

①

# How To Size A Pipe

1) Determine the driving force,

(available pressure, or  $\Delta h$  for gravity fed flow)

2) Apply Bernoulli's eq'n (w/ losses!)

For gravity fed flows:

$$g \Delta h = \frac{1}{2} \rho \left( \frac{Q}{A} \right)^2 \left[ 1 + 4 f_f \frac{L}{D} + \sum K \right]$$

↑ head to drive flow
↑ velocity
↑ acceleration
↑ pipe losses
↑ fitting losses

$$A = \frac{\pi D^2}{4}, \quad Re = \frac{UD}{\nu}$$

3) This is solved iteratively!

$$D = \left\{ \frac{8Q^2}{\pi^2} \frac{[1 + 4 f_f \frac{L}{D} + \sum K]}{g \Delta h} \right\}^{1/4}$$

=> Guess some D, calc U & Re &  $f_f$

=> Get a better guess for D from above relation & iterate!