NAME: ..... Comb: .....

P530/1
BIOLOGY
(Theory)
Paper 1
July/Aug. 2025
$2^{1}/_{4}$hours

Uganda Advanced Certificate of Education
S5 END OF TERM II EXAMS 2025
BIOLOGY
(Theory)
Time: 2 hours

INSTRUCTIONS;
1. Attempt **all** items in **section A** and **section B**
2. Answers in **section A** should be written in spaces provided.
3. Answers to **section B** should be written on answer sheets provided.

FOR EXAMINER'S USE ONLY		
QUESTION	**MARKS**	**EXAMINERS INITIALS**
Item1		
Item2		
Item3		
Item4		
Item 5		
TOTAL		

Turn Over

Item 1

Pricilla a biology student at a certain School in Gulu city used a light microscope with objective lenses ×4, ×10, ×40 and an eyepiece lens of ×10 to study prepared onion epidermal cells.

When observing at ×40, she realized that only part of a single cell was visible and wondered. She recorded the diameter of the field of view at each objective as shown below.

Objective lens	**Diameter of field of view (mm)**
×4	4.50
×10	1.80
×40	0.45

The purpose of her experiment was to determine the magnification of the cell using different objective lenses but she is not fully sure on how to go about it. She has contacted you to help in guiding her achieve her goal.

Tasks

As a learner of Biology guide her to;

(a) Calculate the total magnification of the cell at ×40 objective lens. (03 scores)

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(b) Using the ×10 objective data, estimate the length of a cell if 6 cells span the diameter of the field of view. Give your answer in micrometers. (05 scores)

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(c) Analyze why starting with the ×4 objective lens is preferred when locating a specimen. (04 scores)

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(d) Suggest three safety precautions to avoid damaging the slide at high power objective lens. (03 scores)

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Item 2

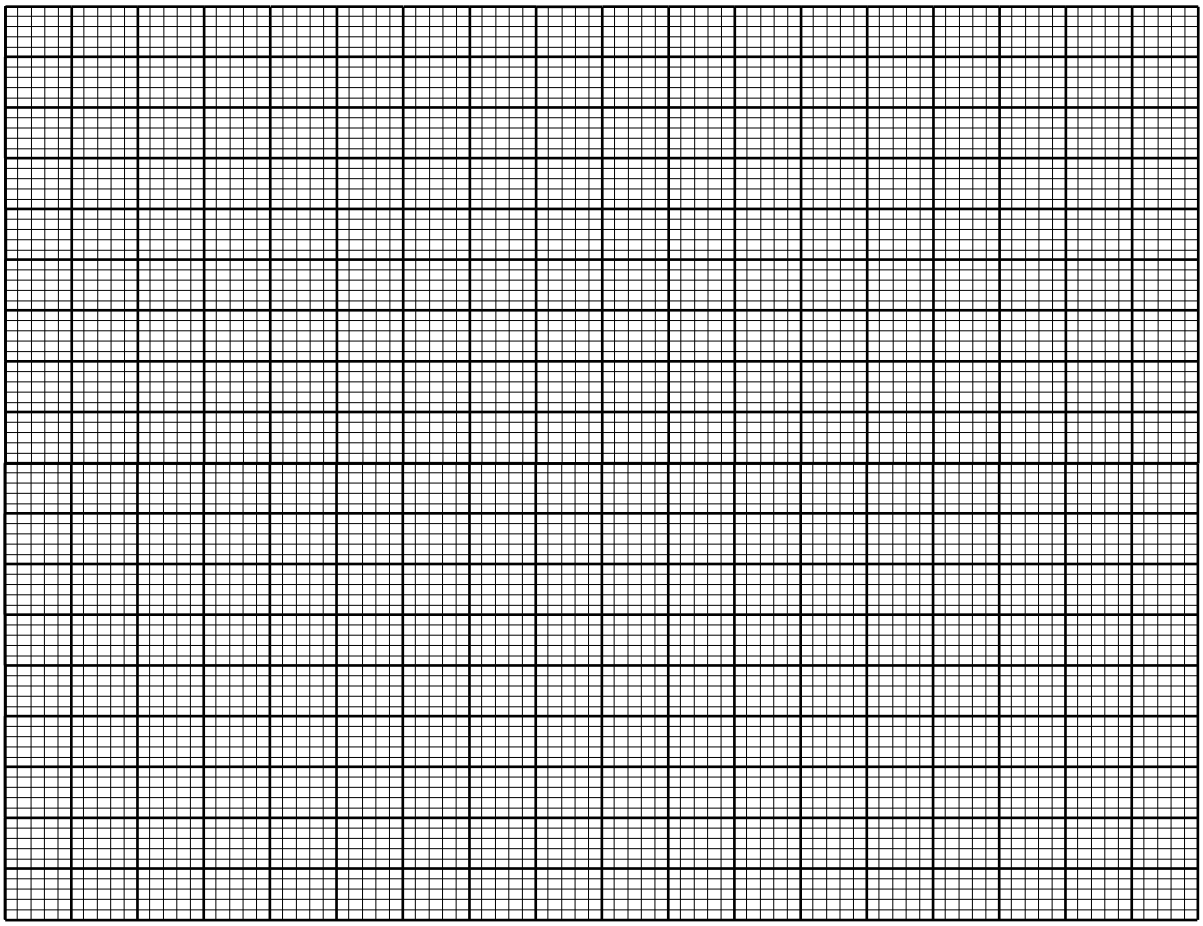
University students at Namulondo research institute were carrying out a scientific experiment to determine the effect of sucrose on the leaf epidermal tissue of two plants X and Y. They obtained thin Leaf epidermal peels from Plant X and Plant Y using a scalpel and both were immersed in sucrose solutions of varying concentrations and allowed to stand for 30 minutes. The percentage of plasmolysed cells was determined by the group, and they recorded it in a table below.

