

# The Cartesian Diver

**Problem:** How does the Cartesian Diver work?

**Materials:** bottle, dropping pipette (the diver), rubber sheet, bucket, water

**Directions:** Read this first. Make certain that you check off each step as you perform them one at a time.

## Procedure:

- ( )1. Fill the bottle completely with water. Set it aside for later use.
- ( )2. Fill the bucket 3/4 full of water.
- ( )3. Fill the dropping pipette with enough water so that it will barely float when placed in the bucket
- ( )4. Remove the pipette from the bucket and place it in the bottle of water. (The pipette should still barely float).
- ( )5. Tightly cover the top of the bottle with the rubber sheet. While holding the rubber sheet in place, press down on the top of the sheet with your finger. (The diver should sink to the bottom of the bottle).
- ( )6. Stop pressing on the rubber sheet. The diver now does what?
- ( )7. Try to get the diver to remain in the middle of the bottle. Did it? Yes or No

**EXPLANATION:** The space at the top of the bottle contains air. This air becomes trapped when you put the rubber sheet in place over the mouth of the bottle. By pushing down on the rubber sheet you are also pushing down on the air trapped in the bottle. This air then pushes on the water. The water, having nowhere else to go is forced into the floating pipette. Now, since the dropper has more water it must also weigh more. Since it weighs more it now sinks to the bottom. When you release the rubber sheet the air in the pipette pushes the water back out of the dropper. The dropper becomes lighter and again floats to the surface of the liquid.

## **FOLLOW-UP:**

1. EACH member of the lab group is to COPY THE ABOVE EXPLANATION and attach it to this paper before turning it in for a grade
2. What can be said about the density of the diver
  - a. at the surface of the liquid?
  - b. at rest in the center of the liquid?
  - c. resting on the bottom of the liquid?
3. Keeping in mind that density relies upon both volume and mass, one of these must have changed in order to change the density of the pipette. Was it the volume or the mass? **EXPLAIN IN DETAIL EXACTLY HOW THE DENSITY OF THE DROPPING PIPETTE CHANGED IN THIS LABORATORY.**