

Name: _____

VOLTAGE, CURRENT AND RESISTANCE Worksheet

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

$$R = \frac{V}{I}$$

Units: R is measured in ohms (Ω)
V is measured in volts (V)
I is measured in amperes (A)

1. Solve for the unknown measurement.

a) $I = 10 \text{ A}$ $R = 1500 \Omega$ $V = ?$	b) $I = ?$ $R = 200 \Omega$ $V = 240 \text{ V}$	c) $I = 15 \text{ A}$ $R = ?$ $V = 110 \text{ V}$
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2. Find the unknown quantity (CONVERT to the base unit FIRST, then solve).

a) $I = ?$ $R = 20 \Omega$ $V = 350 \text{ mV} = \text{_____ V}$	b) $R = ?$ $I = 25 \text{ mA} = \text{_____ A}$ $V = 110 \text{ V}$	c) $I = 15 \text{ A}$ $R = 7333 \text{ m}\Omega = \text{_____ } \Omega$ $V = ?$
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WORD PROBLEMS → Be sure to check your units before solving the following questions!

3. How much resistance does a light bulb create if it has a current of 25 mA around it in a 9 V circuit?

$$I = 25 \text{ mA} = \text{_____}$$

$$V = \text{_____}$$

$$R = ?$$

4. How much current flows through a 16 V battery that has a resistance of 5.1Ω ?

5. The human body offers a very small amount of resistance (let's say $1 \text{ m}\Omega$ for argument). If a lightning bolt (said to have 1.21 GV of potential according to a famous movie called *Back to the Future* released in 1984) hits you, how much current is flowing through your body? PS. It takes a mere 50 mA of current to kill a human being.

Resistance and Ohm's Law

Complete the following questions using the equation: $V = I \times R$ or $R = V \div I$ or $I = V \div R$

6. What is the potential difference across an electrical load that has a resistance of $4\ \Omega$ and a current of $3\ \text{A}$ flowing through it?
7. Calculate the current an electric clothes dryer draws when it is connected to a $230\ \text{V}$ source and has a resistance of $9.2\ \Omega$.
8. What is the resistance in a circuit if a potential difference of $110\ \text{V}$ causes a current of $10\ \text{A}$?
9. What is the potential difference across a hand-held fan that has a resistance of $120\ \Omega$ and a current of $50\ \text{mA}$ flowing through it?
10. An electric toaster has a resistance of $12\ \Omega$. What current will it draw from a $120\ \text{V}$ supply?
11. a) A portable radio connected to a $9.0\ \text{V}$ battery draws a current of $25\ \text{A}$. What is the resistance of the radio?

b) What type of energy is the electrical energy from the battery being converted into in this device?
12. A heating coil offers a resistance of $2.5\ \text{k}\Omega$. What potential difference is required so that $1.5\ \text{A}$ of current pass through it?
13. How much resistance does a heavy duty flashlight have if it has a current of $25\ \text{mA}$ flowing through it and is being powered by four $1.5\ \text{V}$ cells?

Answer Key:

- 1a. 15000V
- 1b. 1.2A
- 1c. 7.33Ω
- 2a. 0.175A
- 2b. 4400 Ω
- 2c. 109.995V
- 3. 360 Ω
- 4. 3.14A
- 5. 1.21×10^{21} A
- 6. 12V
- 7. 25A
- 8. 11 Ω
- 9. 6V
- 10. 10A
- 11a. 0.36 Ω
- 11b. sound and heat
- 12. 3750V
- 13. $V_{\text{tot}} = 6\text{V}$, 0.15 Ω