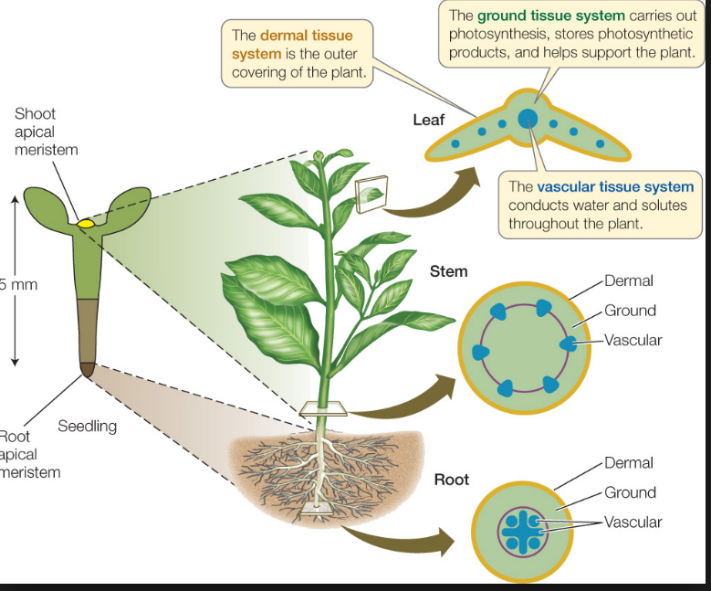
**AP Biology Plant Form and Function**

**Concept 4: Analyzing how water and nutrients move through a plant**

(Ch 36 and Investigation 11)

*You must know: (Ch 36)*

* The role of passive transport, active transport, and cotransport in plant transport.
* The role of diffusion, active transport, and bulk flow in the movement of water and nutrients in plants (with water potential calculations)
* How the **transpiration** cohesion-tension mechanism explains water movement in plants.
* How pressure flow explains **translocation**.
* The function of stomata in gas exchange in plants.
* The role of water potential and transpiration in the movement of water from roots to leaves.
* The effects of various environmental conditions on the rate of transpiration.
* How to identify xylem and phloem and relate their structure to their function.

**Types of Tissue**

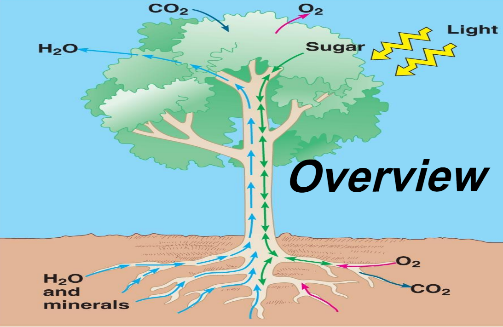
Dermal tissue – \_\_\_\_\_\_\_\_\_\_\_\_\_\_protective covering

Vascular tissue – carries out transportation of materials between \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Xylem** – transports \_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_up from roots into the shoots

**Phloem** – transports \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from leaves to other parts of plant (sites of growth)

Ground tissue – not \_\_\_\_\_\_\_\_\_\_\_or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



How does water & dissolved nutrients get from the roots to the leaves in these tall trees? \_\_\_\_\_\_\_\_\_\_\_\_\_

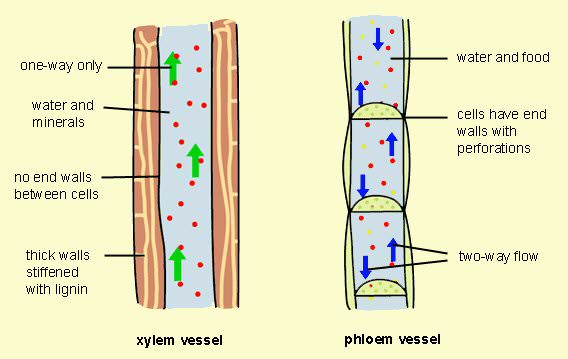
How does sugar get from the leaves to the roots in plants for winter storage?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Transport in Plants**

Water and minerals in the soil are absorbed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Water and minerals are transported upward from roots to shoots as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

