THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/2A **BIOLOGY 2A**

Time: 3 Hour. **ANSWERS** **Year: 2020**

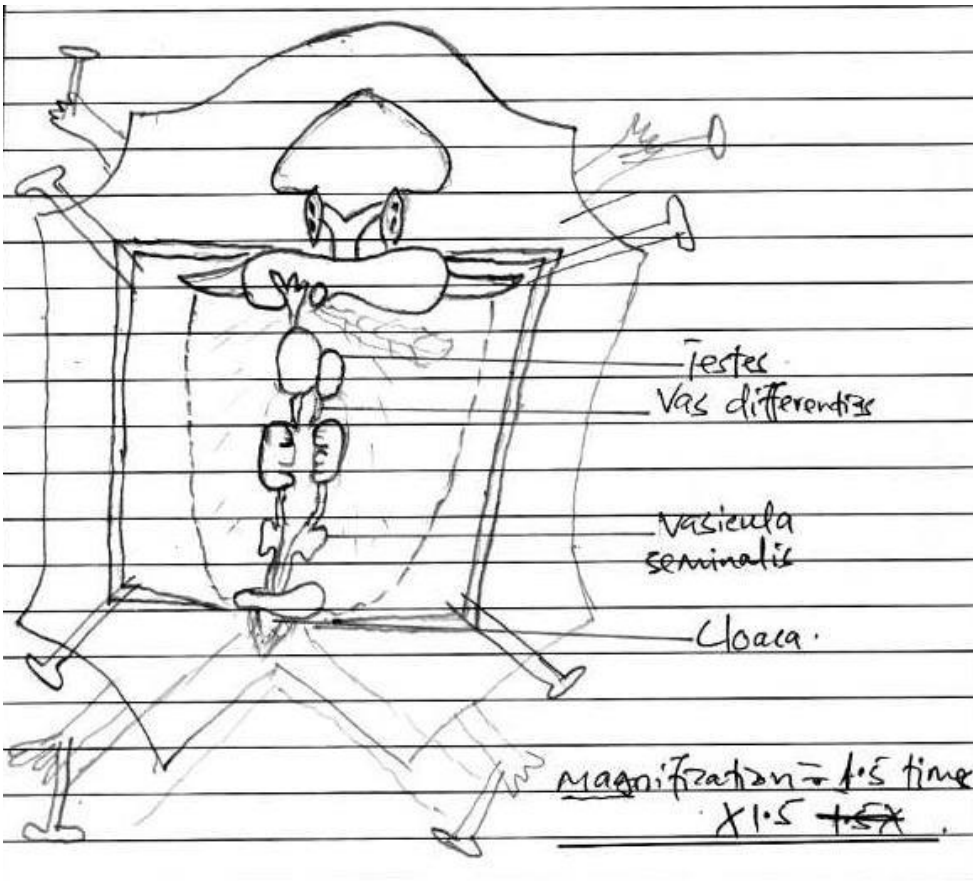
Instructions

1. This paper has three papers.
2. Answer **all** questions.
3. Question **1** contains 30 marks while question 2 and 3 have 10 marks each.
4. Mobile phones are not allowed inside the examination room.
5. Write your Examination Number on every page of your answer booklet.

1. You are provided with a specimen labelled W (a male or female rat).
(a) Dissect specimen W to expose the reproductive and excretory systems.

The dissection should be performed by placing specimen W on its back, pinning down the limbs, and making a shallow longitudinal incision from the lower abdomen up to the chest. Carefully open the body wall to expose internal organs. Clear tissues gently to reveal both reproductive and excretory structures.

(b) Draw a well-labelled diagram showing two parts of the reproductive system and two parts of the excretory system.



(c) What is the sex of specimen W? Give three supporting observations.

If testes are visible in scrotal sacs near the hind limbs, the specimen is male. The vas deferens may be seen running from each testis toward the posterior, which is another male feature. Absence of a uterus and ovaries also supports male identification.

In females, the uterus appears as a Y-shaped organ with two ovaries at the end of the horns. The presence of mammary glands may also support identification as female. A broad pelvic region also tends to indicate a female specimen.

(d) Identify the thread-like structures in specimen W and explain why they are numerous.

The thread-like structures seen in the abdominal cavity are the blood vessels and nerves. They are numerous because they serve as channels for transporting oxygen, nutrients, waste products, and nerve impulses to and from various organs in the body. Their abundance ensures efficient physiological functioning throughout the organism.

2. You are given two solutions: Solution G and Solution H.
(a) Perform biochemical tests on each solution using the reagents provided. Tabulate your results as follows:

Test For	Procedure	Observation	Inference
Starch	Add iodine solution to Solution G	Blue-black colour appears	Starch is present
Reducing Sugar	Add Benedict's solution to Solution H, heat in a water bath	Brick-red precipitate forms	Reducing sugar is present
Protein	Add Biuret reagent to Solution G	Purple colour appears	Protein is present
Lipid	Rub Solution H on brown paper and heat	Permanent translucent spot appears	Lipid is present

(b) Carbohydrates such as starch provide a long-term source of energy, being broken down into glucose during digestion to fuel body processes.

Proteins are essential for body growth and tissue repair. They are used in building enzymes, hormones, and structural components such as muscles and skin.

Lipids serve as concentrated sources of energy. They provide insulation, protect vital organs, and assist in the absorption of fat-soluble vitamins such as A, D, E, and K.

(c) (i) The digestive enzyme responsible for digesting reducing sugars such as those in Solution H is amylase, specifically pancreatic amylase in the small intestine.

(ii) The end product of starch digestion is glucose, a simple sugar readily absorbed into the bloodstream for energy use.

3. Observe the provided specimens P (Mango seedling), K (Fish scale), and L (Cactus).
(a) (i) List two features used to place specimen P into its respective class.

Specimen P has broad leaves with reticulate venation, which is typical of dicotyledonous plants. It also has a tap root system, which is another defining feature of dicots.

(ii) Suggest three adaptations that help specimen L survive in dry habitats.
Specimen L, the cactus, has modified leaves in the form of spines, which reduce water loss by limiting the surface area for transpiration. Its stem is thick, succulent, and green, allowing it to store water and carry out photosynthesis. The waxy coating on its surface reduces evaporation and helps retain moisture in hot, dry conditions.

(b) (i) Identify the organism from which specimen K was obtained.
Specimen K is a fish scale and was obtained from a bony fish, such as tilapia.

(ii) State two functions of specimen K to that organism.

The scale protects the fish from physical injuries and from parasites in its aquatic environment. It also aids in reducing friction as the fish swims through water, improving its hydrodynamic efficiency.

(c) How is specimen P important to human life? Mention three uses.

The mango seedling is economically important as it grows into a fruit-bearing plant. The fruit is consumed as food and used in juice production. Mango trees also provide shade and are used in reforestation programs, while the wood may be used in carpentry.