

CHEN.3030 Fluid Mechanics
Short Quiz: The Energy Equation

A pump draws water through a 20 cm diameter suction pipe and discharges it to the atmosphere through a 15 cm diameter pipe. The flow velocity at the exit is 5 m/s. To what height, h , above the water surface at point A can the water be raised if a 35 kW pump is used?

Assume that the pump operates at 70% efficiency and that the head loss, h_L , in the full system is given by

$$h_L = K \left(\frac{v_C^2}{2g} \right)$$

where v_C is the average water speed at point C and $K = 2$ is the loss coefficient.

Recall that the power added to the fluid by a pump is given by

$$P_A = \gamma Q h_A = \rho g Q h_A = \dot{m} g h_A$$

where h_A is the head added by the pump, γ is the specific weight, etc. using standard terminology.

