

Discover How Capillary Action Works with the Walking Water Experiment

Grades: K - 6

Time: 20 mins set-up; view results the next day



Lesson summary:

Students will learn about capillary action.

What's the big idea? 🌏

Capillary action is when a liquid, like water, moves up something solid, like a tube or into a material with a lot of small holes. Capillary action works against gravity because of three special forces called cohesion, adhesion and surface tension. **Outcomes or purpose:**

Water can move through tubes or porous materials through a process called capillary action.

Teacher background:

Capillary action is at work in LGT gardens every day. Can you name three examples? If you said: Growboxes, peat pellets and GrowEase capillary mat trays then you're right! You get bonus points if you said plants too!

So what is capillary action anyway? Capillary action is when a liquid, like water, moves up something solid, like a tube or into a material with a lot of small holes. Capillary action works against gravity because of three special forces called cohesion, adhesion and surface tension.

Tiny particles of water - also called water molecules - are like a group of good friends. They like to stick together! So when one molecule meets other molecules they tend to stick together in a group. This is called *cohesion*.

Water molecules also like to stick to solid things. Sticking to solid things is called *adhesion*. Some examples of solids are: paper towels, the sides of a hollow tube or growing medium. All of these things have one thing in common: they are porous. In other words, they're not completely solid, they all have tiny tubes or pores that the water can move through. And because water molecules like to stick together, when the first water molecule sticks to the side of the tube or pore, it pulls up the water molecule below it. Just like a good friend.

The water molecules at the top of the chain, use a force called *surface tension*. These water molecules are packed even more closely together at the top, like a big group hug. Surface tension holds the water together at the top helping the chain of water molecules to be pulled up against gravity during capillary action. If you've ever sat beside a pond in summer, you might have seen insects like water striders

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perched on top of the water in the pond. The reason they don't sink is because the surface tension at the very top of the water acts like a film, keeping the water striders from sinking.

Plants couldn't survive without capillary action. Capillary action pulls water into the soil. Plants grow roots into the moist soil and roots absorb water into the plant. Water starts climbing up through the plant through tiny tubes in the stems and leaves. But capillary action can only pull water up a short distance, after which it cannot overcome gravity. To get water up to all the stems and leaves, the forces of adhesion, cohesion go to work inside the plant to move water up to the furthest leaf.

Materials needed:

• 5 Clear glasses

• 4 Pieces of paper towel (half sheets work well)

• Water

• Food colouring in primary colours (red, blue, yellow)

Step by step instructions:

Set the five glasses in a row about 1 cm apart. Fill the first, third and fifth glass almost full of water. Leave the other two empty.

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Put food colouring into the first, third and fifth glasses - one colour per glass. Use 5 - 10 drops in each glass for the best effect.

Discussion questions

• What do you think will happen in this experiment? Do you think the empty jars will stay empty? If not, what colour water do you expect to see in them? Write your guess down on the board or in a journal.

• Why do you think the colours are changing? What does it remind you of? (A rainbow)

Roll the 4 pieces of paper towel lengthwise and then bend in half. Place one end of the paper towel roll in a glass with coloured water and the other end into the empty glass beside it. Do this for all of the glasses.

Now wait. It's best to set up the experiment at the end of the school day. You will see the results by the next morning.

Expand the learning:

- Describe how capillary action works in a plant.
- Describe how capillary action works in a GrowBox, GrowEase capillary mat tray or a peat pellet.