Chapter 7 Problem 68

What is the cost of operating a 3.00 W clock for a year.

1 kW·h = $0.0900 (relationship between energy used and cost)

The definition of power is

$$P = \frac{\text{Energy}}{\text{time}} = \frac{E}{t} \rightarrow E = P \cdot t$$

The energy used is then

$$E = 3.00\,W\,(1\,\text{year})$$

Now convert Watts to kilowatts and 1 year to hours

$$E = 3.00\,W \cdot \text{year}\left(\frac{1\,kW}{1000\,W}\right)\left(\frac{365.25\,\text{day}}{1\,\text{year}}\right)\left(\frac{24\,hr}{1\,\text{day}}\right)$$

$$= 26.3\,kW \cdot hr$$

Now apply the conversion factor between energy and cost.

$$E = 26.3\,kW \cdot hr\left(\frac{\$0.0900}{1\,kW \cdot hr}\right) = \boxed{\$2.37}$$