

The Hydrostatic Paradox



Purpose: Through trickery, the idea of the net force on a container due to fluid pressure is illustrated.

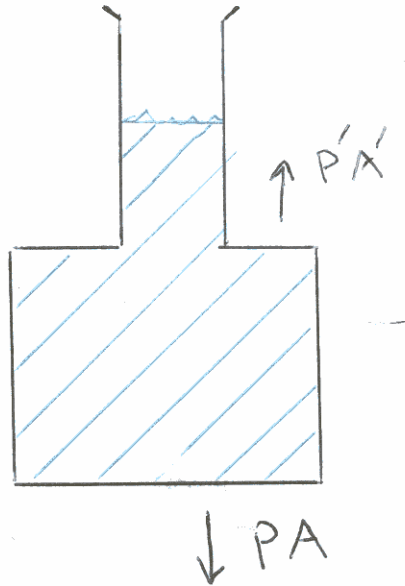
This is more a visual aid than demonstration. By bringing in real equipment, the outcome of an otherwise obvious experiment is in doubt. Doubt might cause thought, and thought might lead to a deeper understanding. You never know.

Note: Fill the flask and beaker to the same height. Tell the students that both containers have the same base area (In fact, they are pretty close.) and the same mass (Again they are close, within 13 g!). Then ask them which one weighs more? Most will say the beaker since it holds more water.

Then you say “Oh ... but the water pressure is the same at the bottom of each because the depths are the same. Since the bottom areas are the same, shouldn't the water press down on each container with the same force?” Many students will then decide they must weigh the same.

The confusion paves the way to the explanation that the force exerted on *all* parts of the container must be taken into account. As an example, it is not hard to show them that the total force exerted

on the simple container shown to the right is downward and equal to the total weight of the fluid.



Extra Equipment: The 400 ml beaker, 250 ml Erlenmeyer flask, a balance, and some food coloring.

Location: Everything is in the G.P. Shelves.