UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

P515/2 PRINCIPLES AND PRACTICES OF AGRICULTURE

SCORING GUIDE

FOR THE SAMPLE PAPER

Turn Over

Item 1

Planning the experiment.
The candidate at the highest level of achievement is expected to give the;
Aim that should have the; nature of the experiment (the relationship between variables) and the purpose of the experiment derived from the challenge in the scenario.

All variables in their categories (independent, dependent and controlled) and

A correct hypothesis (prediction on the interaction of independent and dependent variables of the experiment with a reason for the prediction)

Possible responses

Aim: An investigation to determine the difference in solute potential or water potential between solutions **A** and **B** so as to find the cause of the varied response to the irrigation water by the crops.

Hypothesis: Solution **A** has a higher water potential than solution **B** because it has less solute molecules than **B**.
Solution **B** has a higher water potential than solution **A** because it less solute molecules than solution **A**.
Solution **B** and **C** have the same water potential because they have the same amount of water molecules.

Variables
Independent variables: Solutions **A** and **B**
Dependent variables: Change in length of the irish potato cylinders; firmness of the irish potato cylinders
Controlled variables; Volumes of solutions **A** and **B**; Length of the irish potato cylinders; Time taken for the experiment.

Method of experiment
The candidate is expected to give the;
Procedure that has; all the relevant steps of the investigation, logical flow of all steps in the procedure to produce results, appropriate quantities of variables used, well used materials and mitigated risks. Key steps in the procedure must also be justified.

Procedure:
Protective wear is worn for safety
All the relevant materials and apparatus are assembled
The irish potato tuber is washed with clean water to remove soil
The irish potato is peeled using a knife/cutter to ease boring
Cylinders of known dimension are bored out of the irish potato

The initial length of the cylinders is measured using a ruler
A known volume of solution **A** is measured and put in a beaker labelled **A**
A potato cylinder is dipped into solution **A** in a beaker
The experiment is allowed to stand for a given (reasonable) time e.g. about 15 minutes
The cylinder is removed from the solution and blotted using a blotting paper to wipe it and make measurement easy.
The final length of the cylinder is measured using a ruler (or the cylinder is pressed to determine its firmness)
The procedure is repeated with another cylinder and specimen **B**
Results are recorded in a table

Mitigated risks.

Protective gear like hand gloves are worn to avoid cuts during peeling and masks to avoid inhaling the chemicals that may be in the solutions
The knife is used carefully and cutting is done away from the body to avoid cuts.
Glass ware is handled with a lot of care to avoid breakage
The beakers are clearly labelled to avoid mixing up of the solutions and to take accurate readings for the correct potato cylinders.

Data presentation
The candidate is expected to present complete data sets. Data must be accurate (within acceptable ranges) and presented in appropriate formats. Data must be presented with correct units (where applicable)

Table of results

Specimens	Initial length of the potato cylinder (cm)	Final length of the potato cylinder (cm)
Solution **A**	Same as **B**	Greater than initial length
Solution **B**	Same as **A**	Less than initial length

OR

Specimens	Initial firmness of the potato cylinder	Final firmness of the potato cylinder
Solution **A**	Same condition as **B**	Hard
Solution **B**	Same condition as **A**	Soft

Data analysis
The candidate is expected to identify trends and relationships, and apply scientific principles to give logical interpretation of data

The length of the potato cylinder placed in solution **A** increased because water moved from the surrounding solution by osmosis from a hypotonic solution (solution **A**) into a hypertonic solution inside the potato tuber while the length of the potato tuber placed in solution **B** decreased because the potato tissue lost water by osmosis to a surrounding solution **B** which had a higher solute potential than the potato tissue.

Also, the cylinder in solution A became harder because water moved into it from the surrounding hypotonic solution by osmosis while the one placed in solution **B** became softer because it lost water from its hpotonic tissues to the surrounding hypertonic salt solution.

Conclusion and recommendation
The candidate is expected to give a conclusion as a general statement that links experimental data to the hypothesis.
The recommendation should be linked to the challenge in the scenario.

Conclusion
When a potato tissues are placed in a solution with higher water potential such as solution **A**, the potato tissue gains water by osmosis and increases in size and firmness.

Recommendation
James should obtain water for irrigation from the source where solution **A** was obtained because the water has a higher water potential and the crop roots will absorb water by osmosis for good crop growth as evidenced by the potato cylinder placed in solution **A**.

Item 2
The candidate at the highest level of achievement is expected to;
Observe the specimens and explain the features that make them suitable for specific uses on the farm or explain the conditions that make them suitable or not suitable for survival or use or consumption or explain the causes of the observed conditions on the specimens (for task **a***).*

Manipulate the specimen for specific farm use by making calculations of required quantities, describing how specimens are used either singly or jointly for given farm functions or make diagrams to explain processes or to describe how different specimens can be combined for a common use (for task **b***).*

Explain how specimens can be kept in good working condition for sustainable use or how specimens can be modified to suit desired use or explain how specimens can be controlled (for task **c***).*

Possible responses

(a).

Specimen **D**

Has a string head for driving nails into wood during construction.
Has claws for removing nails out of wood.
Has a handle for gripping during use.

Specimen **E**

Has opposite clamps for gripping wood firmly during use.
Has a handle for opening and closing the jaws during use.
Has a stopper for locking the adjustable bar so that wood does not slip away during work.
Has an adjustable bar to handle wood of various sizes.

Specimen **F**

Is calibrated to take measurements of length and width.
Has a casing for safe keeping.
Has a flexible and adjustable tape to ease work during use.

Specimen **G**

Has a handle for grip during use.
Has a serrated margin for cutting across the grains of wood.
Has a thin flexible blade that can easily enter the wood.

(b).

Number of pieces needed $= \frac{Area\ occupied\ by\ the\ gate\ (m^2)}{Area\ of\ a\ piece\ of\ specimen\ C\ (m^2)}$

Area occupied by the gate $= Length\ (m) \times Width\ (m)$
$= 5\ m \times 4\ m$
$= 20\ m^2$

Area of a piece of specimen **C** $= Length\ (m) \times Width\ (m)$
$= 2\ m \times 0.8\ m$
$1.6\ m^2$

Number of pieces of specimen **C** needed $= \frac{20\ m^2}{1.6\ m^2}$

$= 12.5\ pieces$

The required measurements of specimen **C** are taken using specimen **F**
Specimen **C** is cut into the required pieces using specimen **G**
Pieces of specimen **C** are held together in position using **E**
Nails are driven into the clamped pieces of specimen **C** using specimen **D** in order to make the gate

(c).
Specimen **D**
Use it for its right purpose to ensure durability.
Fix loose handle for improved efficiency/Replace broken handles for improved efficiency.
Store in a cool dry place to avoid rusting.

Specimen **E**
Use it for the right purpose to ensure durability and efficiency.
Lubricate the adjustable parts to reduce wear and tear.
Store in a cool place to prevent rusting.

Specimen **F**
Use it for the right purpose to ensure durability.
Keep it inside the casing to avoid breakage.

Specimen **G**
Set and sharpen the teeth for improved effectiveness.
Lubricate the blade to avoid rusting.
Use a teeth guard to protect the teeth during storage to prevent particles from clogging between them.
Fix loose handle for efficiency/replace broken handle for efficiency.