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: 2023**

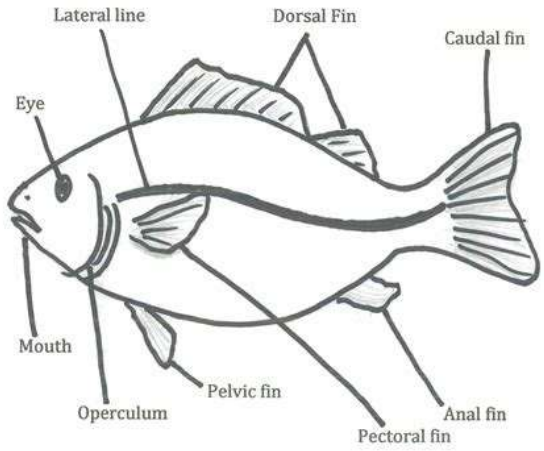
Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. You have been provided with specimens J, X, Y and Z. Observe the specimens carefully, then answer the following questions:

(a)(i) Draw a well labeled diagram of specimen X with locomotory structures intact.



(ii) Why specimen X must have locomotory structures? Give four reasons.
Specimen X must have locomotory structures because:
- To enable it to escape from predators
- To search for food and water
- To find mates for reproduction
- To move to favorable environmental conditions

(iii) Use a knife to cut and totally remove the scales and fines from specimen X and explain seven activities that will be impaired, if the specimen is returned to its habitat alive.
Removing scales and fins would impair:
- Swimming and balancing in water
- Protection from parasites and infections
- Reducing water resistance during motion
- Sensing movement in water
- Temperature regulation
- Communication or mating displays
- Camouflage or defense mechanism

(b)(i) Study specimen Y and J and give their common names and the part of the skeleton from which each specimen were taken.
Specimen Y: Common name – Femur (thigh bone), taken from the hind limb.
Specimen J: Common name – Vertebra (e.g., lumbar), taken from the vertebral column.

(ii) Briefly explain the function performed by specimen Y in the human body.
Specimen Y (Femur) supports the body's weight and facilitates movement by acting as a lever with attached muscles.

(iii) Explain four adaptive features of specimen Y which help it to perform its function to the human body.
- Long and cylindrical shape for strength and support
- Broad ends for articulation with other bones
- Hard outer layer (compact bone) for strength
- Hollow shaft with marrow cavity to reduce weight and produce blood cells

(c)(i) Carefully observe the structure of specimen J and identify the type of joint(s) that would be formed to the body of the animal.
Specimen J forms a vertebral joint, specifically a cartilaginous joint or intervertebral joint.

(ii) Explain how the specimen J is adapted for formation of the joint(s) identified in (i).
- Presence of articular surfaces for smooth movement
- Interlocking projections for stability
- Spaces for intervertebral discs to absorb shock and allow flexibility
- Strong processes for attachment of muscles and ligaments

(d) Closely observe specimen Z and explain three characteristic features which help it to move in its habitat easily.
- Slimy body surface to reduce friction while crawling
- Muscular foot for contraction and relaxation during movement
- Mucus secretion to aid smooth gliding over surfaces

2. Carefully study the specimens G, H and K and answer the following questions:

(a)(i) Identify one feature which may influence the artificial classification system to place both specimens K and H into the same taxonomic group.
Similar external features like body shape, color, or number of legs.

(ii) Why scientists may not concur with the use of artificial classification system for grouping specimens K and H into taxonomic group? Give a reason.
Because artificial classification is based on superficial features, not on genetic or evolutionary relationships.

2(b)(i) Classify each of the specimens G, H and K to Class level.

Specimen G:
- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Insecta

Specimen H:
- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Insecta

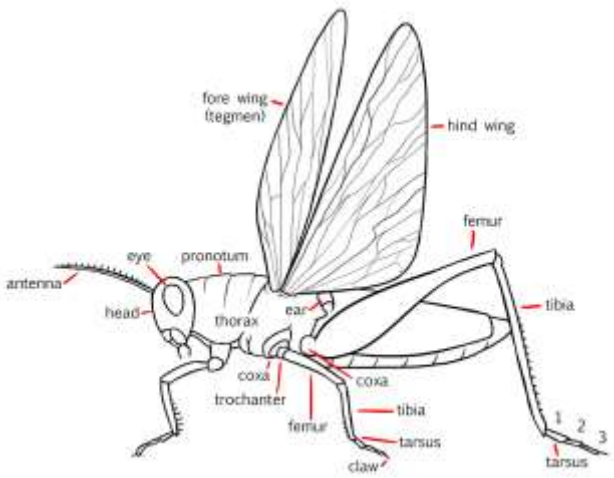
Specimen K:
- Kingdom: Animalia
- Phylum: Arthropoda
- Class: Arachnida

(ii) Account for the features used in the natural classification system to place specimens G and H to their Classes.
- Presence of three body segments (head, thorax, abdomen)
- Three pairs of legs
- One or two pairs of wings
- Compound eyes and antennae

(iii) Name four organisms which share the same Phylum with the specimen K.
- Scorpion
- Spider
- Mite
- Tick

(iv) In what ways members that were placed together with specimen K in the same Class are advantageous in our daily life?
- Spiders control pest insects
- Some produce silk used in textiles or research
- Scorpions have medicinal research value
- Mites aid in decomposition and nutrient recycling

(c)(i) Draw a diagram of specimen H and label external features.



(ii) Identify two observable features of specimen H at the Kingdom level.
- Multicellular organism
- Heterotrophic (obtains food from other organisms)