Chapter 8-2

Pressure

Equation

Pressure = Force / Area

$P = F / A$

Area = pi r^2

SI unit – is the pascal (Pa)

1 Pa = $1N/m^2$

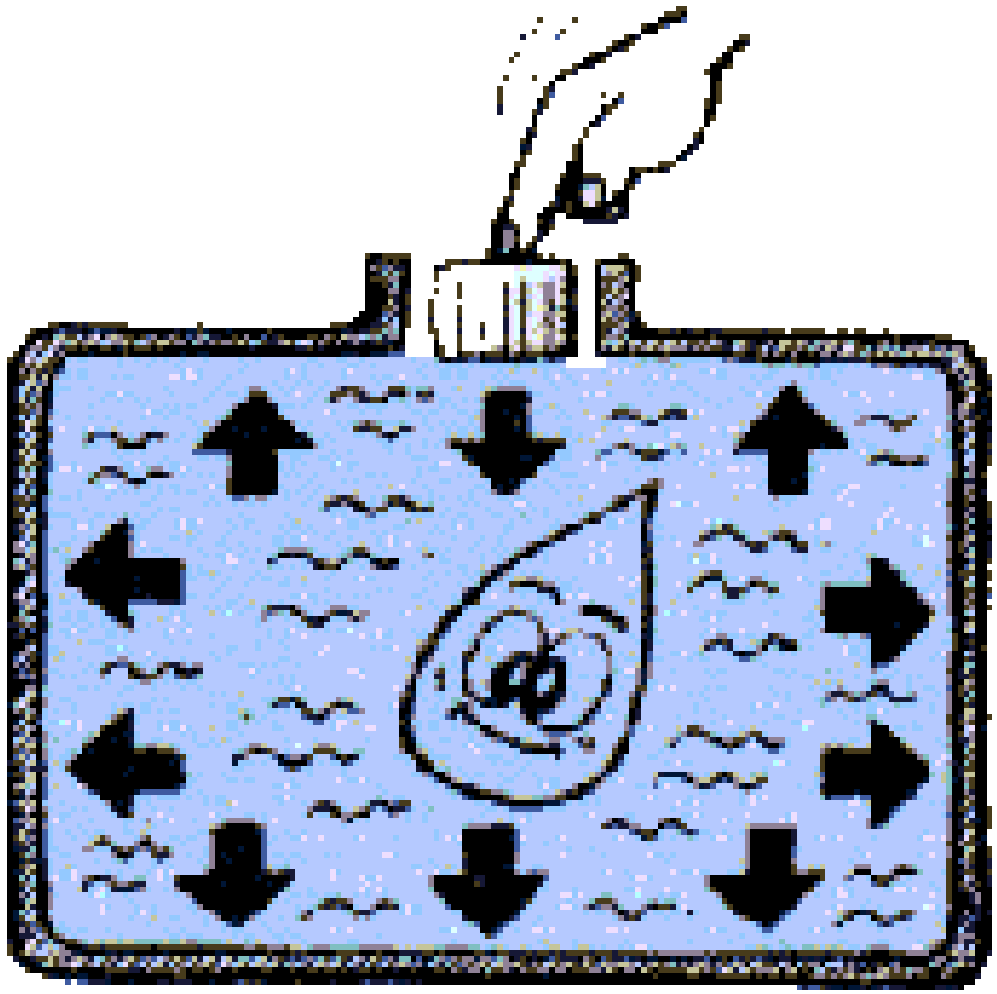
Atmosphere pressure at sea level=1.01×10^5

Bottomless Bottle Demo

Pascal's Principle

Pascal's Principle – Pressure applied to a fluid in a closed container is transmitted equally to every point of the fluid and to the walls of the container.

$P = F_1/A_1 = F_2/A_2$



- In a car lift, compressed air exerts a force on a piston with a radius of 10 cm. This pressure is transmitted to a second piston with a radius of 15 cm. How large a force must the compressed air exert to lift a 330 N car?

Atmospheric Pressure

- Atmospheric Pressure is pressure from above. The weight of the air in the upper atmosphere exerts a pressure on the layers below.
- Kinetic Theory of gases describes the origin of gas pressure. Gas particles are like a collection of billiard balls that constantly collide with one another.
- As they collide with the wall, they exert a force and this force per unit area is the gas pressure.

Pressure and Depth

Absolute pressure = atmospheric pressure + (density x gravity x depth)

$P = P_{atm} + \mathrm{D}gh$

Temperature

- Kinetic theory predicts that temperature is proportional to the average kinetic energy of the particles in a gas.
- The higher the temperature, the faster the particles move.
- As the speed of the particles increase, the amount they hit the wall increases resulting in a higher force and therefore a higher pressure.
- Therefore, temperature and pressure are related.

Assignment

Unit 8.2 Worksheet