

**Physics 105 Class 17**  
**FLUID MOTION**

**First, a Review of Key Concepts from Last Time**

**Pressure in Solids:**

**Pressure in Fluids:**

## **Physics 105 Class 17**

**Buoyancy:**

**Submerged Objects**

**Partially Submerged Objects**

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### Bernoulli effect:

The pressure in a fluid changes with the \_\_\_\_\_ of the fluid.



### Fluid speeds

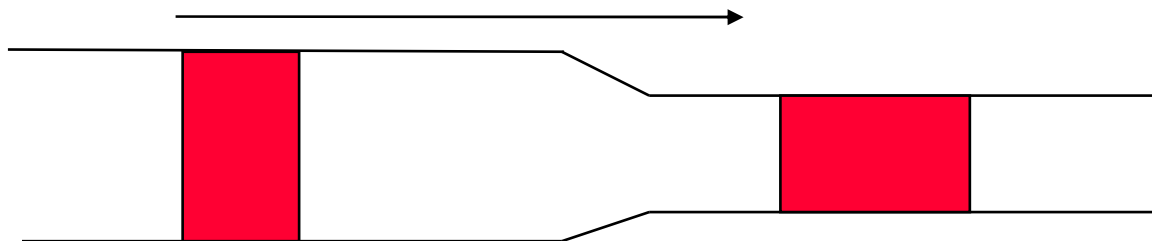
**Volume flow rate:** m<sup>3</sup>/sec past any point:

$$\text{VFR} = \frac{\Delta \text{Volume}}{\Delta t} = \frac{\text{Area } \Delta x}{\Delta t}$$

Assume:

- No friction, viscosity
- Incompressible (constant density)
- No turbulence

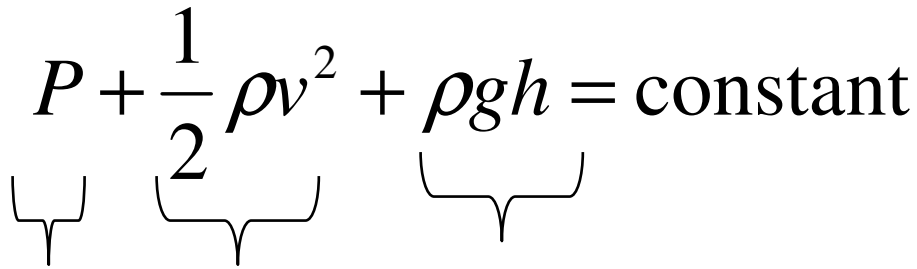
### Conservation of fluid volume



**“Continuity Equation”:**

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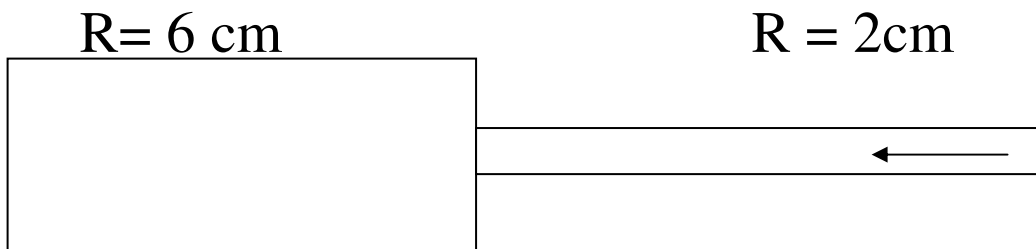
### Bernoulli's equation

$$P + \frac{1}{2} \rho v^2 + \rho gh = \text{constant}$$


W/Vol KE/Vol PE/Vol

or  $P_1 - P_2 =$

Water flows from the little pipe into the big pipe.  
Ignore any friction or height change.

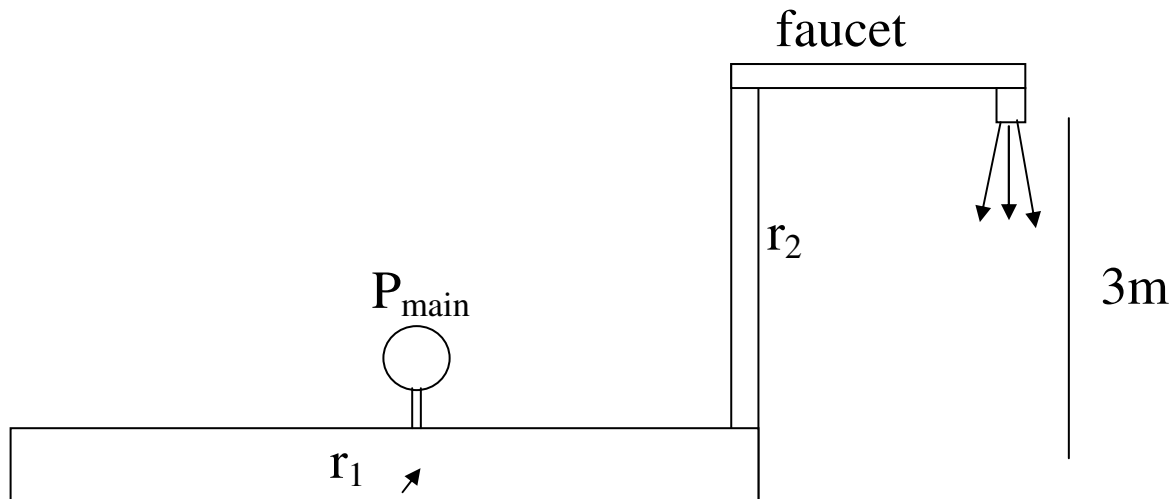


**P1.** The pressure in the right side is \_\_\_\_\_ than on the left

1. greater than
2. same as
3. less than

**P2.** The volume flow rate on the right is \_\_\_\_\_ than on the left. (same answers)

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The faucet of radius  $r_2=2$  cm puts water out at 15 liters/minute. The pressure at the opening of the faucet is assumed to be 1atm. The water main ( $r_1=6$  cm), is 3 meters below the faucet

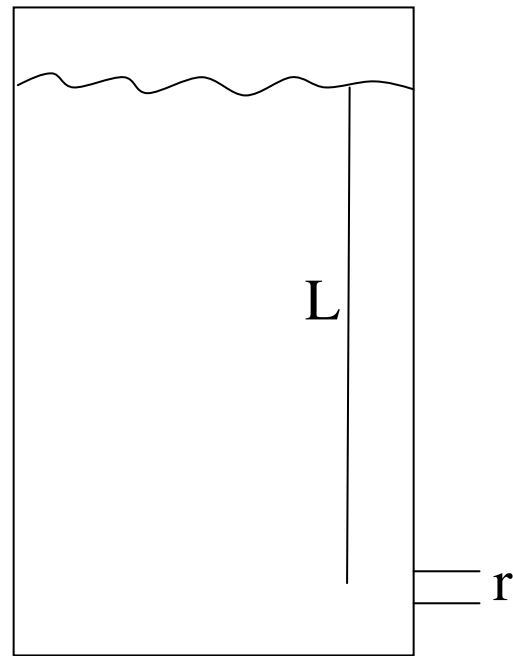
**P4.** The speed  $v$  of the water in the narrow pipe is \_\_\_\_\_ m/s.

What is the pressure in the water main?

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An open water cooler is filled to a level  $L$  above the spout. Assume that the speed of the water in the cooler is negligible (large area).

Find the speed of the water as it leaves (no friction).



Find the volume flow rate.

With friction added?

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### **HOMEWORK HINTS:**