47.61 Olive oil has a dynamic viscosity of $40cP$ and a specific gravity of 0.92. What is the kinematic viscosity?

A. $4.3 \times 10^{-5} \frac{ft^2}{s}$

B. $4.7 \times 10^{-4} \frac{ft^2}{s}$

C. $2.0 \times 10^{-3} \frac{ft^2}{s}$

D. $1.7 \frac{ft^2}{s}$

Use the Specific Gravity to determine the density of the oil.

$$SG = \frac{\rho_{oil}}{\rho_{water}}$$

$$\rho_{oil} = SG \cdot \rho_{water} = (0.92)\left(62.4 \frac{lb_m}{ft^3}\right) = 57.4 \frac{lb_m}{ft^3}$$

Use the relation between Kinematic Viscosity and Absolute Viscosity i.e. 'Dynamic Viscosity'. Use Measurement Relationships for required unit conversioins to align with the answer choices.

$$\nu = \frac{\mu}{\rho}$$

$$\nu = \frac{(40cP)\left(2.412 \frac{lb_m}{hr \cdot ft \cdot cP}\right)\left(\frac{1hr}{3600s}\right)}{57.4 \frac{lb_m}{ft^3}} = 4.7 \times 10^{-4} \frac{ft^2}{s}$$

Answer B

47.62 $900gpm$ of a fluid flows through $500ft$ of a $8in$ pipe. The Reynolds number is $80,000$ and the relative roughness is 0.0003. What is the total pressure drop?

A. $2.5ft$

B. $3.5ft$

C. $5.8ft$

D. $8.2ft$

The pressure drop is calculated with the Darcy-Weisbach Equation.

$$h_f = \frac{fLv^2}{2Dg}$$

The Reynolds number and relative roughness are given. Use the Moody diagram to obtain the friction factor.

$$Re = 80,000$$