

# CAPILLARY ACTION

| 35 minutes |



## OVERVIEW

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### Description

Participants will learn how trees transport water by building small tree models to demonstrate the basics of capillary action.

### Learning Outcomes

- Understand the concept of capillary action
- Explore the way trees obtain water and nutrients
- Collaborate to build tree models

### Outline

1. How do trees get water and nutrients? (5 mins)
2. Capillary Action (5 mins)
  - a. What is capillary action?
  - b. How do trees use capillary action?
3. Tree model activity (20)
  - a. Tree demo
  - b. Group tree model building
    - i.

### Materials

Item	Quantity Per Child	Quantity Per Class
● Standard white coffee filters	● 1	● N/A
● Food colouring	● N/A	● 1 bottle
● Brown cardstock	● N/A	● 4 sheets
● Green cardstock	● N/A	● 4 sheets
● Small, clear plastic cups	● 1	● N/A
● Styrofoam bowl/any wide dish	● N/A	● 1 dish
● Toilet paper OR paper towel	● N/A	● 1 sheet
● Scotch tape	● N/A	● 1/2 roll

## KEY INFORMATION

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### Topic 1: Capillary Action

Capillary action is the phenomenon that occurs when liquid travels through a small space, or tube, in the absence of gravity or other forces. This can be observed when water travels through paper towel. It is also the way that trees are able to get their water from the soil/their roots, to the very top of their leaves. Trees have tiny tubes called Xylem, which are like capillary tubes that let water travel up the sides. Capillary action occurs when adhesion to the walls of a structure is stronger than cohesion between water molecules.

Example Capillary Tree Model:

(note: instead of a jar, use a small plastic cup to reduce cost of purchasing jars)



## LESSON PLAN AND PROCEDURE

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### How trees get water and nutrients (5 mins)

1. What do trees and plants need to survive?
  - a. Ask the class what trees and plants need to survive? (Sun, soil, CO<sub>2</sub>, water)
  - b. Explain that trees and plants need water and nutrients in order to remain healthy.
2. How do tall trees get water to their leaves?
  - a. Ask the class how they think tall trees manage to get water and nutrients all the way up to their leaves.
  - b. They may reply 'trunks', and you can explain that trunks do help transport water to the leaves and branches using a special mechanism called 'capillary action'.

### Capillary Action (5 mins)

3. What is capillary action?
  - a. Explain that capillary action occurs when adhesion (when water molecules stick to non-water molecules) forces are stronger than cohesion (when water molecules sticks to other water molecules) forces between water molecules, so they travel up the sides of an object. Tell them to picture water moving through a piece of paper if a drop of water is spilled.
  - b. Fill the wide dish with 2cm of water, drop 2 drops of food colouring. Take 1 square of toilet paper or paper towel fold it lengthwise a few times. Dip one short edge into the water. Let the kids watch the water 'climb' up the material to demonstrate capillary

action. Reiterate that the water is adhering to the material of the paper towel, not to other water molecules.

4. How do trees use capillary action?
  - a. Tell the class that trees use capillary action via their Xylem. Xylem tubes make up the core of the tree trunk, and because they are like tiny straws, capillary action allows water to travel up the tree trunk to get to the leaves!
  - b. Describe how the water cycles from the rain, to the soil and into the roots, up through the trunk and into the leaves!

### **Tree Model Activity (20-25 mins)**

5. Tree Demonstration
  - a. Demonstrate the tree model to the class. Fold 1 coffee filter in half. Proceed by folding in one edge and continue to fold it over until it is only a couple centimeters wide. Twist the bottom 2 inches, and leave the top end as is.
  - b. Cut a piece of brown/green cardstock into a 2-inch-wide strip and roll it into a cylinder with a diameter of 1 cm, and secure it with tape.
  - c. Insert the twisted portion of the coffee filter into the taped cardstock roll. Ensure the bottom of the coffee filter is at level or longer than the bottom of the cylinder (if it isn't, simply cut the bottom of the cylinder).
  - d. Cut several small vertical lines into the fanned out 'leaves/petals' part of the tree/flower. Spread/fan out the top portion of the folded filter.
  - e. Pour 1 cm of water in the small plastic cup, then add 2 drops of food colouring. Place the tree model into the cup, so the bottom is in the water and the model is standing upright.
6. Model Tree Building
  - a. Hand out 1 plastic cup, 1 coffee filter, 1 small piece of tape and piece of *precut* cardstock to each participant.
  - b. Once everyone is finished taping their trunks and folding their coffee filters, begin pouring 1 cm of water into each of their cups.
  - c. Drop food colouring into each child's cup of water and instruct them to assemble and place their models into their cups.
  - d. Then, simply wait for the capillary action to colour the leaves or petals. (This may take varying amount of time. Be sure to return to check on the capillary tree model frequently)
  - e. If time permits, check on the models the next day (or encourage the children to check on theirs the next day at home) to see what happened. Through capillary action, the food colouring will be pushed to the edge most part of the filter, showing a more concentrated colour.

### **Debrief**

- Ask the participants to review what they observed?
- Recap the concepts of capillary action and how trees and plants get their water.

## **REFERENCES & RESOURCES**

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### **Topic 1**

- [Capillary Action](#)