$$P = IV = I^2R = \frac{V^2}{R} \qquad E = Pt = IVt = I^2Rt = \frac{V^2}{R}t$$

Physics **Name _____**

Power & Energy in a Circuit **Date _____**

1. A heater has a resistance of 10.0 Ω. It operates on 120.0V
   a) What is the current through the resistance?

   b) What is the thermal energy supplied by the heater in 10.0 s?

2. What is the current through a 75-W lightbulb connected to a 120-V outlet?

3. A 30.0-Ω resistor is connected across a 60-V battery.
   a) What is the current in the circuit?

   b) How much energy is used by the resistor in 5.0 minutes?

4. A crock-pot, rated at 220 W, is plugged into a 120-V source and left on for 3 hours.
   a) How much energy (in kWh) does the crock-pot use? (1000 W = 1 kW).

   b) If it costs $0.09 for every kilowatt hour, how much does it cost to run the crock-pot?

5. The current through the starter motor of a car is 210 A. If the battery keeps 12 V across the motor, what electrical energy is delivered to the starter in 10.0 s?

6. An electric space heater draws 15.0 A from a 120-V source. It is operated for an average of 5 hours each day.
   a) How much power does the heater use?

   b) How much energy in kWh does it consume in one day? In 30 days?

   c) At $0.11 per kWh, how much does it cost to operate the heater for 30 days?

7. The current through a toaster connected to a 120-V source is 8.0 A. What power is given off by the toaster?

8. The resistance of an electric stove element at operating temperature is 11 Ω.
   a) If 220 V are applied across it, what is the current through the stove element?

   b) How much energy does the element convert to thermal energy in 30.0 s?

9. A lamp draws 0.50 A from a 120-V generator.
   a) How much power is delivered?

   b) How much energy does the lamp convert in 5.0 minutes?

10. A 4000-W clothes dryer is connected to a 220-V circuit. How much current does the dryer draw?

11. A lamp is labeled 6.0 V and 12 W.
   a) What is the current through the lamp when it is operating?

   b) How much energy is supplied to the lamp in 100 seconds?

12. Danielle left for school at 7 a.m. and forgot to turn off her flat iron, which is rated at 170 W when plugged into a 120-V source. She unplugged it when she got home from school at 3 p.m.
   a) How much energy (in kWh) did the flat iron use?

   b) At $0.12 per kWh, how much did it cost to run the flat iron?