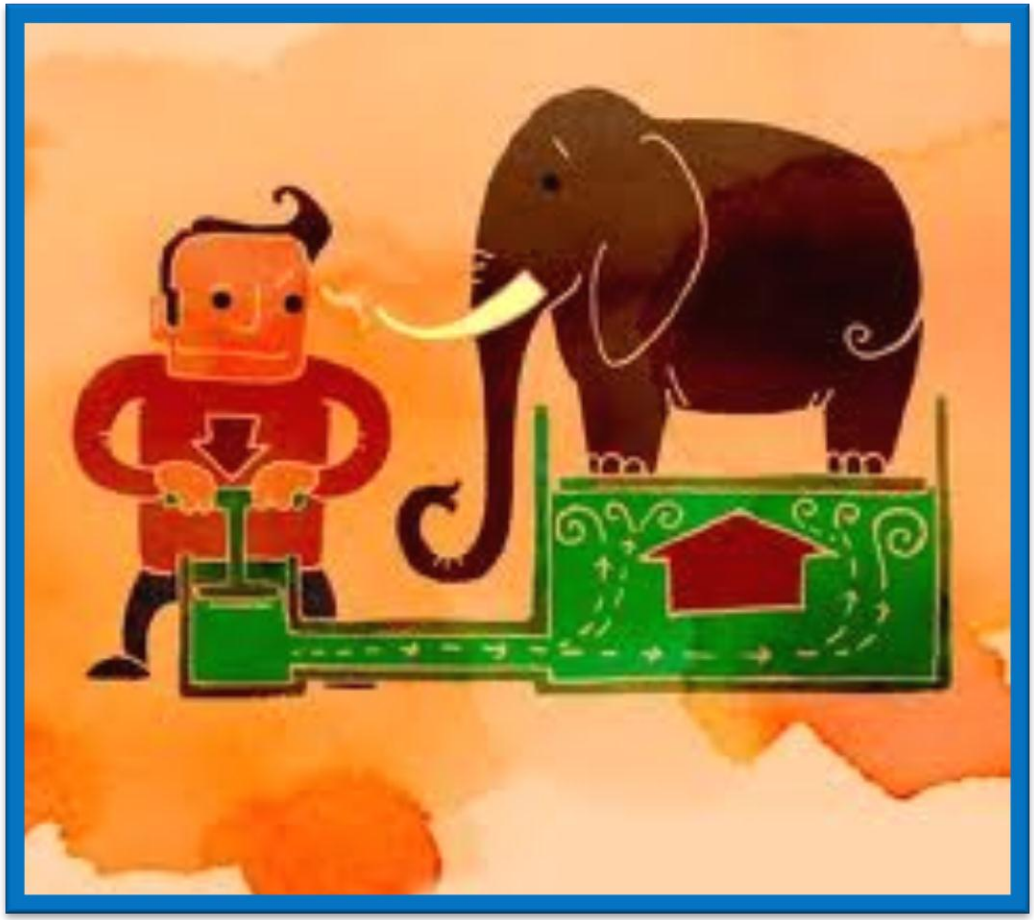
Pascal's Principle Practice



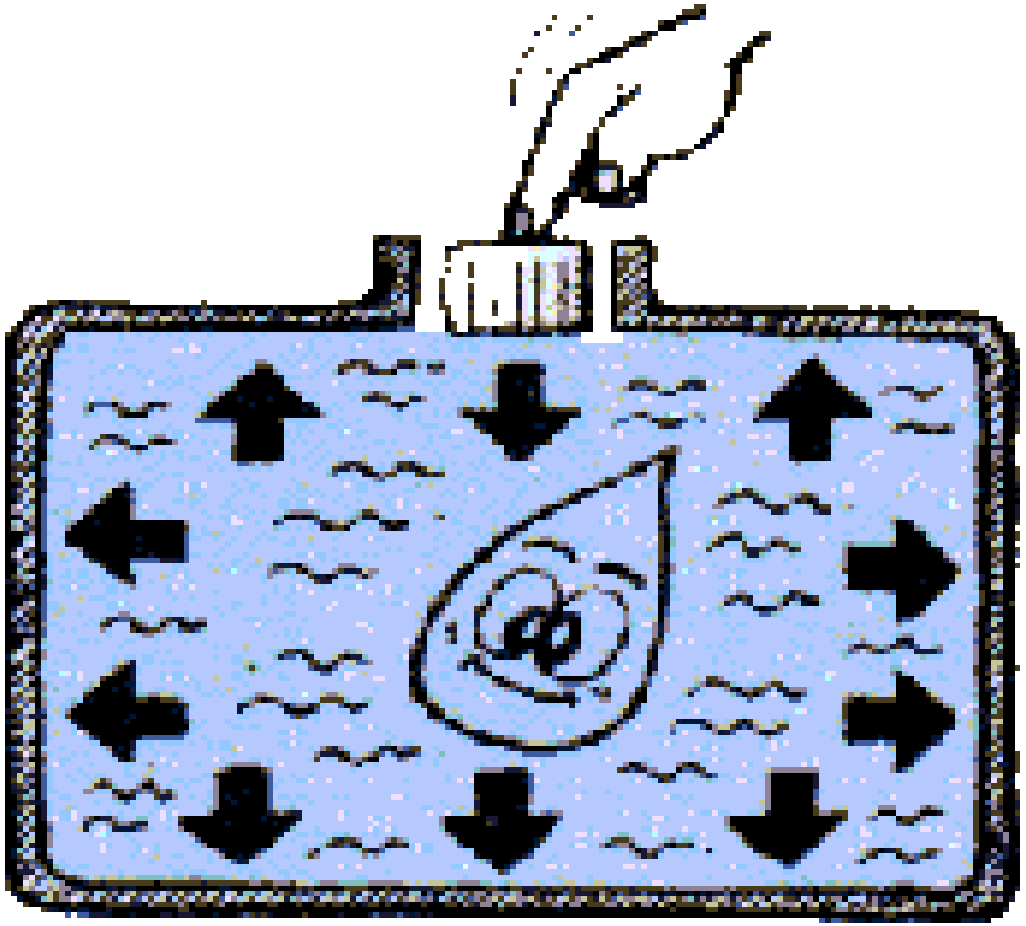
Pascal's Principle

When force is applied to a confined liquid, the change in pressure is transmitted equally to all parts of the fluid.

