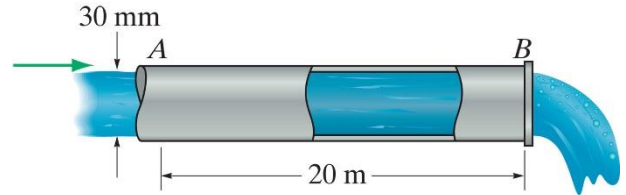


CHEN.3030 Fluid Mechanics
Short Quiz: Pipe Flow Applications

The 30 mm diameter 20 m long commercial steel pipe ($\epsilon = 0.000045$ m) transports water at room temperature. If the pressure at Point A is 200 kPa, determine the volumetric flow rate through the pipe.



Note:

Water properties: $\rho = 1000$ kg/m³ $\mu = 0.001$ N-s/m²

Friction Factor: $f_{\text{lam}} = 64/\text{Re}$ and $\frac{1}{\sqrt{f}} = -1.8 \log_{10} \left(\left(\frac{\epsilon/D}{3.7} \right)^{1.11} + \frac{6.9}{\text{Re}} \right)$ where $\text{Re} = \frac{\rho v D}{\mu}$