Honors Biology Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
NDHS Per: \_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Plant Transport**

**Plant**: terrestrial (mostly), multicellular, photoautotrophic, eukaryote, true tissues and organs

Plant Structure:

Tissue Basic Tissue Types: give rise to specialized cells

**Dermal** - outer coat – **protection
Vascular** – **transport tubes**
**Ground** – between Dermal and Vascular

**Dermal Tissue**:

* **Epidermis**Function: **protection**: secretes the **cuticle (waxy coat on leaves)**

**Vascular Tissue**:

**Xylem**: **Water movement** – unidirectional (up)
**Phloem**: **Sugar movement** – bidirectional

**Ground Tissue**:

* Occupies the space between the vascular tissue and the dermal tissue
Functions:
**Storage** – roots and stems
**Support** – stems
**Photosynthesis** – leaves and some stems

**Plants Roots, Leaves, and Stems:**

**Roots**:
Functions:
 - **absorb water, nutrients and minerals**
 - **anchor plant in soil**
 - **store food and water**
 - **support the plant**

**Stems**:
Function:
 - **support** leaves and flowers
 - **photosynthesis** (non-woody plants – herbaceous)
 - **storage**: food (tubers – potato) and water (cactus)

**Leaves**:
Functions:
 - **photosynthesis**
 - **storage** (succulent leaves, Aloe)
 - **protection**: spines, toxins, trichomes
 - **reproduction**: flowers (modified leaves)



**Transpiration**:

* Transpiration: **Moving water from the roots to the leaves through the xylem**
	+ regulation of the **photosynthesis/transpiration compromise** by the **guard cells and stomata**- Proper **gas exchange** **causes the loss of water** from the air spaces in the spongy mesophyll
	**- pulls water out of the mesophyll** which gets the water **from the xylem**
* Transpirational pull results from the properties of **cohesion and adhesion**
	+ As one water molecule moves out of the xylem **it** **tugs on the water molecule behind it** because they are **bound to each other (cohesion).**
	+ Water does not move down the xylem because it is **sticks to the sides of the xylem (adhesion).**
	+ 
* **Factors Affecting Transpiration:**Temperature: **Hotter = more**
Humidity: **Higher = less**
Air flow (wind): **Higher = more**

**Regulation of Transpiration**

* **Guard Cells**: Regulate the **size of stomata for gas exchange** – responsible for the photosynthesis/transpiration compromise

**Anatomy of Guard Cell**:

* + **unevenly thickened cell walls** (stomatal side is thicker)

**Physiology of Guard Cell**:

* **Potassium ions are pumped into the vacuole** of the guard cell from surrounding cells
* **Higher concentration of K+ causes an influx of water**
* More water causes the **cell to swell**
* Uneven thickness of the cell wall causes the **cell to curve and open**



**Translocation in Phloem**

* Movement from **Source to Sink**
	+ **Source**: Location of **Sugar Production**
		- Photosynthesis: **Leaves (summer and fall)**
		- Starch Metabolism: **Roots (spring)**
	+ **Sink**: Location of **Sugar Consumption or Storage**
		- **Fall (Roots)**
		- **Spring (buds for leaf and stem growth)**
* Sugar is produced and **pumped into phloem**
* **Water follows the sugar**
* **Builds** **pressure** inside of the cell
* **Pushes the solution** through the cells to the sink

