**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ # \_\_\_\_\_\_ Biology Exploration Guide**: Cell Metabolism #7

 Transport of Water and Sugar in Plants

**Key Concepts**: 

* Transpiration drives the transport of water and minerals from roots to shoots via the xylem
* The rate of transpiration is regulated by stomata
* Sugars are transported from sources to sinks via the phloem

**Read:**

* Chapter 36.3-36.5

**Key Terms**: Here is a list of key terms and concepts you will hear about and see during the chapter readings. Get to know them!

|  |  |  |  |
| --- | --- | --- | --- |
| *Xylem*  | *Casparian strip* | *Transpirational pull* | *Unloading* |
| *Phloem* | *Root pressure* | *Translocation* | *Source* |
|  |  | *Loading* | *Sink* |

**Plant Transport of Xylem Sap (Water & Dissolved Minerals)**

1. Discuss the effects of *root pressure* on moving xylem sap (water and dissolved minerals).
2. How does the Casparian strip force water and minerals to pass through the plasma membranes of endodermal cells?
3. Use Diagram #1 at the end of this packet. In your own words, explain how *transpirational pull* moves xylem sap up from the root tips to the leaves. Explain why this is considered *negative pressure*. (Relate this back to water potential.)
4. Use Diagram #1 at the end of this packet. Label the diagram and use it to discuss, in your own words, how transpiration takes advantage of water’s properties of *cohesion* and *adhesion*.

**The Control of Transpiration**

1. Discuss what two factors stomata are constantly trying to balance.
2. Describe the mechanisms of stomatal opening and closing. Include the following terminology in your description: *potassium (K+), water potential, turgor pressure, guard cells*
3. Describe THREE cues that trigger stomatal opening at dawn.

**Translocation of Phloem Sap**

1. Use Diagram #2 at the end of this packet. Label the diagram and use it to describe, in your own words, the process of *translocation*. Trace the path of phloem sap from a primary sugar *source* to a sugar *sink*. Include a discussion of *sugar loading* and *unloading* and the influence of *positive pressure* *flow*.

**Figure #1** – Cut out and paste in your Notebook for question #3 and 4



**Figure #2** – Cut out and paste in your Notebook for question #8

