

Chapter 20 Electricity

Power, Voltage, and Current

The power rating on an electric soldering iron is 40.0 watts. If the soldering iron is connected to a 120-volt line, how much current does it use?

1. Read and Understand

What information are you given in the problem?

$$\text{Power} = P = 40.0 \text{ watts}$$

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

2. Plan and Solve

What unknown are you trying to calculate?

$$\text{Current} = I = ?$$

What formula contains the given quantities and the unknown?

$$P = I \times V; I = \frac{P}{V}$$

Replace each variable with its known value.

$$I = \frac{40.0 \text{ watts}}{120 \text{ volts}} = 0.33 \text{ amps}$$

3. Look Back and Check

Is your answer reasonable?

The answer is reasonable because a soldering iron needs a relatively low current to generate heat.

Math Practice

On a separate sheet of paper, solve the following problems.

1. A steam cleaner has a power rating of 1100 watts. If the cleaner is connected to a 120-volt line, what current does it use?
2. A coffee maker uses 10.0 amps of current from a 120-volt line. How much power does it use?
3. A power mixer uses 3.0 amps of current and has a power rating of 360 watts. What voltage does this appliance require?

**Math Skill:
Formulas and
Equations**

You may want to read more about this **Math Skill** in the **Skills and Reference Handbook** at the end of your textbook.

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WordWise

Match each definition with the correct term in the grid and then write its number under the appropriate term. When you have filled in all the boxes, add up the numbers in each column, row, and the two diagonals. What is surprising about the sums? _____

Definitions

1. A property that causes subatomic particles such as protons and electrons to attract or repel other matter
2. The attraction or repulsion between electrically charged objects
3. Charge transfer without contact between materials
4. Law that total charge in an isolated system is constant
5. A continuous flow of electric charge
6. Material through which charge can easily flow
7. Material through which a charge cannot easily flow
8. The opposition to the flow of charges in a material
9. A circuit in which the charge has only one path through which it can flow
10. An electric circuit with two or more paths through which charge can flow
11. A switch that opens when current in a circuit is too high
12. Information sent as patterns in the controlled flow of electrons through a circuit
13. A smoothly varying signal produced by continuously changing the voltage or current in a circuit
14. A complete path through which a charge can flow
15. A solid-state component with three layers of semiconductors
16. A thin slice of silicon that contains many solid-state components

				Diagonal = _____
integrated circuit _____	induction _____	electric force _____	analog signal _____	= _____
electric current _____	parallel circuit _____	circuit breaker _____	resistance _____	= _____
series circuit _____	electrical conductor _____	electrical insulator _____	electronic signal _____	= _____
law of conservation of charge _____	transistor _____	electric circuit _____	electric charge _____	= _____
= _____	= _____	= _____	= _____	Diagonal = _____

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