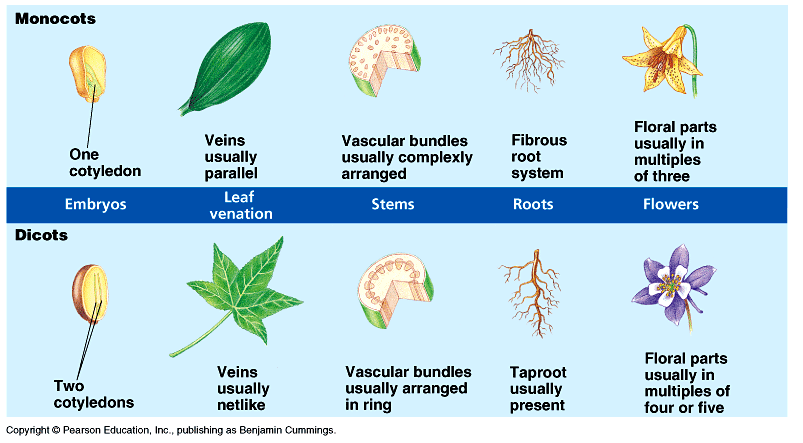
Transpiration, the loss of water from leaves (mostly through \_\_\_\_\_\_\_\_\_\_\_\_\_), creates a force within leaves that pulls xylem sap upward. Through stomata, leaves take in CO2 and release O2. Roots exchange \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the air spaces of soil, taking in O2 and discharging CO2.

Phloem sap can flow both ways between shoots and roots.  It moves from sites of sugar \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (usually leaves) or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (usually roots) to sites of sugar use or storage. Sugars are produced by photosynthesis in the leaves.



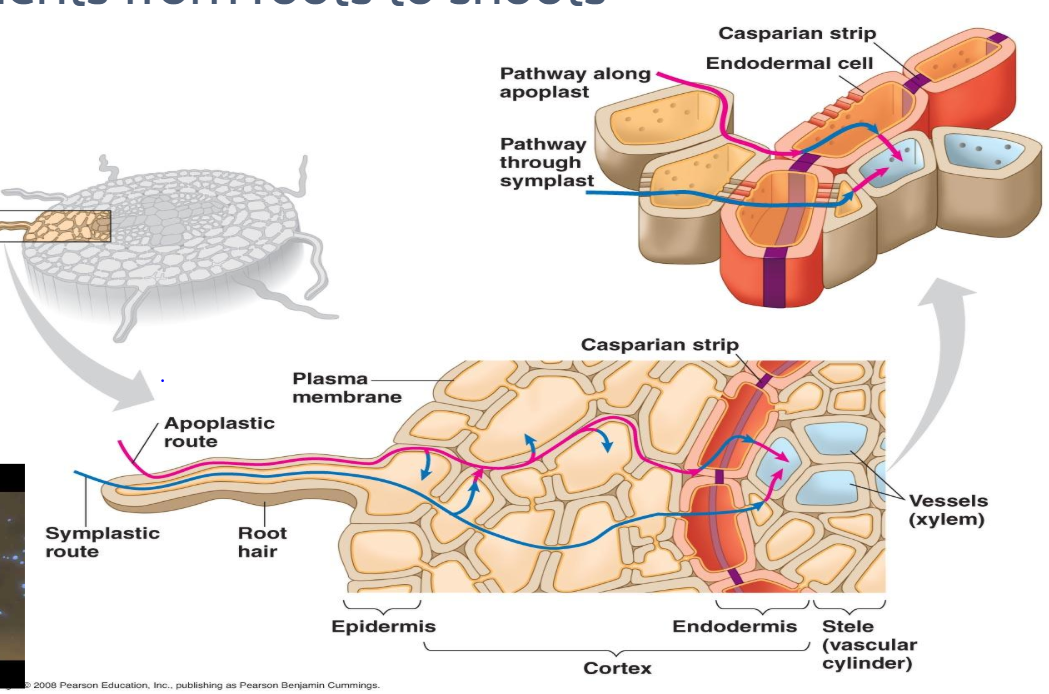
|  |  |
| --- | --- |
| Xylem | Phloem |
|  |  |

