



Name: _____ Date: _____ Group: _____

Plant Interactions

Was it news to you that plants have organs and organ systems? Hopefully not, but if so, now you know that each organ system has a function and systems interact in order for the organism to maintain life, *even* in plants. However, don't take my word for it; find out for yourself!

Part I: Plant Organization

Below is a picture of a typical plant.

1. Label the organism, plant, PURPLE.
2. Label the two plant systems, root system, and shoot system RED.

Plant Diagram



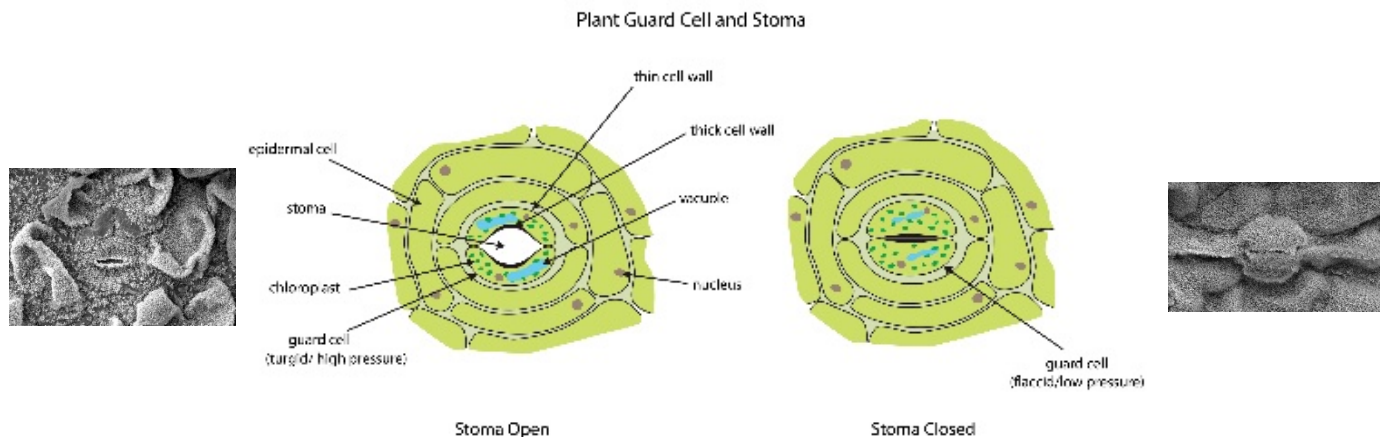


Part I: Plant Organization, continued

One of the most important parts of a plant is its chloroplast, the organelle that allows the plant to be an autotroph (make its own food) by photosynthesis. Some of these chloroplasts are located in guard cells, found in the leaf. At the cellular level, these guard cells are responsible for opening and closing the stomata. When the guard cell opens a stoma (singular for stomata), water can escape the plant.

3. Refer back to your plant diagram. Draw and label the cell, guard cell, BLACK. Draw and label the organelle, chloroplast, GREEN.

In order to maintain life, plants perform the processes of photosynthesis and cellular respiration. In both of these life processes, gases, nutrients, and water is exchanged between the plant and the external environment. The stomata, located on the underside of the leaf, is an important organ in this process. Since the concentration of water inside the leaf is greater than the air surrounding it, water diffuses out of the stomata of each leaf. This creates a pulling effect on the water molecules trapped inside the plant, and draws water upward, away from the roots and through the leaves. This process is called transpiration.



4. Refer back to your plant diagram. Draw and label the organ, stomata, BROWN.

Xylem and phloem are essential tissues for plant life. Xylem is a tissue that transports water and dissolved minerals from the soil upwards to the leaves. Phloem is a tissue that transports sugars (mainly sucrose) from the leaves and stems to other structures in the plant like bulbs or fruit.

5. Refer back to your plant diagram. Draw and label the tissues, xylem and phloem, ORANGE.

6. On your plant diagram, using BLUE, illustrate the flow of a water molecule as it is transported through the plant.



Part I: Plant Organization, continued

7. Reflect on how water, a molecule, moves through the plant, an organism. What levels of organization were involved?

8. How do the root and shoot systems interact? Focus on their interaction in regard to water.

Part II: System Interaction Function Comparison

During this investigation, you will view two plants: a normal plant and a dehydrated plant.

When a plant does not get enough water, how do the systems interact? Describe the effects of dehydration in a plant, including all the levels of organization you labeled on your diagram.

Record your comparison observations of the two plants below.

Root: Examine the roots of the two plants and sketch your observations below.

Control	Dehydrated



Part II: System Interaction Function Comparison, continued

Stem: Examine the stems of the two plants and sketch your observations below.

Control	Dehydrated

Leaf: Examine the leaves of the two plants and sketch your observations below.

Control	Dehydrated

Let's look a little closer, but first, make a hypothesis about how you think water affects the leaf of a plant, specifically its stomata.

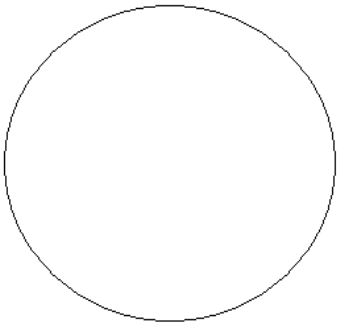
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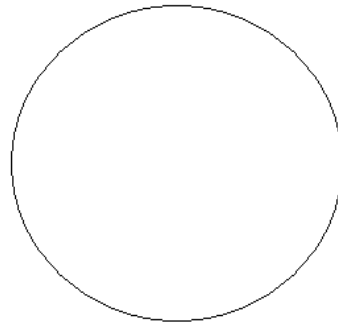
Part II: System Interaction Function Comparison, continued

Procedure for viewing stomata under the microscope.

1. Obtain a leaf sample from your teacher.
2. Paint a small patch of clear fingernail polish the size of a quarter on the underside of the leaf.
3. After the polish dries, stick a piece of clear cellophane tape over the dried polish.
4. Carefully pull up on the tape, making sure to pull off the clear nail polish along with the tape.
5. Tape the tape on a clean microscope slide.
6. Place the slide under the microscope and, starting on scanning power, focus in on the leaf.
7. Once in focus, move to low power, then to high power, focusing after switching each power.
8. Sketch, color, and label the stomata from the normal plant and the dehydrated plant.



_____ (____x)



_____ (____x)

What is the difference, if any, in the plants' stomata? Provide an explanation for either case.

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How does water affect a plant? Include all levels in your explanation, as well as evidence from your observations.

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