Problem 1.23

A 1.8-kW electric heater takes 15 min to boil a quantity of water. If this is done once a day and power costs 10 cents/kWh, what is the cost of its operation for 30 days?

Solution

Multiply the power by the amount of time it's applied for to get the amount of energy used.

$$W = pt = (1.8 \text{ kW}) \left(15 \text{ min} \times \frac{1 \text{ h}}{60 \text{ min}} \right) = 0.45 \text{ kWh}$$

The amount of energy spent in 30 days is $30W = 13.5$ kWh. Therefore, the cost of operation is

$$13.5 \text{ kWh} \times \frac{\$0.10}{1 \text{ kWh}} = \$1.35.$$