**How we categorize plants:**



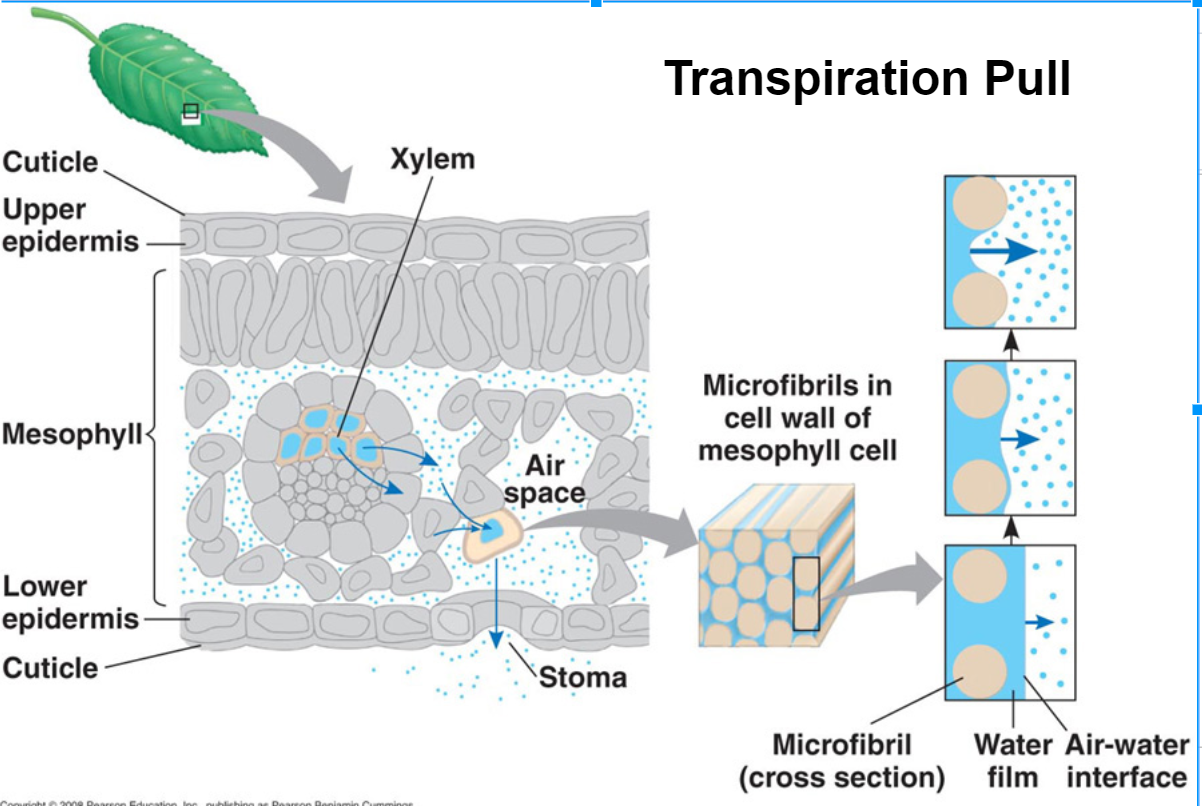
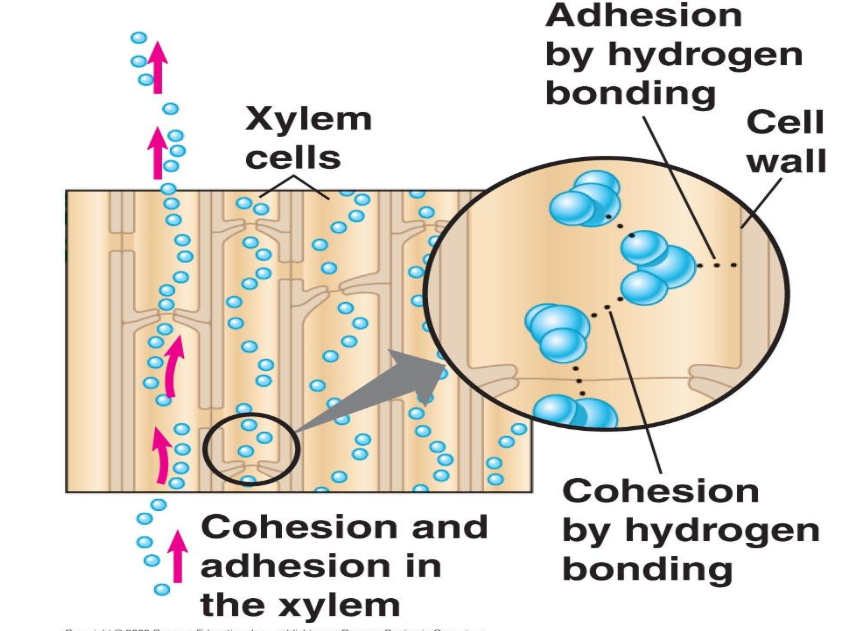
**Plant nutrition and transport:**

