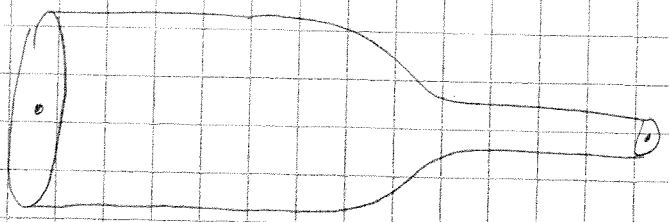
P #D

Ch 9 Worksheet

a) $P_1 = \rho \cdot g \cdot h_1 = (1000\ kg/m^3)(9.8\ m/s^2)(.08\ m) = 784\ Pa$
$P_2 = \rho \cdot g \cdot h_2 = (1000\ kg/m^3)(9.8\ m/s^2)(.05\ m) = 490\ Pa$



$P_1 = 784\ Pa$ $\quad$ $P_2 = 490\ Pa$
$v_1 = 2.40\ m/s$ $\quad$ $v_2 = ?$

$$P_1 + \cancel{\rho \cdot g \cdot y_1} + \frac{1}{2} \cdot \rho \cdot v_1^2 = P_2 + \cancel{\rho \cdot g \cdot y_2} + \frac{1}{2} \cdot \rho \cdot v_2^2$$

$$(784\ Pa) + \tfrac{1}{2}(1000\ kg/m^3)(2.4\ m/s)^2 = (490\ Pa) + \tfrac{1}{2}(1000\ kg/m^3) \cdot v_2^2$$

$$\boxed{v_2 = 2.52\ m/s}$$

b) $A_1 = \pi \cdot r_1^2 = \pi \cdot (1.20\ m)^2 = 4.52\ m^2$
$v_1 = 2.40\ m/s$

$v_2 = 2.52\ m/s$

$$A_1 \cdot v_1 = A_2 \cdot v_2$$

$$(4.52\ m^2)(2.40\ m/s) = A_2 \cdot (2.52\ m/s) \qquad A_2 = 4.31\ m^2$$

$$A_2 = \pi \cdot r_2^2 \qquad (4.31\ m^2) = \pi \cdot r_2^2$$

$$\boxed{r_2 = 1.17\ m}$$

c) Flow rate $= A \cdot v$ (for either Point 1 or Point 2)

$$A_1 \cdot v_1 = (4.52\ m^2)(2.40\ m/s)$$

$$\boxed{\text{Flow Rate} = 10.9\ m^3/s}$$