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: 2012**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

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Prepared by: Maria Marco for TETEA

1(a) Study specimens F and G carefully, then:
(i) Identify specimens F and G using their common names.
Specimen F is a bean seed, while specimen G is a maize grain.

(ii) Compare specimens F and G, then state their observable differences.
Specimen F (bean) has two cotyledons, while specimen G (maize) has one cotyledon.
Bean seeds exhibit external seed coats that are easily removable, while maize grains have fused seed coats.
The plumule and radicle in bean are easily seen and distinct, while in maize they are enclosed inside the endosperm.
Bean seeds are dicots, and maize is a monocot.

(iii) Briefly explain the types of germination which occurs in specimens F and G.
Specimen F undergoes epigeal germination, where the cotyledons emerge above the soil due to elongation of the hypocotyl.
Specimen G undergoes hypogeal germination, where the cotyledons remain underground as the epicotyl grows and pushes the plumule above the soil.

1(b) Using a scalpel, remove the outer coat from specimen F. Split the two parts with the inner sides facing upwards. Then:

(i) Draw a well labelled diagram to show the structures of one part of the split specimen F as would be seen from above.
(A clear diagram should include and label the hilum, micropyle, cotyledon, plumule, and radicle.)

(ii) For each structure labelled in specimen F, state the role they play in seed germination.
Hilum: A scar showing where the seed was attached to the pod, allowing water entry.
Micropyle: Small pore through which water enters during germination.
Cotyledons: Store food to nourish the embryo during germination.
Plumule: Develops into the shoot system.
Radicle: Grows into the root system.

1(c) Using a scalpel, prepare a longitudinal section of specimen G.

(i) Draw a well labelled diagram of the cut surface of specimen G.
(The diagram should show the seed coat, endosperm, scutellum, plumule, radicle, and coleoptile.)

(ii) Identify the part used by specimen G to absorb water during seed germination.

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The scutellum absorbs water and transfers nutrients from the endosperm to the growing embryo during germination.

2(a) Study carefully specimens H and I then:

(i) Identify specimens H and I by their common names.
Specimen H is a grasshopper, and specimen I is an earthworm.

(ii) Suggest the mode of locomotion of specimens H and I. Give reason to support your answer.
H (grasshopper) moves by jumping using its strong hind legs, which are muscular and adapted for leaping.
I (earthworm) moves by contraction and expansion of circular and longitudinal muscles, aided by setae that grip the soil.

(iii) State the features used to place specimen H in the Kingdom Animalia.
Specimen H has multicellular organization, heterotrophic nutrition, bilateral symmetry, and active movement, which are characteristic of Kingdom Animalia. It also lacks cell walls and reproduces sexually.

2(b) Use the hand lens to observe specimens J and K then:

(i) Identify specimens J and K by their common names.
J is moss, and K is liverwort.

(ii) Name the habitats for each of specimens J and K.
J (moss) grows in moist, shaded environments such as rocks, tree trunks, or forest floors.
K (liverwort) grows in damp soil, near streams, or wet rocks.

(iii) Briefly explain the features which enable specimen H to survive in its habitat.
Specimen H (grasshopper) has a waterproof exoskeleton to prevent water loss, compound eyes for wide vision to detect predators, and wings for movement. It also has powerful jaws for chewing vegetation.

(iv) Classify specimens J and K to the phylum level.
J (moss): Phylum Bryophyta
K (liverwort): Phylum Hepatophyta

(v) Write down one advantage and one disadvantage for each specimen J and K.
Advantage of J (moss): Helps in soil formation and prevents erosion.

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Disadvantage of J (moss): Can overgrow and suffocate other small plants.

Advantage of K (liverwort): Used in traditional medicine and helps in water retention.
Disadvantage of K (liverwort): Grows in damp environments which can promote mold and fungal growth.