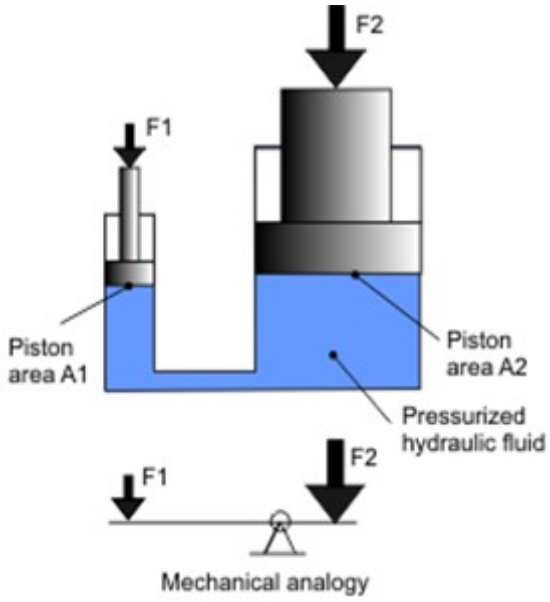
Pascal's Principle
SPH4C

Recall that liquids are _____: their volume remains more or less _____ even if pressure is applied.

Therefore, pressure applied to an enclosed liquid is transmitted to _____ of the liquid and to the _____ of the container. This is known as _____.

Pascal used this principle in the design of a device called the hydraulic _____: a device in which a small force on a small piston is transmitted through an enclosed liquid and applies a _____ force on a _____ piston.

I.e., the pressure (_____) on the small piston equals the pressure (_____) on the large piston:



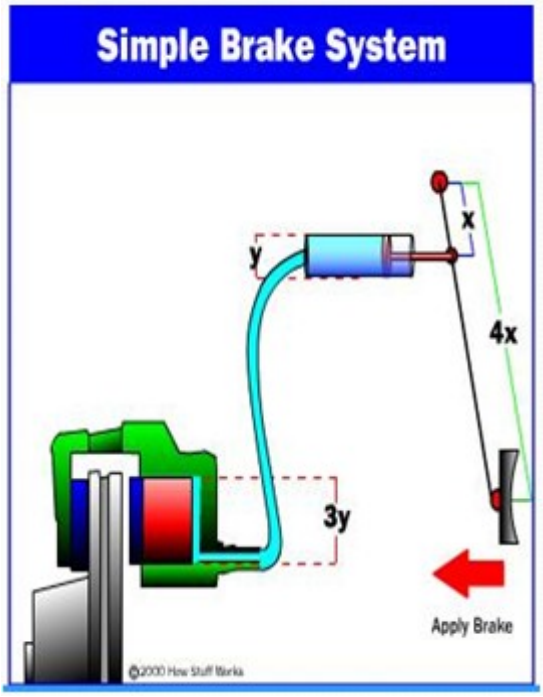
Example:
A force of 14 N is applied to a piston of area 0.01 m^2, which is connected to another piston of area 0.25 m^2. What is the force on the larger piston?

The Ideal Mechanical Advantage (IMA) of the system would be:

& Actual Mechanical Advantage (AMA) of the system would be

However, since the volume of the larger cylinder is obviously larger, the _____ the larger cylinder is displaced is _____.

Car brakes incorporate both levers and hydraulics: the distance from the pedal to the pivot is _____ times the distance from the cylinder to the pivot, so the _____ at the pedal will be _____ by a factor of _____ before it is transmitted to the cylinder (_____ class lever).



The diameter of the brake cylinder is _____ times that of the pedal cylinder, increasing the _____ and therefore the force by a factor of _____.

All together, this system _____ of your foot by a factor of _____.

So if you put 100 N of force on the pedal, _____ will be generated at the wheel squeezing the brake pads.

More Practice

In a hydraulic system with two pistons, piston A is half the diameter piston B.

1. The pressure on piston A is _____ the pressure on piston B.

   A. 1/4 B. 1/2 C. 2 times D. 4 times E. the same as

2. The force on piston A is _____ the pressure on piston B.

   A. 1/4 B. 1/2 C. 2 times D. 4 times E. the same as

3. The ideal mechanical advantage of the system, if the force is applied to piston A is:

   A. 1/4 B. 1/2 C. 1 D. 2 E. 4

4. The ideal mechanical advantage of the system, if the force is applied to piston B is:

   A. 1/4 B. 1/2 C. 1 D. 2 E. 4