education

Department of Education
FREE STATE PROVINCE

GRADE 10

LIFE SCIENCES

ASSIGNMENT

SUPPORT AND TRANSPORT SYSTEMS IN PLANTS

TIME: 50 minutes

MARKS: 50

NOTE: ALL ACTIVITIES MUST BE COMPLETED BY EACH LEARNER IN A CONTROLLED ENVIRONMENT UNDER THE SUPERVISION OF A TEACHER.

NAME: .....

DATE: .....

This assignment consists of 9 pages

QUESTION 1

Wilting and guttation are both related to water loss in plants.

Wilting involves the loss of water vapor through the stomata of leaves. This occurs due to high temperatures or insufficient water. Wilting results in the drooping or rolling up of leaves and stems. It's a very quick process.

Guttation involves the secretion of liquid water from the plant by hydathodes and is caused by high root pressure and high humidity. Guttation appears as water droplets on the edges or tips of leaves and is a slow process.

The diagrams below represent different processes of water loss.

Diagram 1

Diagram 2

1.1 Which diagram represents guttation?

(1)

1.2 What is the process called where water loss in the form of water vapor is released through stomata?

(1)

1.3 Name ONE external factor that increases water loss in plants.

_____ (1)

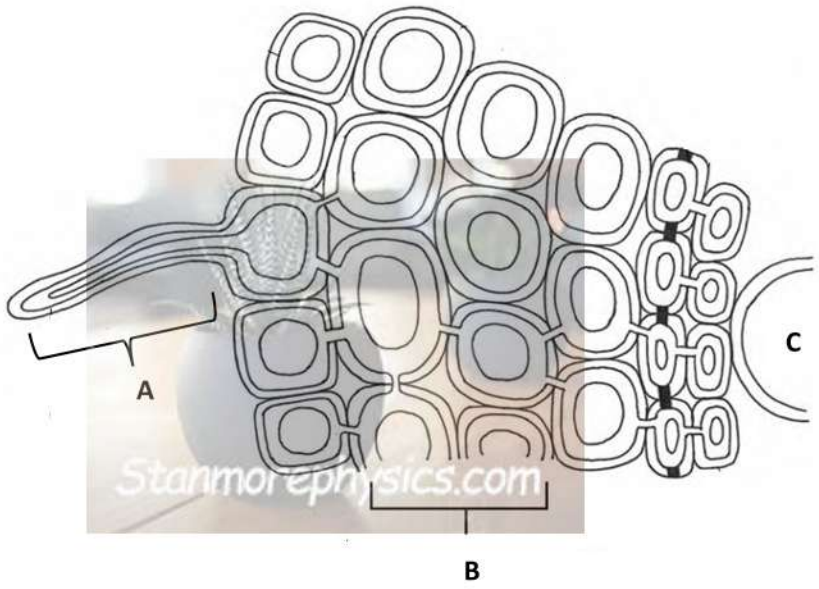
1.4 Tabulate TWO differences between the process of guttation and wilting.

(5)

(8)

QUESTION 2

The diagram below shows tissues found in a dicotyledonous root.



2.1 Identify:

a) Structure **A**

_____ (1)

b) Tissue **B**

_____ (1)

c) Vascular tissue **C**

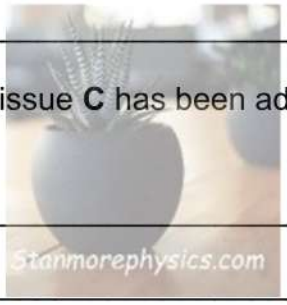
_____ (1)

