

RAFT IDEAS

Topics Air Pressure,
Atmosphere, Weather

Materials List

- ✓ 1 to 2 liter bottle with cap
- ✓ 1 centimeter cube
- ✓ Sandpaper
- ✓ Hot glue gun or other type of suitable glue

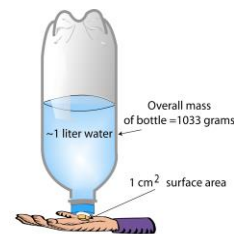
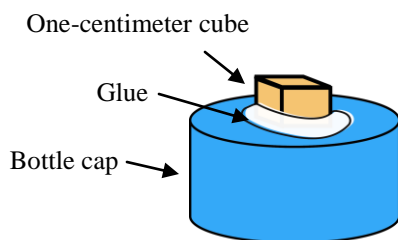
This activity can be used to teach:

- Atmosphere (Next Generation Science Standards: Grade 5, Earth and Space Science 2-1)
- Structure of Matter (Next Generation Science Standards: Grade 5, Physical Science 1-1)
- Forces & Motion (Next Generation Science Standards: Middle School, Physical Science 2-2; High School, Physical Science 2-1)



Air Pressure - Feel it!

What's the pressure we're all under?



Let your students experience air pressure in a new way with this easily made device that will add a pressure equal to one atmosphere to a square centimeter of skin.

Assembly

1. Lightly sand the top of the bottle cap and the one-centimeter cube. Sanding will roughen the surface providing a better grip for the glue.
2. Remove any dust from the cap and the cube. Glue the cube to the cap, using extra glue around the edges. Let the glue dry or cool as required.
3. To be very accurate the bottle needs to be filled with enough water to make an overall weight of 1,033 grams. A 2-liter soda bottle filled with 1 liter of water is a close approximation. Use 975 milliliters of water for a much closer approximation. Alternately, measure the mass of the empty bottle with the cube/cap and subtract that mass from 1,033 grams. Then, add the remaining mass in milliliters of water. One milliliter of water is a one gram mass.
4. Screw the cap on tightly.

To Do and Notice

1. To feel the atmospheric pressure of 1 kg/cm^2 , invert the bottle and place the centimeter cube on a finger. To keep the bottle from tipping, place a finger from the other hand on the, now upright, bottle bottom. Lightly position the finger in the center depression to steady the bottle without adding extra "pressure." (Note: Divers at 10 meters (33 feet) below the water's surface have one additional atmosphere of pressure on very part of their body. The pressure increases an additional atmosphere for each additional 10 meters of depth!)

The Science Behind the Activity

Air pressure at sea level is about 1 kilogram per square centimeter (about 14.7 pounds per square inch). We are under this pressure all the time and thus do not notice unless the pressure changes significantly. Flying in a plane or traveling to the mountains and back are examples of changing air pressure. Ears popping and water bottles bulging or collapsing are also examples of the effects of changing air pressure. The mass of the air above us does not squash us because we have air inside our bodies. The push of the air inside balances the push of the air outside. Local air pressure can vary slightly, with areas of high and low pressure, associated with weather systems and changes.

Web Resources (Visit www.raft.net/raft-idea?isid=274 for more resources!)

NASA web page - http://kids.earth.nasa.gov/archive/air_pressure/

National Weather Service - <http://www.srh.noaa.gov/jetstream/atmos/pressure.htm>