**37.44 A 75% efficient fuel pump supplies $50gpm$ of No. 2 diesel fuel ($SG = 0.88$). The differential pressure accross the pump is $30psi$. The motor driving the pump is 82% efficient. What is the electrical demand to run the pump?**

A. $930W$

B. $1.1KW$

C. $1.2KW$

D. $1.4KW$

First determine the hydraulic horsepower produced by the pump, then use the efficiencies to determine the electrical demand to run the pump.

The specific gravity is required only when the differential pressure is given in feet of head. When the pressure added by the pump is already in $psi$, select the formula for Water Horsepower that uses $\Delta P$ directly. For this formula, the units for the flow rate, $Q$, must be $gpm$. The units for differential pressure, $\Delta P$, must be $psi$.

$$whp = \frac{Q\Delta P}{1714}$$

$$whp = \frac{(50)(30)}{1714} = 0.875hp$$

The brake horsepower, $bhp$, is the water horsepower divided by the pump efficiency.

$$bhp = \frac{whp}{\eta_{pump}}$$

The electrical demand, $\dot{W}$, is the brake horsepower divided by the motor efficiency.

$$\dot{W} = \frac{bhp}{\eta_{motor}}$$

By substitition the electrical demand can be expressed as the water horsepower divided by both the pump and motor efficiencies. Calculate the power required to run the pump. Convert units to $KW$.

$$\dot{W} = \frac{whp}{\eta_{pump}\eta_{motor}}$$

$$\dot{W} = \frac{0.875hp}{(0.75)(0.82)}\left(0.7457\frac{KW}{hp}\right) = 1.06KW$$

**Answer B**