

P #37

Ch 17 - pg 551

Find energy needed to heat water:

$$m = 1.50 \text{ kg}$$

$$\Delta T = 50.0^\circ\text{C} - 10.0^\circ\text{C} = 40.0^\circ\text{C}$$

$$c = 4186 \text{ J/kg}^\circ\text{C}$$

$$Q = m \cdot c \cdot \Delta T$$

$$= (1.50 \text{ kg}) (4186 \text{ J/kg}^\circ\text{C}) (40.0^\circ\text{C})$$

$$Q = 251,160 \text{ J (Work)}$$

Find P:

$$W = Q = 251,160 \text{ J}$$

$$t = 10.0 \text{ min} = 600 \text{ sec}$$

$$P = \frac{W}{t} = \frac{251,160 \text{ J}}{600 \text{ sec}}$$

$$P = 418.6 \text{ J/sec}$$

Find R:

$$P = 418.6 \text{ Watt}$$

$$V = 120 \text{ V}$$

$$P = I \cdot V \text{ so } 418.6 \text{ W} = I \cdot (120 \text{ V})$$

$$I = 3.49 \text{ A}$$

$$V = I \cdot R \text{ so } 120 \text{ V} = (3.49 \text{ A}) \cdot R$$

$$R = 34.4 \Omega$$