

$$I = \frac{P}{V} = \frac{1200\text{ W}}{120\text{ V}}$$

Review Key Ideas and Vocabulary

- Give an example of a device that converts electrical energy into each of the following types of energy:
 - heat - light
 - kinetic energy - electric car
 - light energy - light bulb.
- A warm cup of coffee has 20 000 J of energy. After being heated in a microwave, the cup of coffee has 70 000 J of energy. How much work was done by the microwave to heat the coffee?
 - 20 000 J
 - 50 000 J
 - 70 000 J
 - 90 000 J
- What is the reading shown by the kilowatt-hour meter dials in Figure 1?

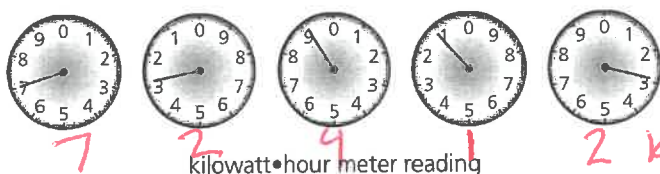


Figure 1

- 72912
 - 72923
 - 83023
 - 73913
- A family uses a 1200 W microwave oven for 30 min. If electrical power costs \$0.063/kW·h, what is the cost to use the microwave oven?
 - \$0.038
 - \$0.43
 - \$2.27
 - \$37.80
 - A watt is to power as a (J) energy is to work.
 - Is a kilowatt-hour a unit of electrical energy or a unit of power? Explain your answer.

Energy.

$$E = P \cdot t$$

$$\text{Joules} = (\text{Watts}) \cdot (\text{seconds})$$

Use What You've Learned

- A hair dryer is rated at 1200 W. How much current flows through the hair dryer when it is plugged into a 120 V outlet? $I = 10\text{ A}$
- Calculate the power rating of an electric toaster that uses 210 000 J while toasting bread for 140 s. $P = \frac{E}{t} = \frac{210000\text{ J}}{140\text{ s}} = 1500\text{ W}$
- How much electrical energy does a 2 W clock use in one day? $E = Pt = (2\text{ W})(86400\text{ s}) = 172800\text{ J}$
- A Segway® Personal Transporter (PT), shown in Figure 2, has two electric motors (one for each wheel) and one 72 V battery. If each motor consumes 180 W of power when travelling up a hill, how much current would the motors get from the battery? $I = \frac{P}{V} = \frac{360\text{ W}}{72\text{ V}} = 5.0\text{ A}$

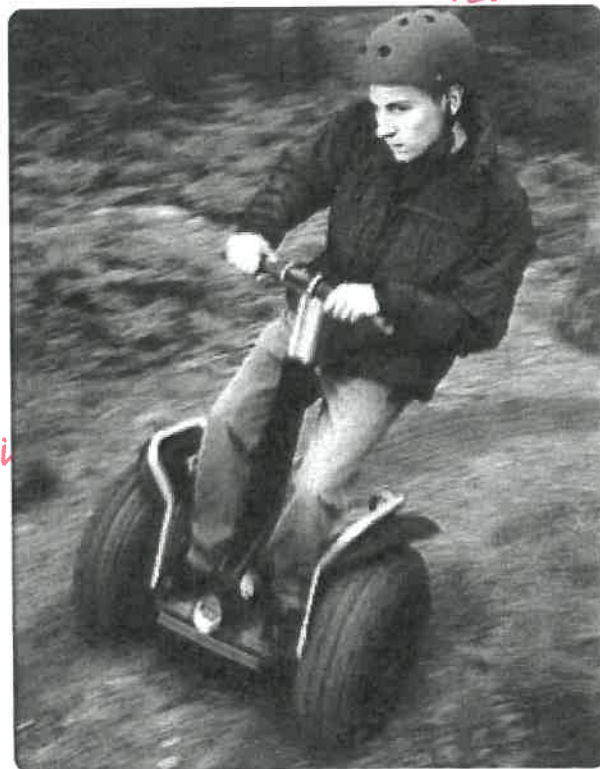


Figure 2

- $$E = VIt = (120\text{ V})(0.55\text{ A})(48\text{ s}) = 3168\text{ J}$$
- An electric drill has a current of 0.55 A flowing through it for 48 s. If the drill is connected to a 120 V outlet, how much energy is used?
 - How much energy does a calculator use in two minutes if it draws 0.2 mA of current from a 2.8 V battery? $E = VIt = (2.8\text{ V})(0.0002\text{ A})(120\text{ s}) = 0.0672\text{ J}$
 - What is the power of a 1.2 kA lightning bolt with a voltage of 1.5 MV? $P = VI = (1500000\text{ V})(1200\text{ A}) = 1.8 \times 10^9\text{ W}$