

# Toothpick Star Science Experiment

Turn broken toothpicks into a star!

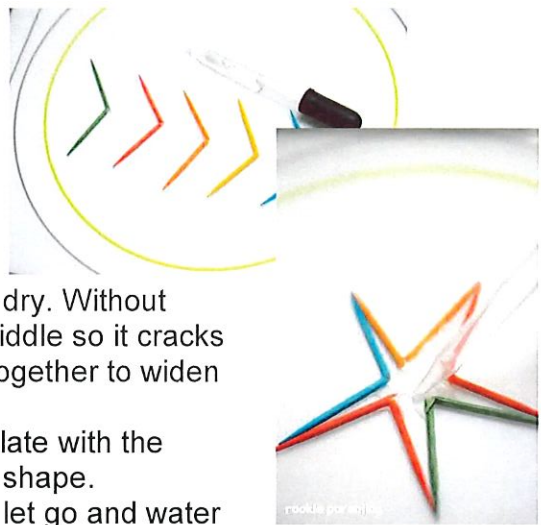
See capillary action, adhesion and cohesion in action!

<https://www.rookieparenting.com/toothpick-star-science-experiment/>

<https://www.stevespanglerscience.com/lab/experiments/toothpick-star-table-trick/>

## Supplies

1. Five round wooden toothpicks
2. Water
3. Plate
4. Pipette



## What to do:

1. Start with round toothpicks that are brand new and dry. Without breaking them completely, bend each one at the middle so it cracks but doesn't break into two pieces. Press the ends together to widen the split.
2. Place the 5 broken toothpicks in the center of the plate with the broken points touching one another, forming a star shape.
3. Squeeze the top of pipette, put it in the water, then let go and water will fill the pipette.
4. Carefully squeeze a few drops of water from the pipette where the broken toothpicks meet. The goal is to place the water so that all the exposed, broken ends get soaked. However, don't add so much that the toothpicks start to float.
5. The right amount of water reforms your closed star into an open, recognizable shape in seconds.

## How does it work?

The toothpicks you used were probably made of dried birch wood. When you break the toothpicks, you stretch and compress the wood fibers inside them. When you put drops of water in the middle of the closed star formation, the dry wood fibers in each broken toothpick absorb some of it. This causes the fibers to swell and then to expand. The absorption of the water into the toothpick is due to capillary action. Capillaries are microscopic hollow tubes within the wood that draw water along the length of the toothpick. Capillaries normally carry water and food throughout a living plant's stem and leaves.



As the wood absorbs the water, each individual toothpick tries to straighten itself as the soaked fibers expand. This straightening action causes the toothpick ends to push against each other. As the toothpicks straighten and push against each other, the inside of the star opens up into the final star shape.

## Take it further...

- Test whether hot or cold water makes the movement faster or slower. What about salt water or sugar water or something else dissolved in water? What about other types of water like distilled or bottled?
- Find out what surface allows the greatest expansion of the fibers: a plastic tablecloth? a wooden table? a formica countertop? a glass surface? a flat surface? a curved surface? etc.
- Test other liquids. Maybe the caffeine in coffee or cola will speed things up a little. Maybe milk or cream will make it a lot slower. Tests like these are what science is all about!