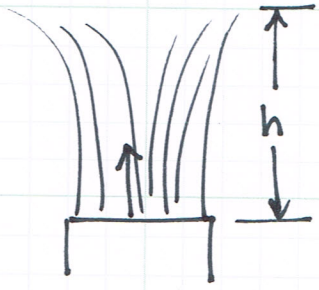
4.49) A water jet issues vertically from a nozzle as shown. The water velocity as it exits the nozzle is 18 m/s. Calculate how high h the jet will rise.

SKETCH:



KNOWN:

$V = 18\ m/s$

UNKNOWN:

$h = ?$

GOVERNING EQN:

$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} + z_1 = \frac{P_2}{\gamma} + \frac{V_2^2}{2g} + z_2$$

SOLUTION

$$\frac{P_1}{\gamma}^{\to 0} + \frac{V_1^2}{2g} + z_1 = \frac{P_2}{\gamma}^{\to 0} + \frac{V_2^2}{2g}^{V_2=0} + z_2$$

$$0 + \frac{(18\ m/s)^2}{2(9.81\ m/s^2)} + z_1 = 0 + 0 + z_2$$

$$z_2 - z_1 = h = \frac{324\ m^2/s^2}{19.62\ m/s^2}$$

$$\boxed{h = 16.5\ m}$$