Name _____

Date _____

1. Plant roots have tiny hairs that absorb water.
2. Plant roots use energy to pump water into the plant.
3. Nutrients enter root cells through the process of diffusion.
4. Nutrients enter root cells through the process of active transport.
5. Plant roots grow until they find water.

Master 3.2, *Moving Water and Nutrients into Roots*

Name _____

Date _____

Procedure

Step 1. Fill the cup about 1/2 full of water.

Step 2. Place the cup of water into the center of the larger container.

Step 3. Fill the larger container with water until its level is the same as that in the cup.

Step 4. Add several drops of food coloring to the water in the larger container and gently mix the water until the color is evenly distributed through the water. Do not add food coloring to the water in the cup!

Step 5. Using a sharp pencil, poke 2 holes in the cup, opposite each other.

Step 6. Watch the water in the cup for 5 minutes and record your observations in the following space.

Observations

Experiment 1

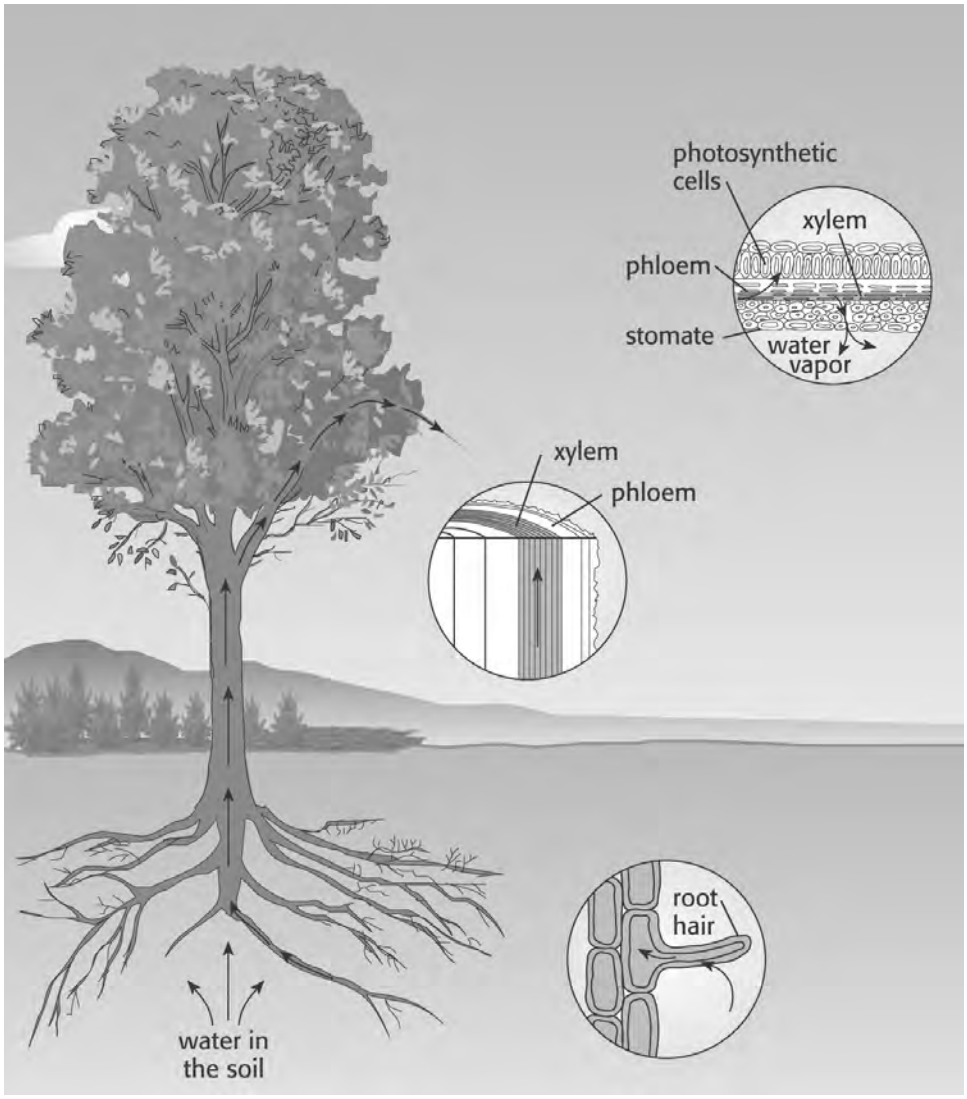
Scientists know that some essential elements are found in very low amounts in the soil. They found that some of these same elements are present in root hairs at concentrations 100 times higher than those measured in the soil.

What process can move an essential element from a place of low concentration (in the soil) to one of higher concentration (inside the root hairs)?

Experiment 2

The data from *Experiment 1* caused the scientists to believe that active transport was responsible for moving some essential elements from a low concentration in the soil to a higher one inside the root hairs. They know that this process requires energy. The scientists next exposed the living roots to a chemical that stops energy production. Once again, they measured the amounts of essential elements in the soil and inside the root hairs.

What do you think they observed?



1. Xylem transports water up from the roots.
2. Phloem transports sugars produced in the leaves during photosynthesis down the plant.

Name

Date

Procedure

Step 1. Obtain a cup, some food coloring, and a piece of celery stalk.

Step 2. Pour food coloring into the cup to a depth of at least 0.5 centimeters.

Step 3. Place the piece of celery stalk into the cup of food coloring so that it is resting on its cut surface.

Step 4. Predict what you think will happen to the food coloring. Record your prediction in the following space.

Step 5. Allow the celery to stand undisturbed for 5 to 10 minutes. Record your observations in the following space.

Prediction

Observations