

# TEACHER'S DEMONSTRATION: Hot and Cold Water

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This demonstration is from "Surfing Scientist" at [www.abc.net.au/science/surfingscientist/pdf/teachdemo10.pdf](http://www.abc.net.au/science/surfingscientist/pdf/teachdemo10.pdf).

The teacher's demonstration is added to help students understand the density properties of hot and cold water. Air exhibits the same qualities as water with regard to density.



**Time:** 20 minutes

## Materials:

Large clear jar or small aquarium

Smaller jar or similar to use as a platform for the bottles to rest—it must fit inside the large jar or aquarium

Two small bottles (food coloring bottles or vanilla essence bottles work well)

Two pitchers

Hot and cold water

Ice

*Ensure that the two small bottles and the smaller jar will fit inside the larger jar or aquarium as required.*

**NOTE:** This beautiful demonstration works best if you can keep the bottles closed until they are fully submerged in the large jar. Use a jar with a very wide mouth or a small aquarium.

## Instructions:

1. Fill the large jar with tap water.
2. Submerge and invert the smaller jar and rest it on the bottom of the larger jar to act as a platform for the two small bottles.
3. In a pitcher, mix ice, water, and about 5 drops of blue food coloring to make cold, blue water. In the other pitcher, use hot water or boil a kettle to make hot water and color red. Fill one bottle with the cold blue water and the other with the hot red water.
4. Carefully submerge the bottles into the large jar and rest them on the smaller jar. The cold water will descend and the hot water will rise – depending on the volume of the large jar, this will continue for many minutes.
5. When the demonstration is completed, pour the water into a garden bed or around the base of a tree on school grounds.

## Safety notes:

- Emphasize the safety precautions you are taking before performing this demonstration and insist that students only attempt this demonstration under the supervision of an adult.

**Explanation:**

When fluids (liquids and gases) are heated, they expand and therefore become less dense. Any object or substance that is less dense than a fluid will float in that fluid, so hot water rises (“floats”) in colder water.

When fluids are cooled, they contract and therefore become more dense. Any object or substance that is more dense than a fluid will sink in that fluid, so cold water sinks in warmer water. Hot air rises and cold air descends for exactly the same reason.

Hot water rises and cold water descends in the jar.

This demonstration helps explain the swirl when hot and cold fluids meet – hot is going up and cold is going down. Together it is a convection column.