Review of Unit 1–2:

- **Fluid**: substance that can flow.
- A fluid can exert force. Force per unit area is called **pressure**:

$$P = \frac{F}{A}$$

Unit: Pascal = Pa = N/m^2

- **Atmospheric pressure**: average pressure of the atmosphere at the sea level.

1 atm = 1.01×10^5 Pa = 760 mm Hg

- **Absolute pressure**: measured relative to vacuum.
- **Gauge (relative) pressure**: measured relative to the atmospheric pressure.

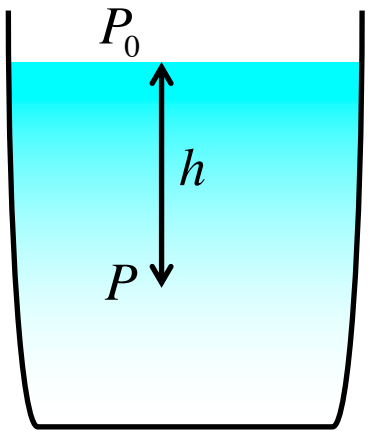
Review of Unit 1–2:

- When a fluid is not moving or moving very slowly, the pressure at a point depends on the depth of that point:

$$P + \rho g h = P_0$$

$\rho =$ density of the fluid

$P_0 =$ pressure at the surface



Note: The pressure does not depend on any horizontal dimension of the fluid or its container.

- **Archimedes' Principle**: a submerged object experiences an upward force in the fluid that is equal to the weight of the fluid displaced

$$F_{bouyant} = \rho g V$$

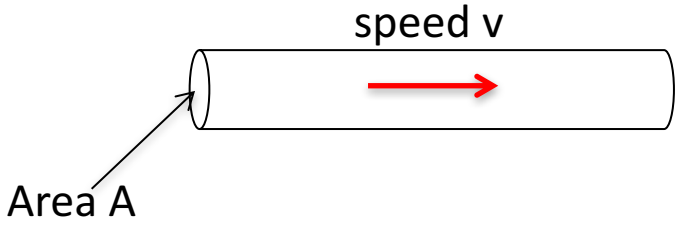
$\rho =$ density of the fluid

$V =$ submerged volume of the object

Review of Unit 1–2:

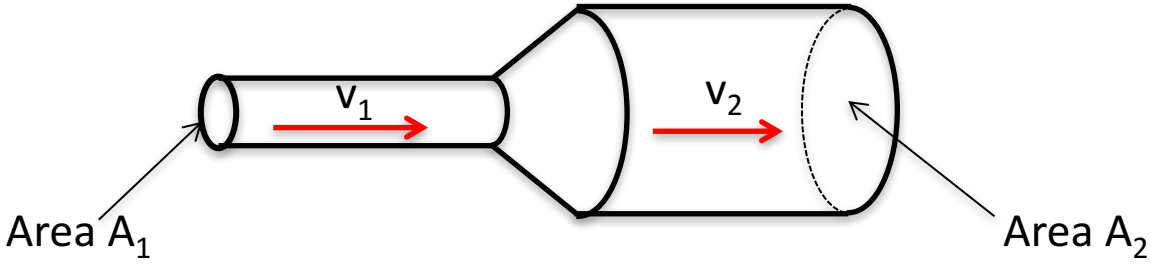
- **Fluid flow**: volume of fluid passing a point per unit time

Mathematically, $f = vA$



- **Conservation of fluid**: flow in = flow out

If the fluid is incompressible, $v_1 A_1 = v_2 A_2$ (continuity equation)



Review of Unit 1–2:

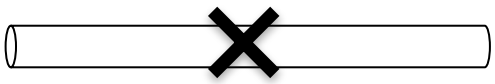
- **Viscosity**: a measure of a fluid's resistance to flow.
- **Non-viscous fluid flow**: water flowing through a tube, etc

$$P_1 + \rho g h_1 + \frac{1}{2}\rho v_1^2 = P_2 + \rho g h_2 + \frac{1}{2}\rho v_2^2$$ Bernoulli's equation

- **Viscous fluid flow**: corn syrup, water flowing through a capillary, etc.

