**46.54** $20gpm$ **of oil with specific gravity 0.88 flows through a valve with a valve coefficient of 4.5. What is the pressure drop across the valve?**

A. $3.9psi$

B. $4.4psi$

C. $17psi$

D. $20psi$

The Valve Flow Coefficient for a fluid other than water is given by the equation below which accounts for the specific gravity. The volume flow rate must be in $gpm$ and the pressure drop must be in $psi$. Rearrange to isolate $\Delta P$, substitute, and solve.

$$C_v = Q\sqrt{\frac{SG}{\Delta P}}$$

$$C_v^2 = Q^2\frac{SG}{\Delta P}$$

$$\Delta P = \left(\frac{Q}{C_v}\right)^2 SG = \left(\frac{20}{4.5}\right)^2 (0.88) = 17.4psi$$

**Answer C**

**46.55** $1000gpm$ **of water is pumped up an incline of** $200ft$**. The suction pressure is** $50psig$ **and the pressure at the extent of the discharge piping is** $250psig$**. The head loss through the discharge piping is** $40ft$**, and losses through the suction piping are negligible. The suction and discharge piping diameters are** $12in$ **and** $8in$**, respectively. How much horsepower is supplied by the pump?**

A. $111hp$

B. $132hp$

C. $177hp$

D. $410hp$

Use the modified Bernoulli Equation for head added by a pump.

$$h_A = \frac{P_2 - P_1}{\gamma} + \frac{v_2^2 - v_1^2}{2g} + z_2 - z_1 + h_f$$

Neglect the velocity term. Use the rule of thumb conversion factor to convert the differential static pressure from $psi$ to $ft$.