Transport in Plants

A. Fill in the Blanks

Complete the sentences with the correct terms.

1. The _____ tissue transports water and dissolved _____ from the roots to the rest of the plant.
2. The process of transporting food, in the form of glucose, from the leaves to other parts of the plant is called _____.
3. Water vapor is lost from the leaf through tiny pores called _____.
4. Root hairs are tiny extensions that vastly increase the _____ for efficient water absorption.
5. Phloem transports food made during _____ in the leaves.

B. Match the Following;

Match the term in Column A with its correct description in Column B.

Column A	Column B
1. Xylem	A. The process of moving food through the phloem.
2. Phloem	B. Pores on the leaf surface for gas exchange and water loss.
3. Transpiration	C. Tissue that transports food from the leaves.
4. Stomata	D. Increases the root's surface area for absorption.
5. Translocation	E. The loss of water vapor from a plant's leaves.
6. Root Hairs	F. Tissue that transports water and minerals from the roots.

C. Practice Problems

Answer the following questions in more detail. Use complete sentences.

1. What is the main difference between xylem and phloem in terms of the direction of transport?
2. What substance does xylem transport? What substance does phloem transport?

3. Explain the function of root hairs. Why are they important?
4. What are stomata, and what two roles do they play in the life of a plant?
5. Give two reasons why transpiration is a necessary process for plants.
6. What is translocation? Which tissue is responsible for it?
7. Describe the complete path a water molecule takes from the soil to the atmosphere through a plant.
8. If you place a white flower in blue-colored water, what do you expect to see after 24 hours? Which tissue is responsible for this?
9. Why does the phloem need to transport substances both up and down the plant?
10. What are vascular bundles?

D. Warm-up Questions

Answer these quick questions to get your brain working!

1. What are the two main substances that plants need to transport throughout their body?
2. Which part of the plant is responsible for absorbing water from the soil?
3. In which part of the plant is food (glucose) made?
4. What is the name of the process where plants lose water vapor from their leaves?
5. Name the two types of transport tissues found in plants.

E. Challenge Questions

Think critically to answer these questions.

1. How would a hot, dry, and windy day affect the rate of transpiration? Explain your reasoning.
2. A tree has a disease that completely blocks its phloem tissue. What would happen to the tree's roots after a few weeks, and why?
3. Xylem tissue is made of dead cells, forming hollow tubes. Phloem tissue is made of living cells. Why is this structural difference important for their respective functions?
4. A gardener removes a complete ring of bark (including the phloem) from the trunk of a fruit tree. A few weeks later, they notice a swelling on the trunk just above the removed ring. Explain this observation.
5. Cactus plants in the desert have very few leaves or leaves modified into spines. How does this adaptation help them survive in terms of water transport?

F. Word Problems & Application

Apply your knowledge to these real-world scenarios.

1. **The Transplanted Seedling:** A gardener carefully moves a small tomato plant from a small pot to a large garden bed. For the first few days, the plant looks wilted, even though the soil is moist. Why does this happen?
2. **The Plastic Bag:** A student ties a clear plastic bag tightly around a leafy branch of a healthy plant on a sunny day. After a few hours, what will they observe inside the bag? What process causes this?
3. **Maple Syrup:** To get sap for making maple syrup, people drill a small hole into the trunk of a maple tree in the spring. Is the sweet, sugary sap being collected from the xylem or the phloem? Justify your answer.
4. **Watering a Plant:** Why is it much more effective to water the soil around a plant than to spray its leaves with water?
5. **The Cut Stalk:** You cut a celery stalk and leave it on a kitchen counter for a day. It becomes limp and floppy. If you then place it in a glass of water, it becomes firm again. Explain both observations using your knowledge of plant transport.

G. True or False

1. Phloem transports water and minerals from the roots. _____
2. Transpiration is the process that pulls water up from the roots. _____
3. Xylem transport is bidirectional (it goes both up and down). _____
4. Stomata are found mainly on the roots of a plant. _____
5. Translocation is the movement of water through the xylem. _____