Name:

Class:

**Stomata Lab (Academic)**  
Plants and animals both have a protective skin layer of tissue called the **epidermis**. Plants have special pores called stomata to allow passage of gases. The **guard cells** on either side of the stomata openings, control when the pores are open to complete photosynthesis. During photosynthesis the reactant carbon dioxide needs to enter and the oxygen waste by-product needs to exit. Water that entered as a liquid through the stem turns to gas and exits the leaf by transpiration (evaporation of water out of plants) and can result in dehydration of the plant if not regulated.

Unlike other plant epidermal cells, the guard cells **contain chlorophyll** to do photosynthesis.  This allows the cells to expand/contract  to open or close the stomata.  Guard cells also close when dehydrated.  This keeps water in the plant from escaping.  The number of stomata on the epidermal surface can tell you a lot about a plant.  Usually, a high concentration of stomata indicates fast growth and wet climate.  Lower concentrations of stomata indicate lower rates of photosynthesis and growth or adaptations for dry weather.

**Procedure:**

1. View a leaf epidermis (skin) slide and diagram two stomata (opening created by two guard cells). Label the guard cells, the stomata (opening) and one of the epidermis cells adjacent (next to) the stomata. [pictures A and C]
2. View and diagram a leaf cross-section. Label the vein, waxy epidermis cells, photosynthetic mesophyll cells and the chloroplasts they contain (color them green). [pictures B and D].

B

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A

**Microscope Pictures (label again!):**

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D

C

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**Stomata Lab Questions**

1. What are stomata?
2. What is the purpose of the stomata?
3. What controls the opening /closing of the stomata?
4. When would the stomata need to be open?
5. Why would it be beneficial to close the stomata?
6. Define transpiration.
7. How would the temperature on the top of the leaf be different than the bottom of the leaf? Why?
8. What side of the leaf do we find more stomata? Why?
9. What is the purpose of photosynthesis?
10. Write out the chemical equation for photosynthesis and label the reactants and products. Don’t forget to label the arrow!
11. What gas enters the stomata as a reactant for photosynthesis?
12. What gas exits the stomata as a waste by-product of photosynthesis?
13. What cells of the leaf are clear to let sunlight through and provide a protective surface layer?
14. Photosynthesis occurs in the mesophyll layer of the leaf (upper middle). What pigment actually absorbs the sunlight energy AND what organelle (cell part) is that pigment found in?
15. Plants are green! Out of the colors of the rainbow (ROYGBIV), which colors are highly absorbed? Which colors are reflected into your eye instead of being absorbed?
16. There are other pigments that can do photosynthesis (anthocyanin-puple, and caratonoids-orange). Normally plant leaves have so much chlorophyll in them that the other colors don’t show through. When can you see these other colors?