?

The shoot was cut under water to prevent air bubbles from entering the xylem vessels, which could block water uptake and affect the accuracy of the experiment.
c) Write down the conclusion from the experiment.

The experiment demonstrates that plants lose water through transpiration, and this water is drawn up through the stem to replace the lost moisture.

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