Candidates Name: ……

Signature: ……

| Random No. | | | | | | Personal No. | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

*(Do not write your School/ Centre Name or Number anywhere on this Booklet.)*

**553/2&3**
**BIOLOGY**
**Paper 2**
**2024**
**2.5 hours**

# ALLIANCE JOINT EXAMINATIONS BOARD-(AJEB)

Uganda Certificate of Education

**Biology**

*Paper two*

**2 Hours and 30 minutes**

## INSTRUCTIONS TO CANDIDATES:

- This paper consists of ***two*** examination items.
- Answer ***all*** the items in the spaces provided.
- Drawings should be made in the spaces provided.
- Use ***sharp*** pencils for your drawings. Coloured pencils or crayons should not be used.
- No additional sheets of writing paper are to be inserted in the booklet.
- Work on additional sheets will not be scored.



**allianceexaminationsboard@gmail.com**

## Item 1.

A community health worker in Nakaseke District noticed that children under 5 years old in Village A frequently suffer from stunted growth and fatigue, while those in Village B are healthier. Both villages rely on staple foods **P** (maize flour) and **Q** (sorghum porridge), but Village B also consumes a local leafy green vegetable.

**Task:**

1. Perform an investigation on food tests for the samples **P** and **Q** and use your results to advise the health worker on the likely nutritional deficiency in Village A and suggest a solution.



**allianceexaminationsboard@gmail.com**

**TURN OVER**

Item 2.

A farmer in Masindi reported that his maize crops in Field **M** (near a swamp) had yellowing leaves, while those in Field **N** (upland) grew normally. Specimens **R** (roots from Field M) and **S** (roots from Field N) were collected.

**Task:**

(a) (i) Compare the root structures of **R** and **S** under a microscope. Record differences in root hair density and color.

(ii) Link your observations to the maize health in Field **M**.

(b) Draw and label a diagram of the root section of **R**.

# CONFIDENTIAL: SPECIMENS & MATERIALS LIST

## Alliance Joint Examinations Board (AJEB)

## Biology Paper 2 (Practical)

## 2024 Examination

**Item 1: Nutrition and Health Investigation**

**Specimens:**

1. **Food Sample P**: Dried maize flour (labeled "P").
2. **Food Sample Q**: Dried sorghum flour (labeled "Q").
3. **Control Sample**: Freshly prepared juice from local leafy green vegetable (e.g., *Amaranthus* or "dodo").

**Reagents:**

1. **Biuret solution** (for protein test).
2. **DCPIP solution** (1%, for vitamin C test).
3. **Distilled water** (for dilution control).
4. **Benedict's solution** (optional, for reducing sugars if needed).

**Apparatus:**

1. Test tubes and racks.
2. Droppers/pipettes.
3. Measuring cylinder (10 mL).
4. Mortar and pestle (for homogenizing samples).
5. White tile/spotting tile.
6. Glass rods.
7. Labels/markers.

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**Item 2: Crop Ecology and Root Adaptation**

**Specimens:**

1. **Specimen R**: Maize roots from waterlogged soil (Field M), preserved in 70% ethanol.
2. **Specimen S**: Maize roots from well-drained soil (Field N), preserved in 70% ethanol.

**Reagents:**

1. **Iodine solution** (to stain root cells for microscopy).
2. **Methylene blue** (alternative stain).
3. **Glycerine** (for mounting).

**Apparatus:**

1. Microscopes (100x–400x magnification).
2. Microscope slides and coverslips.
3. Dissecting needles/forceps.
4. Scalpel/blade (for root sectioning).
5. Petri dishes (for temporary mounting).
6. Filter paper (to blot excess liquid).

## *Notes for Examiners:*

1. **Item 1**: Ensure food samples are homogenized uniformly. Fresh vegetable juice must be prepared on the exam day to prevent vitamin C degradation.
2. **Item 2**: Preserve roots in ethanol to maintain structure. Provide pre-cut transverse sections if students struggle with sectioning.
3. **Safety**: Provide gloves and goggles for handling reagents (e.g., DCPIP, ethanol).

**Storage Instructions:**

- Store reagents in labeled, airtight containers.
- Keep specimens refrigerated until 1 hour before the exam.

***Confidentiality:*** *This document must not be shared with candidates or unauthorized personnel.*