PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI

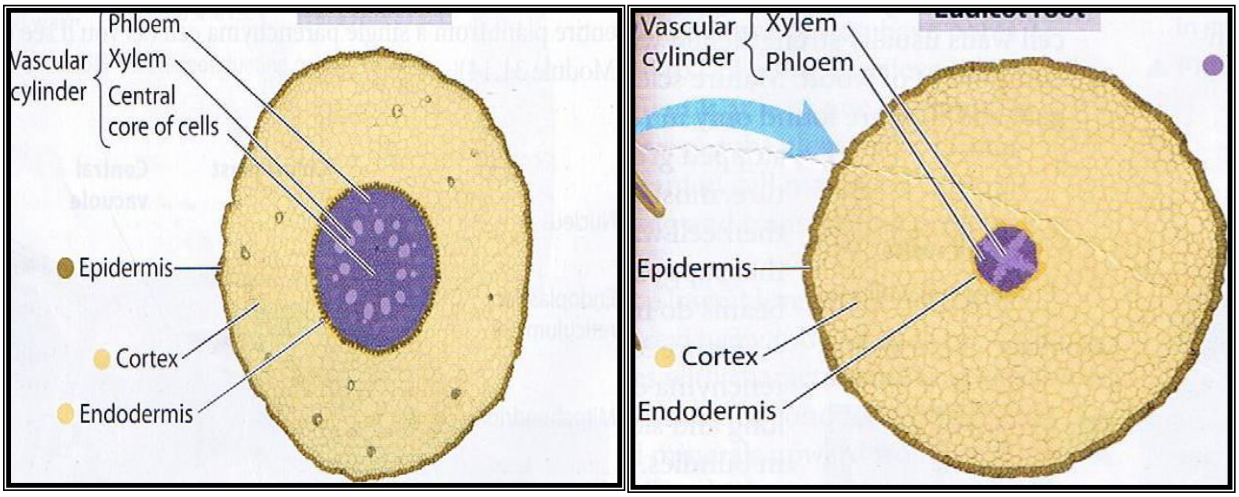
LESSON NOTES

Subject: Biology **Year/Level:** 11

Week 9

Strand	1 Structure and Life Processes
Sub Strand	1.5 Structure And Functions In Plants
Content Learning Outcome	Investigate and illustrate the different types of roots and explain their functions and adaptations.

Cross Section of a Monocot Root **Cross Section of a Dicot Root**



Distinguishing Feature:
In a monocot root, the xylem and phloem are not arranged in an ordered manner whereas in a dicot root the phloem cells are situated at the arms of the xylem vessel forming a unique "X" shape in the endodermis.

Root Hairs
- Helps to absorb water and minerals from the soil
- Increases surface area for absorption of water and minerals

Root Cap
- Covers the tip of the root
- Protects the meristem
- As cells of meristem wear away, the epidermal cells divide to replace them

Meristem
- Also known as the meristematic region
- Cell division takes place here
- Pushes roots forward, deeper into the soil

Root Epidermis
- Covers the outer surface of the plant
- Epidermal cells have thick, tough cell walls which protects the soft layers inside
- Small root hairs extend out to increase the surface area for absorption

Vascular Column
- Made up of xylem and phloem tubes
- Runs all the way from roots to leaves

❖ **Xylem** – transports water and minerals from roots to leaves

❖ **Phloem** – transports food from the leaves to all parts of the plants

Cortex

- Fills the space between the epidermis and the vascular columns
- Provides support
- Gives the root strength for anchoring
- Cortex cells are filled with starch

Summary of Root Parts and Functions

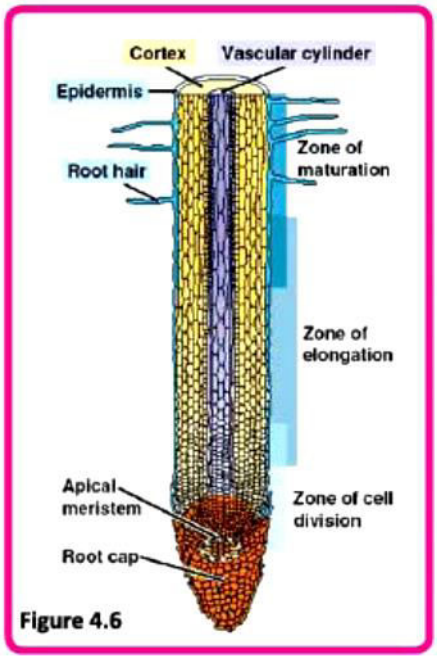


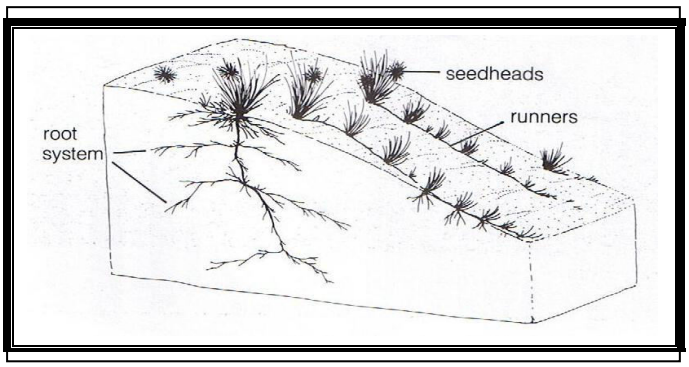
Figure 4.6

Part of Root	Function
Root cap	Group of loosely arranged cells around the tip of the root, protecting it during growth
Meristem region	This is found at the tip of the root, it is the place where growth takes place
Vascular cylinder	Contains xylem and phloem, the tubes that conduct food and water to and from roots
Cortex	Tissue found between the epidermis and the vascular cylinder
Root hairs	Tubular outgrowth of the epidermal cells that are in contact with soil for absorption
Zone of maturation (or differentiation)	Region where cells have stopped growing and start to differentiate and become specialized
Zone of cell elongation	Region where cells are developing vacuoles and becoming longer. Most growth occurs here
Zone of cell division	Region where new cells are constantly being made

Activity

1. What is the function of the root cap? _____
2. In which part of a root is food stored? _____
3. *Spinifex* is a large grass that is often the first plant to establish itself on sand dunes. The constant wind and high temperatures mean that the plant has a special problem of conserving water by reducing transpiration-a problem made more serious by shortage of soil water. Study the diagram and state four adaptations to survive in these conditions.

Spinifex growing on a sand dune



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