Electric Power

- Recall that the rate energy is converted from one form to another is power.

- The unit of power is the watt (or kilowatt).

 So in a units form: Electric power (watts)= current (amperes) x voltage (volts),where 1 watt = 1 ampere x 1 volt.

1. What is the power when a voltage of 120 V drives a 2-A current through a device?

2. What is the current when a 60-W lamp is connected to 120 V?

3. How much current does a 100-W lamp draw when connected to 120 V?

4. If part of an electric circuit dissipates energy at 6 W when it draws a current of 3 A, what voltage is impressed across it?

5. Explain the difference between a kilowatt and a kilowatt-hour.

6. One deterrent to burglary is to leave your front porch light on all the time. If your fixture contains a 60-W bulb at 120 V and your local power utility sells energy at 8 cents per kilowatt-hour, how much will it cost to leave the bulb on for the whole month?

Show your work and include units.

7. A 750 Watt hairdryer is used for 15 minutes. Calculate the kWh used. Calculate the cost to use 15 min. every day for 1 year @ 8 cents/kWh

8. A room has a 60 watt, a 100 watt, and a 150 watt light bulb. How much does it cost to use all of the lamps

for 2.5 hr @ 8 cents/ kWh?

9. A current of 11 Amps @ 240 Volts flows through an electric range. If it is used an average of 1 hour/day:

a. Calculate the watts used by the range.

b. Calculate the kWh used per month.

c. What is the cost to run the range for one month at 8 cents/kWh?

d. What is the cost to run the range for one year at 8 cents/kWh?

10. A 615 watt refrigerator runs 24 hours/day.

a. Calculate the cost to run it for one month (30 days).

b. Calculate the cost to run it for one year (365 days).

11. A bulb is plugged into a 120 Volt outlet. The resistance of the bulbs is 330 ohms.

a. Calculate the current through the bulb.

b. Calculate the watts and kWh.

c. Calculate the cost to run the bulb for 10 hours @ 8 cents/kWh

12. There is a current of 2.0A through a hair-blower that transfers 10800J of energy to the blower in 45s.

A) What is the potential difference across the hair-blower?

B) What is the efficiency of the hair-blower if it does work of 9180J?

13. An electric toaster operating at a potential difference of 120V uses 34 200J of energy during 30s it is on.

A) What is the current through the toaster?

B) What is the efficiency of the toaster if it transfers 29070 J of heat during the 30-s period?

14. What is the useful sound output from a radio of efficiency 50% when supplied with 20J of energy?

15. Calculate the current drawn when a stereo of power 100W is connected to a 230V supply.

16. An electric motor pulls a mass of 4kg up by 3 metres in 5 seconds when supplied with 360J of electrical energy.

A) What is the weight of the mass?

B) How much work does the motor do?

C) What is the power of the motor?

D) What is the percentage efficiency of the motor?

E) What is the power supplied to the motor?