

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 5.1 Ω ?

5. The human body offers a very small amount of resistance (let's say 1 m Ω 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 4Ω and a current of 3 A flowing through it?

7. Calculate the current an electric clothes dryer draws when it is connected to a 230 V source and has a resistance of 9.2Ω .

8. What is the resistance in a circuit if a potential difference of 110 V causes a current of 10 A ?

9. What is the potential difference across a hand-held fan that has a resistance of 120Ω and a current of 50 mA flowing through it?

10. An electric toaster has a resistance of 12Ω . What current will it draw from a 120 V supply?

11. a) A portable radio connected to a 9.0 V battery draws a current of 25 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 A of current pass through it?

13. How much resistance does a heavy duty flashlight have if it has a current of 25 mA flowing through it and is being powered by four 1.5 V cells?

Answer Key:

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