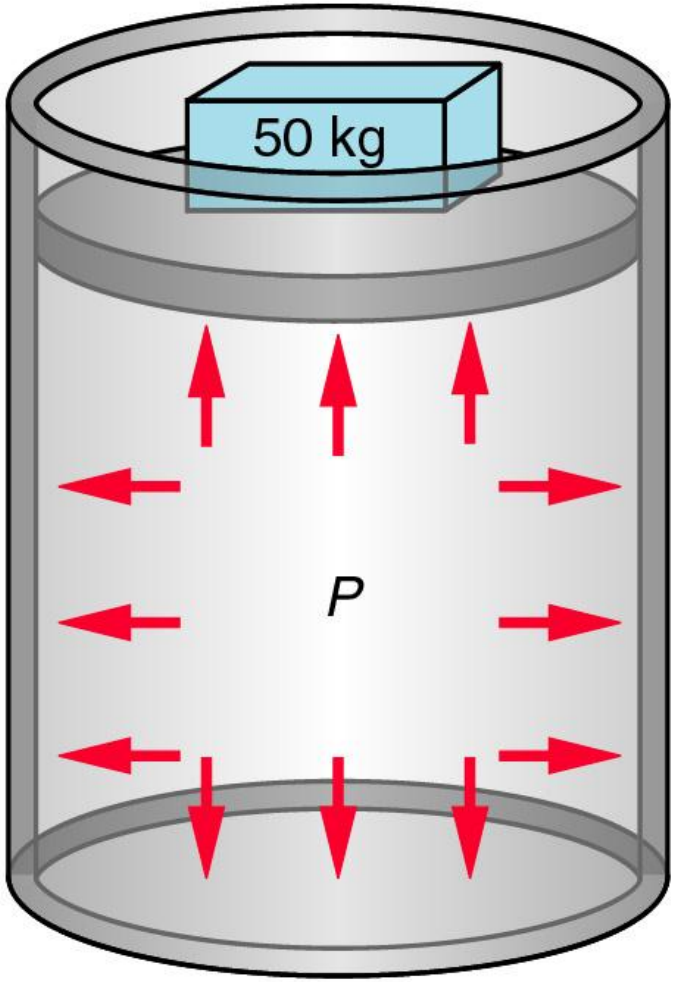
Draw a bottle of water with arrows to illustrate the regular exerted pressure. Then draw a water bottle that you squeeze. What happens to the pressure? What happens if you open the top?