Sucrose concentration in (M)	0.0	0.2	0.4	0.6	0.8	1.0
Percentage Plasmolysis for Plant X	0	15	50	85	100	100
Percentage Plasmolysis for Plant Y	0	5	25	60	90	100

Tasks

As Biology learner help the university students;

a) Plot a graph of % plasmolysis against sucrose concentration for both plants on the same axes. (10 scores)



b) From the graph, determine the incipient plasmolysis point for each plant (02score).

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c) Analyse why Plant X plasmolysed more rapidly than Plant Y in the same solution (03).

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Item 3

A histology class examined micrographs of three tissues. Micrograph A showed striated fibres with multiple nuclei per cell; Micrograph B showed elongated cells with tapered ends; Micrograph C showed cells with intercalated discs and branching fibrer. The class is faced with the challenge of distinguishing tissues using their observed characteristics from micrographs and identifying the tissues. Your friend has called you to help the histology class understand the tissues.

Tasks

As a student who has studied tissues in A-level biology help them to;

a) Identify each tissue A, B, and C. (03 scores)

b) Compare the structure of tissues A and C in relation to their function. (04s)

c) Evaluate the advantage of multinucleation in tissue A. (03 scores)

SECTION B

Attempt all the two numbers in this section

Item 4

Mr. Aleper is a cattle keeper from north-eastern Uganda which is drought prone sub-region in Uganda. He struggles hard to maintain the quantity of milk production from his cows during drought seasons by adding salt to the water he gives to his cows so that they can drink more borehole water to produce more milk but all the same he gets the same results due to lack of enough feeds during this dry season. He decided to visit the office of the District Agricultural officers in the district and the district vet officer was tasked with a task of trucking the quantity of milk production in cows by analyzing the impact of the three chemicals of life, water, proteins and lipids. You have been asked to help these officials in analysing the three chemicals of life in cows so as to find a lasting solution to the problem of Mr Aleper.

The table below shows their findings on milk composition from cows under normal and drought conditions.