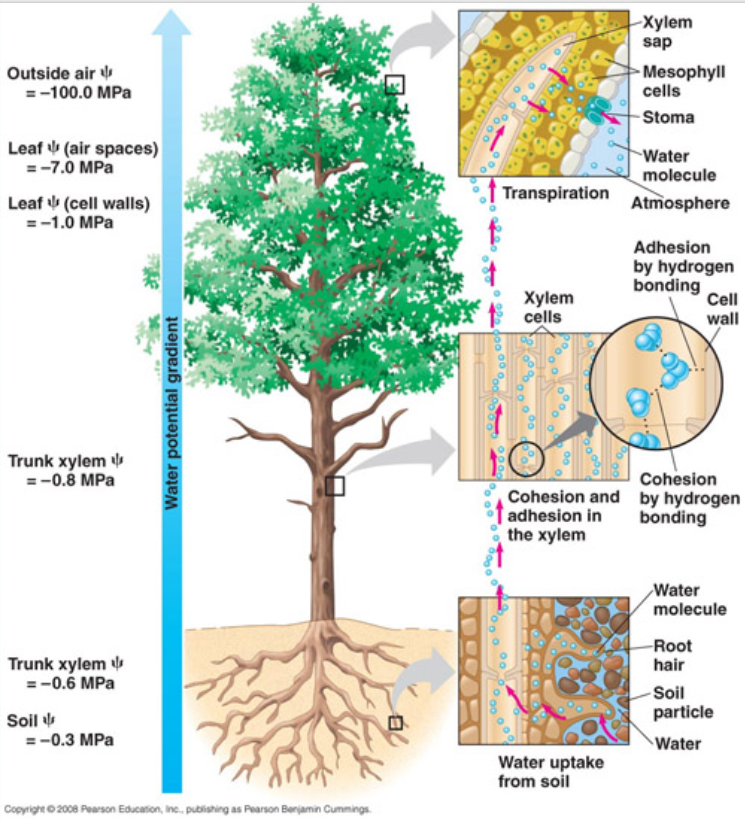
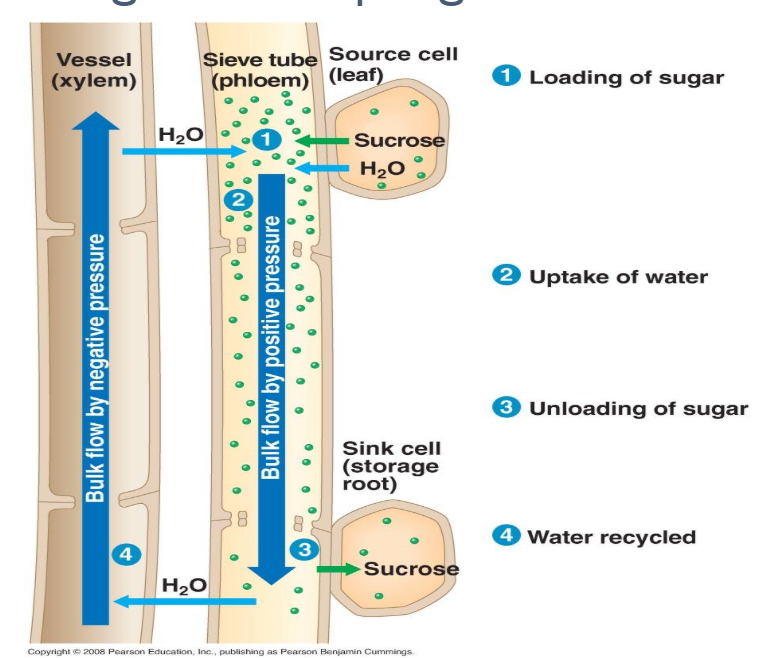
1. What nutrients do plants need?
2. Why does it take oxygen up through the roots?
3. How does water get from the outside to the center where the vascular tissue is?
4. Why does the vascular tissue move to the outside of the stem?
5. How does water get into the roots in the first place?
6. Apoplastic route travels through the:
7. Symplastic route travels through the:
8. What is the function of the Casparian strip?
9. Is xylem dead or alive?
10. Xylem flow work because of which of water’s properties?
11. Is phloem alive or dead?
12. Sugar is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the source to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



Let’s take what you know about passive and active transport and see how it applies in plants.

[Plasmolysis](http://36_09aplasmolysis_sv.mpg) an effect of osmosis, which is an example of *passive* transport

* **Bulk Flow**: the movement of water through a plant from regions of high pressure to regions of low pressure. Water and solute move through both xylem and phloem tissue by way of bulk flow

**Water Potential:**

The value for Ψ in root tissue was found to be -3.3 bars.  If you place the root tissue in a 0.1 M solution of sucrose at 20°C in an open beaker, what is the Ψ of the solution, and in which direction would the net flow of water be?