How does Pascal's Principle explain what happens if you squeeze a water bottle?

A force applied to one section of an enclosed liquid at rest will be transferred to the entire liquid with **the same amount of force.**



The pressure exerted on the piston extends uniformly throughout the fluid, causing it to push outward with equal force per unit area on the walls and bottom of the cylinder.



Hydraulic Systems

A force applied to one piston increases the fluid pressure throughout the fluid.

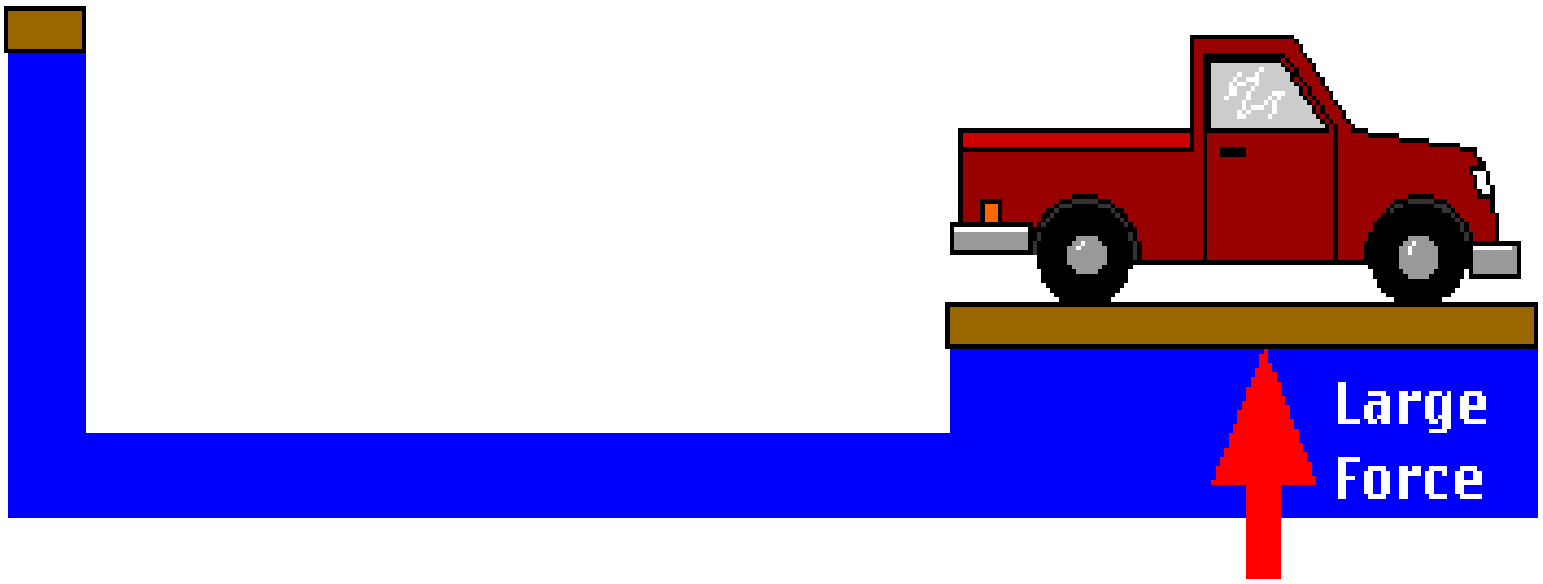
If the second piston has a larger surface area, the force is multiplied!

