THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

733/2A **BIOLOGY 2A**

Time: 3 Hour. **ANSWERS** **Year: 2002**

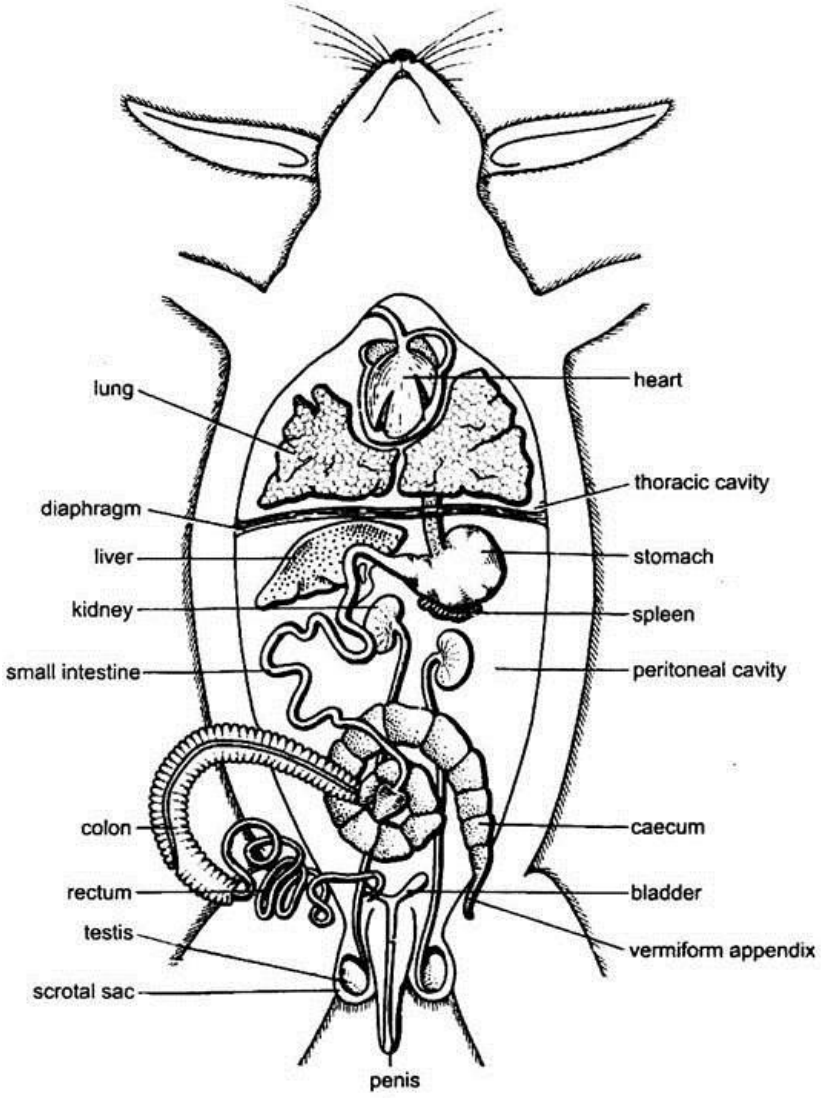
Instructions

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. Dissect the provided specimen P (a female rabbit) in the usual way to expose the digestive system.

(a) Draw a labelled diagram of the dissected specimen P showing six digestive organs.

(Drawing should be done practically. The labelled parts of the digestive system should include: oesophagus, stomach, small intestine, caecum, large intestine (colon), and rectum.)



(b) Identify two precautions taken when cutting the abdominal skin.

One precaution is to make a shallow incision to avoid damaging the internal organs beneath the skin. Deep cutting could tear the stomach or intestines, leading to spillage and loss of visible structure.

Another precaution is to begin the incision from the lower abdomen and move upward slowly while lifting the skin with forceps. This ensures controlled opening and prevents cutting underlying structures unexpectedly.

(c) State the roles of the caecum and large intestine in digestion.

The caecum plays a vital role in the fermentation of plant material, especially cellulose. It houses symbiotic bacteria that break down complex carbohydrates into absorbable nutrients, which is essential in herbivorous animals like rabbits.

The large intestine mainly functions in water reabsorption and compaction of undigested material into feces. It also allows the absorption of some vitamins produced by bacteria, such as vitamin K and B12.

2. You are provided with solution A. Carry out a biochemical food test:

(a) Use appropriate reagents to test for food contents in solution A. Record results in this table:

Food Tested	**Procedure**	**Observation**	**Inference**
Starch	Add iodine solution	Blue-black colour appears	Starch is present
Reducing sugar	Add Benedict's solution and heat	Orange-red precipitate forms	Reducing sugar is present
Protein	Add Biuret solution	Purple colour appears	Protein is present
Lipid	Rub on brown paper dry over flame	Permanent translucent spot forms	Lipid is present

(b) Mention the importance of the food substances identified in human diet.

Starch is a source of energy as it is broken down into glucose which fuels body processes and cellular respiration.

Reducing sugars like glucose provide quick energy, especially important during physical activity or when the body needs an immediate supply.

Proteins are essential for growth, repair of tissues, enzyme formation, and the production of hormones and antibodies.

Lipids serve as an energy reserve, provide insulation, protect internal organs, and help in the absorption of fat-soluble vitamins (A, D, E, K).

(c) Explain the necessity of applying heat during the test for reducing sugar.

Heat is required in the Benedict's test to activate the reaction between reducing sugars and the copper(II) ions in the reagent. Heating reduces the copper(II) sulphate to insoluble copper(I) oxide, forming a red or orange precipitate which confirms the presence of reducing sugar.

3. Observe specimens R (Onion), S (Mango seedling), and T (Cactus). Then answer:

(a) List two visible features placing specimen R in its correct kingdom.

Specimen R shows presence of a defined cell wall, which is typical of organisms in the Plantae kingdom.

It has green leaves with chlorophyll, confirming its ability to perform photosynthesis, a major plant characteristic.

(b) Describe three adaptations of specimen T to arid conditions.

Specimen T has thick, fleshy stems that store water, enabling the plant to survive during prolonged droughts.

Its leaves are reduced to spines, minimizing surface area to reduce water loss through transpiration.

The stem is green and performs photosynthesis, compensating for the reduced leaf surface.

(c) How does specimen S differ from specimen R in leaf venation and stem type?

Specimen S, being a dicot (mango), has broad leaves with reticulate venation, while specimen R (onion, a monocot) shows parallel venation.

Specimen S has a woody stem with secondary growth, whereas specimen R has a soft, herbaceous stem without secondary thickening.

(d) Suggest three economic uses of specimen T.

Cactus is used as ornamental plants in homes and gardens due to their unique appearance and low maintenance.

Some cactus species are edible and used as food sources, especially the pads and fruits like prickly pear.

Cactus plants are used in arid land restoration programs for preventing soil erosion and improving soil fertility in desert areas.