2.2 Describe the function of vascular tissue **C.**

_____

_____ (2)

2.3. Mention THREE ways in which vascular tissue **C** has been adapted to the function mentioned in QUESTION 2.2.



_____

_____

_____ (3)

2.4 Explain the process of water absorption by osmosis in Part **A.**

_____

_____

_____

_____

_____ (4)

2.5 Name THREE forces responsible for the upward transport of water in the plant.

_____

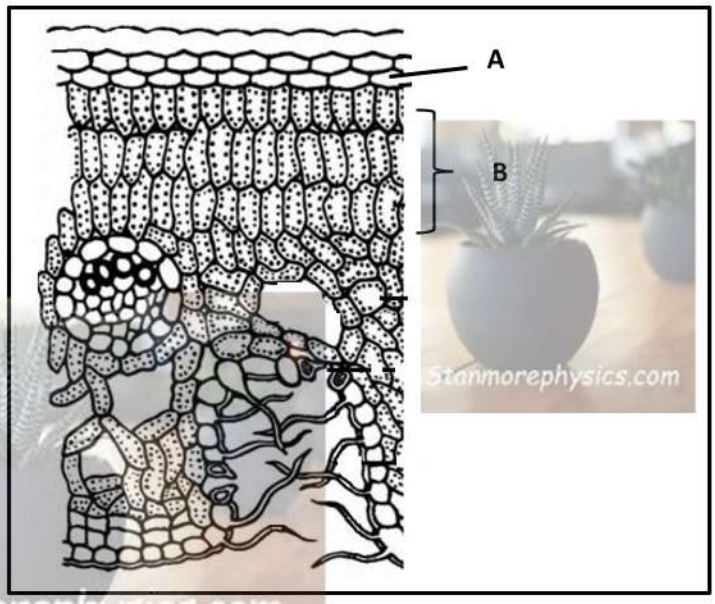
_____

_____

(3)
(15)

QUESTION 3

The diagram below shows a portion of a dorsiventral leaf.



3.1 Give ONE reason why the leaf is known as a dorsiventral leaf.

_____

(1)

3.2 Give the function of part:

a) **A** - _____

_____ (1)

b) **B** - _____

_____ (1)

3.3 Give THREE observable structural adaptations of the dorsiventral leaf to prevent water loss..

_____

_____

_____

_____

_____ (3)

3.4. Draw a labelled diagram of the stoma of a leaf.

(5)
(11)

QUESTION 4

Investigation: How Petroleum Jelly Affects Water Loss from Leaves

All plant leaves have a thin, waxy layer called the cuticle. This layer helps to reduce water loss from the leaf. In a laboratory experiment, petroleum jelly can be used to act like the cuticle and help investigate water loss.

In this investigation, learners wanted to find out how putting petroleum jelly on different parts of a leaf would affect how much water is lost.

Important:
We cannot measure the water loss directly. Instead, we measure how much lighter the leaf becomes — when water evaporates, the leaf loses weight.

Steps of the Investigation:

- Four leaves from the same plant species were used.
- The leaves were the same size.
- Different treatments were applied:
  - Leaf **A**: Petroleum jelly on top and bottom.
  - Leaf **B**: Petroleum jelly on top only.
  - Leaf **C**: Petroleum jelly on bottom only.
  - Leaf **D**: No petroleum jelly (control).
- The starting weight of each leaf was measured.
- The leaves were placed under blue light for 24 hours.
  (Blue light causes the tiny pores, called stomata, to open and allow water vapor to escape.)
- After 24 hours, the final weight of each leaf was measured.
- The percentage decrease in mass was calculated for each leaf.

The results are shown in the table below.

Leaf treatments	Initial weight of the leaf before starting the experiment	Weight of the leaf after 24 hours of exposure to blue light	Percentage (%) decrease in weight
Leaf A	10g	8g	20
Leaf B	15g	5g	66
Leaf C	12g	7g	42
Leaf D	10g	2g	**X**

4.1 Identify the dependent variable in the investigation.

_____ (1)

4.2 What structure of the leaf would be blocked by the petroleum jelly?

_____ (1)

4.3 Name THREE ways in which the learners ensured the validity of the investigation.

_____

_____

_____ (3)

4.4. Calculate the percentage decrease in water loss at **X** in leaf **D.** Show all your calculations.

_____

_____

_____ (3)

4.5 What conclusion can be drawn from the results?

_____

_____ (2)

4.6 Draw a bar graph to represent the percentage decrease in weight.

(6)
(16)
Total: (50)

LIFE SCIENCES GRADE 10

ASSIGNMENT

SUPPORT AND TRANSPORT SYSTEMS IN PLANTS

DATE: 13 MAY 2025

TIME: 50 minutes **Marking guidelines** **MARKS: 50**

QUESTION 1

1.1 Diagram 1✓ (1)

1.2 Transpiration✓ (1)

1.3 **High** temperatures✓ / **high** light intensity / wind / **low** humidity (1)
(Mark first ONE only) **(Any one)**

1.4

Diagram 1 / Guttation	Diagram 2 / Wilting
- Water dispensed in liquid form✓ - Liquid water emitted by hydathodes✓ - Is a slow process✓ - High humidity✓ / sufficient water present	- Water dispensed in vapor form✓ - Water vapour emitted by stomata✓ - Is a quick process✓ - Low humidity✓ / insufficient water present