Component	**Normal (%)**	**Drought (%)**
Water	87	82
Proteins	3.4	2.5
Lipids	3.6	4.5

Tasks

a) Analyse the changes in water, proteins, and lipids in milk under drought. (04 scores)

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b) Explain two physiological reasons for reduced milk protein during drought.(04score)

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c) Suggest one reason for increased lipid content. (02 scores)

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Item 5

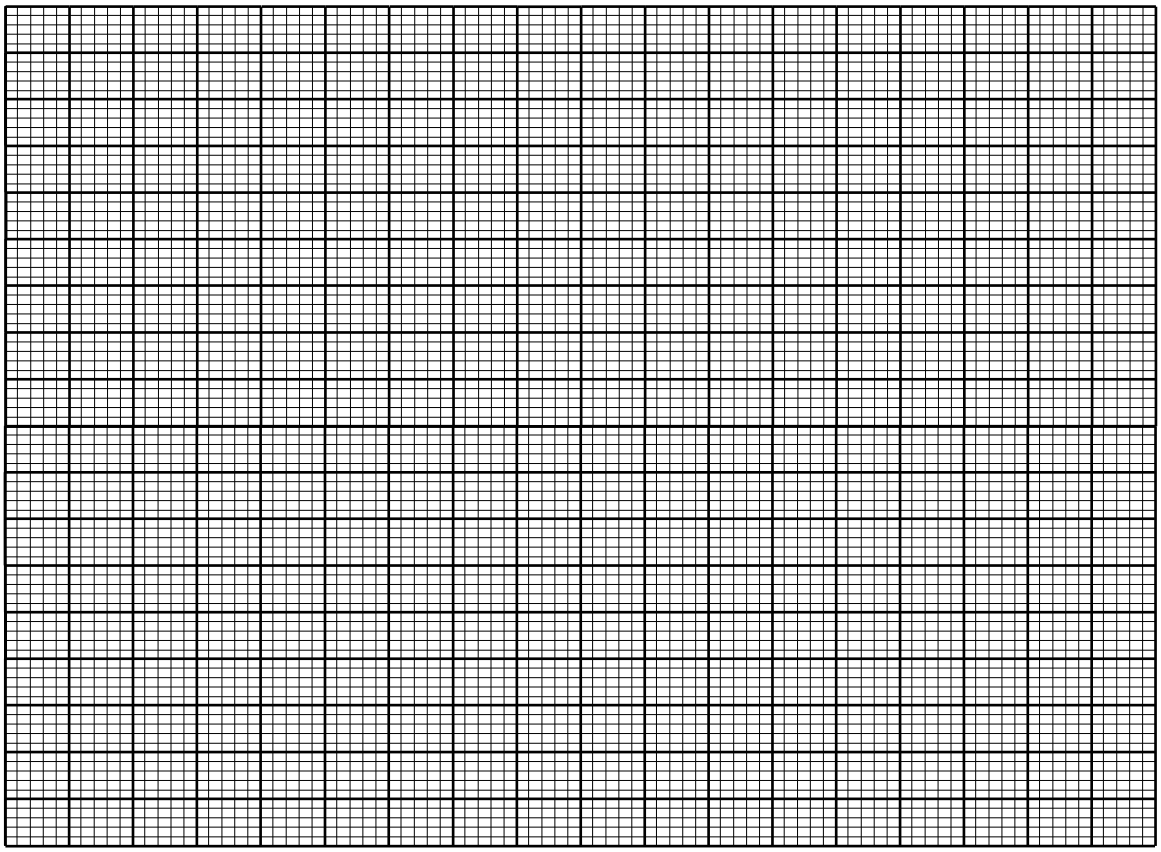
During the study of carbon 3 and carbon 4 plants, the rate of photosynthesis was studied using wheat and maize plants for a considerable period of time.
A scientist is interested in understanding the impact of increasing temperatures on wheat and maize plants so as to advice the high altitude community in kapchorwa district on when and which areas to grow the two crops so as to get a good yield. The table below shows the net photosynthetic rate (μmol $CO_2/m^2/s$) of wheat (C_3) and maize (C_4) at different temperatures. The data was also shared with A-level students for analysis and you were chosen to represent your school.

Temp (°C)	20	25	30	35	40
Wheat	18	19	15	10	5
Maize	16	22	30	29	

Tasks

As a student who has studied the C3 and C4 plants, analyze the data;

a) Plot a graph of photosynthetic rate with temperature for both plants (same axes).10s



b) From the graph, determine the optimum temperature for each plant. (02score)

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c) Using your knowledge of C_3 and C_4 pathways, explain why maize outperforms wheat at high temperatures. (03scores)

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END