

Name: \_\_\_\_\_

# VOLTAGE, CURRENT AND RESISTANCE Worksheet

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

$$R = \frac{V}{I}$$
 Units: R is measured in ohms ( $\Omega$ )  
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  $\Omega$ ?

5. The human body offers a very small amount of resistance (let's say 1 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       $R = V / I$       or       $I = V / R$

6. What is the potential difference across an electrical load that has a resistance of  $4 \Omega$  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  $9.2 \Omega$ .
  
  
  
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  $120 \Omega$  and a current of  $50 mA$  flowing through it?
  
  
  
10. An electric toaster has a resistance of  $12 \Omega$ . 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  $2.5 k\Omega$ . 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 Ω
- 2c. 109.995V
3. 360 Ω
4. 3.14A
5.  $1.21 \times 10^{21}$ A
6. 12V
7. 25A
8. 11 Ω
9. 6V
10. 10A
- 11a. 0.36 Ω
- 11b. sound and heat
12. 3750V
13.  $V_{tot} = 6V$ , 0.15 Ω