(Mark first TWO only) (Any 2 x 2 + 1 for table) (5)

(8)

QUESTION 2

2.1 a) A - Root Hair✓ (1)

b) B - Parenchyma✓ (1)

c) C - Xylem✓ (1)

2.2 -Transport water and dissolved minerals ✓
-From the roots to the stem and leaves✓/ upwards in the plant.
-Lends sturdiness ✓ to the plant (Any 2) (2)

2.3
- Xylem is long ✓
- hollow tubes✓ / no cross walls
- Cell walls are thickened✓/cell walls consist oflignin
- Own pits✓
- Xylem consists of dead tissue✓

(Mark first THREE only) (Any 3) (3)

2.4

- In the soil, there is an area of high-water concentration✓ / high water potential
- In root hairs /in the vacuole there is a lower water concentration✓ / low water potential due to the
- High concentration of solutes✓ in the cell
- Water travels through the selectively permeable membranes✓/cell membrane of the root hair into the vacuole along with the concentration gradient✓/Osmosis
- And trough diffusion through the cell wall ✓

(Any 4) (4)

2.5 Transpiration pull✓ / Pulling power of transpiration
Root pressure✓
Capillary action✓ / Capillarity
(Cohesive and adhesive) ✓
(Mark first THREE only) (Any 3) (3)

(15)

QUESTION 3

3.1 The top and bottom of the leaf are different✓ / do not look the same/Different cells on top and bottom (1)

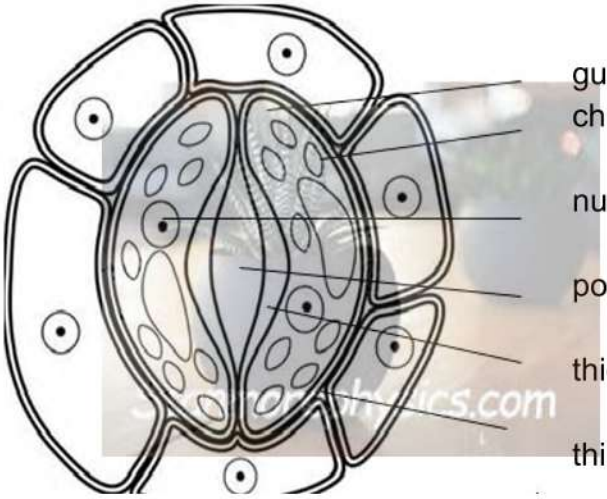
3.2

a) Provides protection for the underlying tissue✓ / Allow sunlight through to the underlying tissue (1)

b) Photosynthesis✓ (1)

3.3 Thick cuticle✓
Sunken stomata✓
Presence of hair✓
Double epidermis✓
Stomata in the lower epidermis ✓
(Mark first THREE only) **(Any 3)** (3)

3.4 **Stoma**



Heading **(H)** ✓
Correct diagram **(D)** ✓
Any THREE Correct labels **(L)** ✓✓✓ (5)
(11

QUESTION 4

4.1 Water loss ✓ (1)

4.2 Stomata✓ (1)

4.3 -(Four) leaves of the same plant species were used✓
-(Four) leaves of the same size were used✓
-They exposed all leaves to the same blue light✓ for the
-Same amount of time (24 hours) expose.✓
(Mark first THREE only) (Any 3) (3)

4.4 $\frac{(10-2)}{10}$✓ × 100✓

= 80%✓ (3)

4.5 Leaves without petroleum jelly lose the most water.✓✓
OR
Petroleum jelly helps reduce water loss by blocking the stomata.✓✓
OR
Most water loss (transpiration) occurs at the lower surface of the leaf.✓✓
(Mark first ONE only) (Any 1) (2)

4.6

Criteria for marking the chart:

Criteria	Points
Bar graph is drawn (**T**)	1
The heading of the graph contains both variables (**C**)	1
Correct labeling on the X axis and Y axis with correct unit on the Y axis (**L**)	1
Same spaces and width for bars and Correct scale for Y-axis (**S**)	1
Plot (**P**) correct for: 1- 3 Bars All 4 required bars	 1 2

(6)

Note:
If the learner's calculation in QUESTION 4.4 was incorrect, do not penalise the learner for wrong plotting. Accept if bar was drawn with incorrect calculation.

(16)

TOTAL: 50