37.6 The air horsepower produced by a fan is $6.3hp$. The fan has a mechanical efficiency of 80% and the fan motor has an efficiency of 95%. The fan runs for 12 hours per day. What is annual electricity consumption for the fan?

A. $21,000kWh$

B. $27,000kWh$

C. $36,000kWh$

D. $54,000kWh$

To find the electrical consumption, start by finding the electrical demand by dividing the air horsepower by both the fan efficiency and the motor efficiency and converting from hp to KW.

$$\dot{W} = \frac{AHP}{\eta_f \eta_m} = \frac{(6.3hp)\left(0.7457\frac{KW}{hp}\right)}{(0.8)(0.95)} = 6.18KW$$

Find the annual consumption by multiplying the demand by the amount of time the fan runs throughout the year.

$$Consumption = (6.18KW)\left(12\frac{hr}{day}\right)(365days) = 27,074kWh$$

Answer B