Static Pressure

Using PhET – Fluid Pressure and Flow

Before you do this lab, find the basic physics formula for pressure: P = The standard units are:

Open the simulation. Grab the pressure gauge and see what happens to the readings as you lower it from the top of the screen down to just above the water (about 3 meters). Explain why this happens:

Click on the Grid box in the upper-right. Fill the tank. Now lower the pressure gauge from the top of the water to the bottom of the screen (about 3 meters). Explain why this result differs from your previous answer:

Leaving the pressure gauge at the bottom of the screen, discover how the pressure is related to the density (ρ):

Leaving the pressure gauge at the bottom of the screen, discover how the pressure is related to the gravity:

The formula for pressure at depth at sea level is P = 101325Pa + ρgd, where d is depth. Use this formula to calculate the pressure in Pa under 3 meters of water (show your work):

Now switch to the triangular tank using the 2nd window at the upper-left. Slide the pressure gauge sideways along the bottom of the tank. What happens as the gauge goes under the slants? Explain:

Now go to the 3rd window at the upper-left. Put a pressure gauge at the bottom of each tank. What happens to the pressures as the weights are added on the left tank? What is your conclusion?

Remove the weights. This is a hydraulic system like the brake system on your car. The left piston is small like your brake pedal piston and the right piston is large like the piston at your brake pads. Get a ruler and measure the heights of the fluid in each tank. Now add 1000kg to the left and re-measure the heights. Describe and explain:

Work is F*d, where d = (change in height). How much work is done on the left piston? W=

Ideally, all this work is transmitted to the right piston. What force does this piston have? F =

Use this to explain how you apply a small force on your brake pedal and yet you are able to bring a fast 1000kg car to a stop using the hydraulic principle (even without power brakes!):

Now turn off the atmosphere (upper-right box) and describe how the pressure changes as you raise one of the gauges up to the top of the screen:

This is called gauge pressure and is how most pressure gauges work. Before now, all the gauges you used were set to tell you the absolute pressure. Write a formula that converts absolute pressure to gauge pressure:

Which is bigger, gauge pressure or absolute pressure?

This is just an introduction. You need to *practice* to get *better*.