

## ACTIVITY 2

# Hot and Cold, Up and Down



### MATERIALS

**4 Glass Bottles with Wide Opening**

**Blue and Red Food Coloring**

**Plastic Bin**

**Warm Water**

**Cold Water**

**Playing Cards**

### DIRECTIONS

1. Clouds also need a change in temperature and pressure. This happens when warm and cold air masses mix together. We are going to explore this next.
2. In two bottles, add a drop of red food coloring to indicate which will have warm water. In the other two bottles, add a drop of blue food coloring to indicate which will have cold water.
3. Work together to fill two red bottles with warm water from the tap and the two blue bottles with cold water. Each bottle must be filled to the brim with water. Do not leave any air at the top. Children can use spoons or eye droppers to fill the bottles to the very top.

***Teacher Tip:** Use shoe box sized plastic bins to give children independence with water while also keeping your space clean. The plastic bins will catch any water spilled and can easily be poured into the sink.*

4. Place an old playing card (or an index card) over the mouth of one of the warm water bottles. Hold the card in place as you turn the bottle upside down and rest it on top of one of the cold water bottles. The bottles should be positioned so they are mouth to mouth with the card separating the two liquids.
5. Ask questions such as: What is keeping the colored water separate? What do you think would happen if there wasn't a card between the bottles?

**Note:** Most children will think the colors will mix as the water mixes.



6. Tell the children you want them to observe (watch carefully) what happens when the card is removed. Hold the bottles in place while a child carefully slips the card out from in between the two bottles.

7. **Ask:** What did you observe? Why do you think the liquids do not mix?

**Note:** Many children fascinated by the water staying divided. They cannot figure out why they did not mix. Sometimes they will ask for the bottles to be shaken or stirred around. Instead, try pressing students about putting the blue/cold water on top instead with the red/warm water on the bottom. Remind them it is okay to not know the answers.

8. Repeat steps 4-6, with the bottle of cold water on top of the warm water. Remind children to observe what happens when the card is removed before removing the card.

9. **Ask:** What did you observe? Why do you think the liquids mix instead of staying separate like the example above?

**Answer:** *Water is made up of lots and lots of tiny pieces called particles. Cold water is more dense than warm water. This means the little bits, or particles, of water are pressed closer together when it is cold. When water is warm, the particles are less dense, or not pressed together. When things are more dense, they sink. When things are less dense, they float.*

10. **Ask:** So, why did the cold water sink and the warm water float? Let the children share their understanding.

**Teacher Tip:** *Give students paper and markers to draw what they observed. This will help them explain their understanding when they don't have the vocabulary they need.*

11. The swirls of colors we observed as the warm and cold water mixed is called a current. Water has currents, or movements, and so does air. Currents in the air swirl and mix just like the water in the bottles did.

12. **Ask:** What do you think would happen if warm and cold air mixed like the warm and cold water mixed?

**Answer:** *It swirls just like water as the warmer air rises and colder air sinks.*