# Weather Forecasting
# Learning Activity 1

**Objective:**

Students will learn about the density principle in relation to the atmosphere.

**Overview:**

Density represents how molecules behave with one another in a substance or object. If the molecules move slowly, they will become tightly packed, resulting in a higher density. If the molecules move very fast, they will become more and more spaced apart from each other, resulting in a lower density.

Water and air behave very similarly…thus water can be used as a great example of how air parcels, or bubbles of air, can move when heated or cooled. When the air/water is heated, tiny bubbles will form and rise, because they have a lower density that the surrounding air/water.

**Total Time:**

25 minutes

**Supplies:**

Four empty glass bottles, warm water for two bottles, cold water for two bottles, food coloring, level surface

**Procedure:**

Start by boiling several cups of water in the portable boiler/hot plate. Next, fill 2 glass bottles about ¾ full with tap water, while filling the remaining 2 bottles ¾ full with the hot water. **BE CAREFUL, AS THE GLASS BOTTLES CONTAINING THE HOT WATER WILL BE VERY HOT!!!** Add a few drops of food coloring to one of the cool water bottles, and also to one hot water bottle. Stand one hot water bottle atop one cold water bottle, until they balance, and also stand the remaining cold water bottle atop the last hot water bottle. (If the table you are using is uneven, you may use a cookie sheet for stability. In addition, the cookie sheet will catch any water that may spill out of the bottles.) Observe the motion of the food coloring.

**Discussion:**

From this experiment, you were be able to see that the food coloring remained suspended in the hot water bottle that was atop the cold water bottle, while the food coloring in the adjacent bottle setup fell into the hot water bottle, as the cold water bottle rested overhead. Why is this??? The density of the cold water was pushing the food coloring to the lower hot water bottle, while the fast molecular motion associated with the hot water bottle was suspending the food coloring in this bottle atop the cold water bottle. Also notice the bubbles rapidly rose in the hot water bottle; These bubbles represented air parcels, emphasizing that the warmer air/water was allowed to rise, because it is less dense than the colder air/water.

What would happen to the food coloring when two of these bottles cooled to the same temperature??? The food coloring would become evenly distributed, resulting in the same color to both bottles.