THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/2A **BIOLOGY 2A**

(ACTUAL PRACTICAL A)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2009**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You have been provided with specimens S_1, S_2, S_3 and S_4. Observe the specimens carefully and answer the following questions:

(a)(i) What characteristics are common among specimens S_1, S_2, S_3 and S_4?

All specimens are multicellular organisms, they have cell membranes, and most have some form of locomotion or growth movement. They exhibit specialized cells and tissues for specific functions and are composed of organs or structures adapted to their mode of life.

(a)(ii) Name the kingdom and phylum/division to which specimens S_1, S_2, S_3 and S_4 belong.

S_1: Kingdom Fungi, Phylum Basidiomycota

S_2: Kingdom Plantae, Division Bryophyta

S_3: Kingdom Animalia, Phylum Arthropoda

S_4: Kingdom Animalia, Phylum Arthropoda

(a)(iii) Why are S_3 and S_4 placed in different classes?

Though both are arthropods, S_3 may be an insect (Class Insecta) and S_4 an arachnid (Class Arachnida). Insects have three body segments and six legs, while arachnids have two body parts and eight legs.

(b)(i) What distinctive features place specimen S_2 in its respective kingdom?

S_2 is a bryophyte with no true roots, stems, or leaves. It reproduces via spores and lacks vascular tissues. It also thrives in moist environments and shows alternation of generations.

(b)(ii) Why are specimens S_3 and S_4 classified under the same phylum?

Both have segmented bodies, jointed appendages, and exoskeletons made of chitin. These are defining features of Phylum Arthropoda.

(c)(i) Suggest how the specimen labelled S_1 is adapted to its mode of life.

S_1 (fungus) has hyphae that spread to absorb nutrients, enzymes for external digestion, and a large surface area for absorption. It grows well in moist, decaying matter and reproduces via spores that spread easily.

(c)(ii) Give reasons why specimen S_1 cannot grow taller.

S_1 lacks vascular tissues such as xylem and phloem, which are needed to transport water and nutrients to support upright growth. It also has no rigid support structures.

(d) Describe the advantages and disadvantages of the organisms which belong to the class into which S_3 is found.

Advantages:

- Insects (S_3) are essential for pollination of crops.

- They serve as food for other animals and aid in decomposition.
Disadvantages:
- Many are pests that damage crops.
- Some spread diseases such as malaria and cholera.

2. You have been provided with a variegated leaf and iodine solution. Carefully follow the instructions and answer the questions that follow:

(a) What was the aim of the experiment?
To test for the presence of starch in a variegated leaf and show that photosynthesis occurs only in the green parts of the leaf.

(b) Why was the leaf dipped in hot water for 30 seconds?
To kill the leaf and stop all cellular activities, making it easier to test for starch.

(c)(i) Give reason why the leaf was boiled in ethanol?
To remove chlorophyll from the leaf so that the color change with iodine can be observed clearly.
(c)(ii) Why was the leaf dipped once again in hot water?
To soften the leaf after it was hardened by ethanol and to make it easier to spread without breaking.

(d) Give the interpretation of the results observed when a few drops of iodine solution were poured onto the decolourised leaf.
The green parts of the leaf turned blue-black, indicating the presence of starch and confirming that photosynthesis occurred in those areas. The non-green parts showed no color change, meaning no starch was produced there. This demonstrates that chlorophyll is required for photosynthesis.