Pascal's Principle

"The pressure exerted at one surface of an incompressible fluid is equal to the pressure exerted on any other surface."

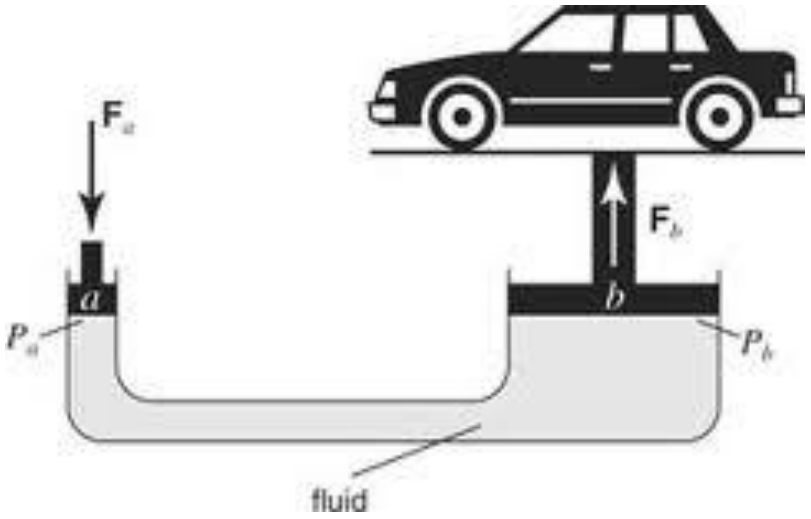
Small Force

This allows a small force applied to a small area to be converted to a large force applied to a large area, as in the hydraulic lift below.



Hydraulic Press Calculation

Pressure = $\frac{\text{Force}}{\text{Area}}$



P=F/A

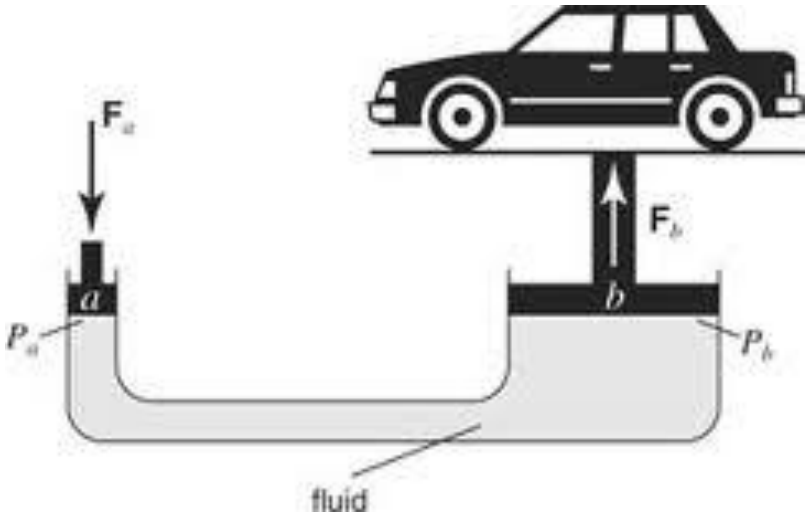
Pressure IN = Pressure OUT

Same thing as ….

Pressure 1 = Pressure 2

Hydraulic Press Calculation

$$\frac{\text{Force(in)}}{\text{Area(in)}} = \frac{\text{Force(out)}}{\text{Area(out)}}$$



Same thing as ….

$$\frac{\text{Force (small)}}{\text{Area (small)}} = \frac{\text{Force (large)}}{\text{Area (large)}}$$

Same thing as ….

$$\frac{\text{Force}_1}{\text{Area}_2} = \frac{\text{Force}_1}{\text{Area}_2}$$

Hydraulic Press Calculation Practice

The small and large pistons of a hydraulic press have areas of 2 cm^2 and 4 cm^2. If the load on the large piston in 3200 N, what is the input force (effort) that must be applied on the small piston?

Hydraulic Press Calculation Practice

Suppose a force of 100 N is applied to a piston with a cross sectional area of .0005 m^2. What would be the force out (F_2) if the size of the piston out was .01m^2?