Ohm's Law

Directions: Read online textbook pages 700 – 703. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

1. Which graph best represents the relationship between the potential difference across a conductor and the current through the conductor at constant temperature?

(A)   (B)   (C)   (D)
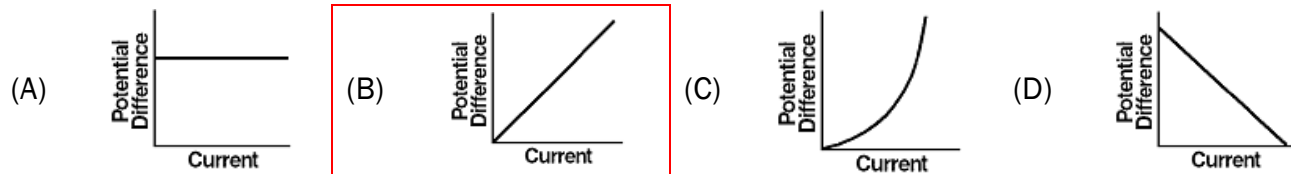
2. A 6.0 ohm resistor that obeys Ohm's Law is connected to a source of variable potential difference. When the applied voltage is decreased from 12 V to 6.0 V, the current passing through the resistor

(A) is doubled   (B) is quadrupled   (C) is halved   (D) remains the same

3. A prototype electric car is powered by a 312 V battery pack. What is the resistance of the motor circuit when 2.8 x 10^5 C passes through the circuit in 1.00 h?

$$R = \frac{V}{I} = \frac{Vt}{q} = \frac{312V(3600s)}{2.8\times10^5 C} = 4.0\Omega$$

$$I = \frac{q}{t} = \frac{2.8\times10^5 C}{3600s} = 78A$$

$$R = \frac{V}{I} = \frac{312V}{78A} = 4.0\Omega$$

4. A team from Texas A&M University has built an electric sports car with an enormous maximum motor current. Determine this current if it can be provided by a 720 V power supply and the circuit resistance is 0.30 Ω.

$$I = \frac{V}{R} = \frac{720V}{0.30\Omega} = 2400A$$

5. When a 62 Ω resistor is connected to a battery, the current in the circuit is 0.39 A. What is the potential difference of the battery?

$$V = IR = 0.39A(62\Omega) = 24V$$

6. An automobile headlight with a resistance of 35 Ω is placed across a 12 V battery. What is the current through the circuit?

$$I = \frac{V}{R} = \frac{12V}{35\Omega} = 0.34A$$

Answers in size order: 0.34, 4.0, 24, 2400