

# Celery Stalk Water Race

**Overview** You already know that plants need water to survive. But how do they actually drink that water? In this experiment, you will learn how water travels through a plant, and you will get to try to make the water go faster and slower!

**What to Learn** Carefully observe where the water is when you cut the celery open. This will help you identify the structural element called the xylem. In this experiment, you will also measure how far the water travels in a certain amount of time, and you will get to change the water to try to make it go faster or slower.

## Materials

- Two clear containers (i.e. 12 oz glasses)
- 4+ stalks of celery, with leaves still attached (depending on how many variables they will test)
- Colored Water
- Paper towels
- Ruler
- Data recording sheet (worksheet and science journal)

## Experiment

1. First, find four celery stalks about the same size with leaves still attached.
2. Mix up a four-cup batch of colored water using food dye and cold water.
3. Place your celery stalks in the water, leaf-end up. After an hour or two, take it out and place it on the paper towel. Label your celery stalk with the each time length it was in the water.
4. Repeat this for different increments of time. Try one overnight!
5. Use a ruler and measure how high the water went. Record this in your science journal.
6. Now make a graph that compares the time to distance traveled by placing the time on the horizontal axis and the distance traveled on the vertical.
7. What happens if you start with hot water? Ice cold water? Salt water?
8. What happens if you cut the celery stalk at the base high enough so it straddles two cups of different colors?

## Celery Stalk Water Race Data Table

Time Celery Was in Water	Distance Water Traveled up Celery

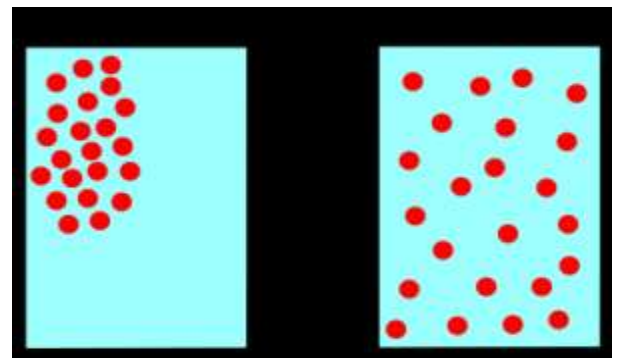
### Reading

Cell membrane structure lets in the things the needed and didn't let in the things it didn't need, like a security guard deciding who should or shouldn't get into a building. There are two ways substances can get into a cell: Passive transport and Active Transport. In this experiment, we will focus on Passive Transport, specifically osmosis.

The first way substances can get into a cell is called **passive transport**. This process does not require any energy, because of the **concentration** of the substance inside and outside the cell. Concentration is how much of a substance there is in a certain area. In passive transport, the substance is going from an area of high concentration to low concentration.

To understand how this works, imagine blowing up a balloon and then letting the air out. When you do this, the air flows out quickly and without any extra energy because it is going from a place where there are a lot of air molecules (inside the balloon) to a place where there are fewer air molecules (outside the balloon.) In other words, it is going from an area of high concentration to low concentration.

The red dots are all in the top left corner. This is where the concentration is the biggest. The dots will move down and to the right, until they are spread out evenly.



Sometimes substances undergo passive transport all by themselves. They just slide right through the cell membrane. Other times they need a protein to help them make it across the membrane. But they *never* need energy, because they are going from high to low concentration. One special kind of passive transport is **osmosis**, when water crosses into the cell.

### Exercises

1. What two types of transport move substances into a cell?
2. How does water get into the celery?
3. What are the tubes in celery called?
4. In what direction does air flow? Hint: Think of the balloon example.
5. What happens to the water after it travels through a plant?
6. Use answers 1-4 to describe the process of water traveling through a celery stalk.

**Answers to Exercises: Celery Stalk Water Race**

1. What two types of transport move substances into a cell? (Answer: Active and Passive.)
2. How does water get into the celery? (Answer: Osmosis.)
3. What are the tubes in celery called? (Answer: xylem.)
4. In what direction does air flow? Hint: Think of the balloon example. (Answer: Air flows from most concentrated area to least concentrated area).
5. What happens to the water after it travels through a plant? (Answer: It evaporates through transpiration).
6. Use answers 1-4 to describe the process of water traveling through a celery stalk. (Answer: Water enters a plant through a passive transport process called osmosis. It travels through the xylem, from most concentrated to least concentrated area. Thus, it travels from bottom to top. Once at the top, it evaporates, making room for new water flow.)