Student's name……Signature ……

Stream ……

**553/1**

**BIOLOGY**

(PRACTICAL)

**Paper 2**

JAN/FEB 2024

2 hours **PROPOSED MARKING GUIDE**

# UGANDA CERTIFICATE OF EDUCATION.

# COMPETENCE BASED ASSESSMENT EXAMINATIONS

BIOLOGY

(PRACTICAL)

**Paper 2**

**2Hours**

**INSTRUCTIONS:**
• *This paper consists two questions.*
*Attempt all questions*
*Responses must be written in the spaces provided.*
• *Illustrations in form of drawings should be made where necessary, with a sharp pencil.*

**1.** Mwanje john is food technologist who graduated from Makerere University on 29th/01/2024. Immediately after graduation, he applied for a job in a food processing industry following the previously radio and Daily newspaper advertisement by the industry. Being very lucky, he was shortlisted for interviews, but during a practical interview, he was provided with two solutions **A** and **B.** He was supposed to investigate which of the two solutions will be the best sample for **pickling** the cucumbers that are to be transported to America**.** He was provided with a fresh plant organ **M** to use it for his investigations but he became worried and got confused and stressed of not getting the job since he did not know what to do.

**As a student of biology, design and carry out an experiment to help Mr. John to get the job. Your experiment planning should include the; Title of experiment, Aim of experiment, Hypothesis. Variables, List of apparatus and materials used, Procedure, experimental set up, Presentation of data, Explanation of your hypothesis and Conclusion. (25 scores)**

**Confidential (solution A = 30cm$^3$ of 3% of table salt solution, solution B 30cm$^3$ of water, plant organ M is Irish potato)**

**Proposed marking guide:**

**HINT:** *since pickling is the process f preserving food by basically immersing food items in solution of salt or acid, to prevent it's spoilage by bacteria, molds and yeasts. It basically works on the principle of* ***osmosis.***

**Solution:**

**TITLE: AN EXPERIMENT TO INVESTIGATE WHICH OF THE TWO SOLUTIONS A AND B IS BEST FOR PICKLING THE CUCUMBERS.**

**AIM:**

*To determine which of the two solutions A and B is best for pickling the cucumbers.*

**HYPOTHESIS:**

*If the potato cylinder placed in either solution A or B becomes shorter, smooth, soft and curves, then the food solution will be the best for pickling the cucumbers.*

**VARIABLES:**

*Length of potato cylinders, volume of solution during the experiment.*

**List of apparatus**

*Measuring cylinder, razorblade, corkborer, test tubes, filter paper, stop clock, ruler, labels*

**Materials.**

*Solution A and B, plant organ M.*

**Procedure:**

- ✓ *Two test tubes were labelled A and B, and then placed in a test tube racker.*
- ✓ *They were then filled with 8cm$^3$ solution A and B respectively measured using a measuring cylinder.*
- ✓ *A cock borer of 0.5cm diameter was pushed into the Irish potato to obtain two potato cylinders/strips.*
- ✓ *The two cylinders were then trimmed using a razorblade to a uniform length of 3cm, measured by a ruler.*
- ✓ *One cylinder was then placed/immersed into each test tube A and B and stop clock was started. It was made sure that the strips are covered by solution.*
- ✓ *After 45 minutes, the strips were withdrawn/ removed from the test tubes and their surfaces were wiped/ moped with filter paper to remove the solutions.*
- ✓ *Using a ruler, the new final length of the strips was measured and recorded. Also the volume of solution was measured.*
- ✓ *The results were noted and recorded as shown in the table.*

**Presentation of data (observations)**

| **Characteristic observation** | **Strip from solution A** | **Strip from solution B** |
|---|---|---|
| **Length (initial length= 2cm)** | 1.5cm hence decreased in length/ became shorter. | 2.3cm hence increased in length/ became longer |
| **Strength** | Soft | Hard |
| **Texture** | Smooth | Rough |
| **Curvature** | It became curved | It remained straight |
| **Volume of solution ( initial volume was 8cm$^3$ )** | 8.7cm$^3$ | 7.4cm$^3$ |

**After 45 minutes;**

**Cylinder from A**

**cylinder from B**

**Explanation of your hypothesis:**

- ✓ *The potato cylinder that was placed in solution A became shorter, curved, soft smooth and the volume of final solution was higher than the initial volume of solution. This is predicted to be due to loss of water from potato cylinder by osmosis to solution A. This provides evidence that solution A is hypertonic.*
- ✓ *The potato cylinder removed from solution B became longer, hard, remained straight, rough and the volume of final solution was lower than the initial volume of solution. This is could have been due to the fact that potato cylinder gained water by osmosis from solution B. this implied that solution B was hypotonic.*
- ✓ *Since pickling is done to reduce water content of the cucumber in order to increase its shelf time, if the cucumber is placed in solution A, the cucumber cells lose water by osmosis, making them to shrink, hence reducing in size. This causes the cucumber to become dehydrated, inhibiting growth of harmful microbes that could cause spoilage*

**Conclusion:**

*therefore solution A is the best for pickling of cucumber but solution B cannot since it is hypotonic, making cucumber cells gain water by osmosis that allows growth of bacteria, mould or yeasts that can cause spoilage and rotting of cucumber.*

***END***