36.45 **A 70% efficient pump driven by a 93% efficient motor delivers $150gpm$ of $120°F$ hot water at a head of $40ft$ with a rotational speed of $1800rpm$. The pump runs from 7am-7pm Monday-Friday year round. The average cost of electricity is \$0.12/kWh. What is the annual cost to run the pump?**

A. \$275

B. \$300

C. \$650

D. \$700

Calculate the Water Horsepower.

$$whp = \frac{Q\Delta h}{3960}$$

$$whp = \frac{(150)(40)}{3960} = 1.5hp$$

Calculate the electrical power required to drive the pump by dividing by the pump efficiency and motor efficiency. Convert units from hp to KW.

$$\dot{W} = \frac{whp}{\eta_{pump}\eta_{motor}} = \frac{1.5hp}{(0.7)(0.93)} = 1.7KW$$

Calculate the cost of running based on the power, the annual run time, and the cost of electricity.

$$C = (1.7KW)\left(\frac{12hr}{day}\right)\left(\frac{5days}{wk}\right)(52wks)\left(\frac{\$0.12}{kWh}\right) = \$636$$

Answer C