Unlike non-viscous fluid flow, viscous fluid flow requires a pressure difference:

$$f = \frac{\Delta P}{R}$$

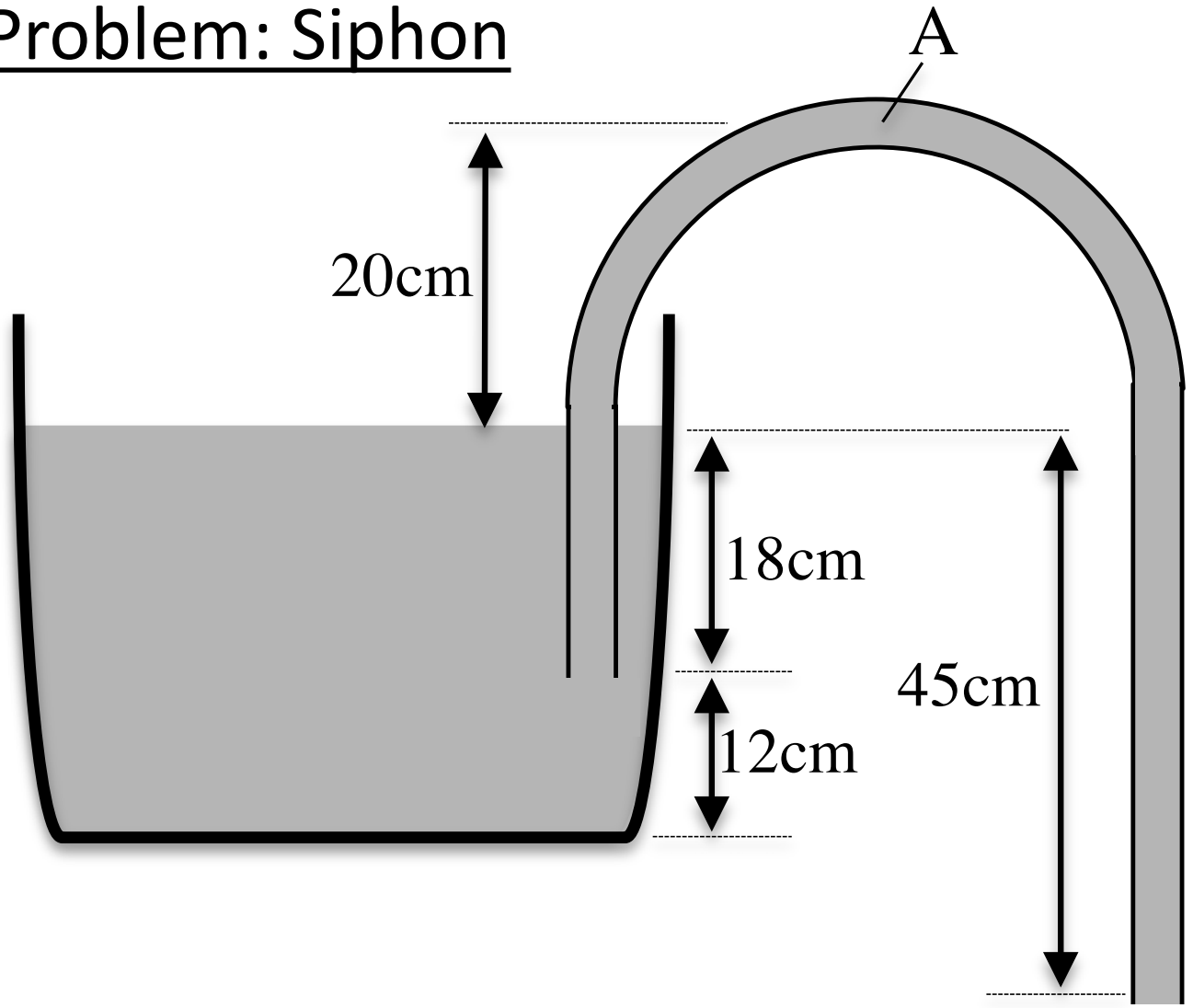


$f =$ flow

$R =$ flow resistance

$\Delta P =$ pressure difference across flow restriction

Practice Problem: Siphon



a) With what speed does the water flow out of the tube?

b) What is the pressure at the highest point of the tube?