Power Practice Problems

ANSWERS

Name:

Sample Problem 5

Find the cost of operating an oven for 3.0 h if it draws 25 A from a 240-V supply at a rate of 8.5¢/kW·h.

① $P = VI$

$P = 240 \times 25$

$P = 6000 \, W$ or $6 \, kW$

② $\Delta E = P \Delta t$

$\Delta E = 6 \, kW \times 3 \, h$

$\Delta E = 18 \, kWh$

③ COST = $\Delta E \times$ RATE

COST = 18×8.5¢

= $1.53

Sample Problem 1

What is the current drawn by a 1.0×10^2-W light bulb operating at a potential difference of 120 V?

① $I = P/V$

$I = 100/120$

$I = 0.83 \, A$

Sample Problem 2

What is the resistance of a 6.0×10^2-W kettle that draws a current of 5.0 A?

$P = I^2 R$ OR $R = P/I^2 = 600/25$

$R = 24 \, \Omega$

Understanding Concepts

1. A large refrigerator operates at a voltage of 120 V, drawing a current of 4.6 A. What is the power rating of the refrigerator? $552 \, W$

2. Write an equation for each of the following:
   (a) voltage in terms of power and electric current $V = P/I$
   (b) electric current in terms of power and voltage $I = P/V$
   (c) electric resistance in terms of power and electric current $R = P/I^2$
   (d) electric resistance in terms of power and voltage $R = V^2/P$

3. Using a voltage of 1.2×10^2 V, what current do the following draw?
   $1.7A$ (a) a 2.0×10^2-W light bulb   (b) a 1200-W heater $10 \, A$

4. Calculate the resistance of a 360-W hair dryer designed for a 120-V power supply. $40 \, \Omega$

5. The current through a device of resistance 22 Ω is 2.0 A. Find the power rating of the device. $88 \, W$