Name: Key

Practice - 20.2 Ohm's Law: Resistance and Simple Circuits

1. The IR drop across a resistor means that there is a change in potential or voltage across the resistor. Is there any change in current as it passes through a resistor? Explain. **No** $I = \frac{V}{R}$ The current depends upon V + R. It is the voltage drop that drives the current.

2. What current flows through the bulb of a 3.00-V flashlight when its hot resistance is 3.60 Ω?

$$I = \frac{V}{R} = \frac{3.00\,V}{3.60\,\Omega} = \boxed{0.833\,A}$$

3. Calculate the effective resistance of a pocket calculator that has a 1.35-V battery and through which 0.200 mA flows.

$$I = \frac{V}{R} \Rightarrow R = \frac{V}{I} = \frac{1.35\,V}{0.200 \times 10^{-3}\,A} = \boxed{6.75 \times 10^{3}\,\Omega}$$

4. What is the effective resistance of a car's starter motor when 150 A flows through it as the car battery applies 11.0 V to the motor?

$$I = \frac{V}{R} \Rightarrow R = \frac{V}{I} = \frac{11.0\,V}{150\,A} = \boxed{7.33 \times 10^{-2}\,\Omega}$$

5. How many volts are supplied to operate an indicator light on a DVD player that has a resistance of 140 Ω, given that 25.0 mA passes through it?

$$V = IR = (25.0 \times 10^{-3}\,A)(140\,\Omega) = \boxed{3.50\,V}$$

6. A. Find the voltage drop in an extension cord having a 0.0600-Ω resistance and through which 5.00 A is flowing.

$V = IR = (5.00 A)(0.0600 \Omega) = \boxed{0.300 V}$

B. A cheaper cord utilizes thinner wire and has a resistance of 0.300 Ω. What is the voltage drop in it when 5.00 A flows?

$V = IR = (5.00 A)(0.300 \Omega) = \boxed{1.50 V}$

C. Why is the voltage to whatever appliance is being used reduced by this amount?

The voltage is fixed coming out of the outlet. A voltage drop in the cord leaves less for the appliance.

7. A power transmission line is hung from metal towers with glass insulators having a resistance of 1.00×10^9 Ω. What current flows through the insulator if the voltage is 200 kV? (Some high-voltage lines are DC.)

$I = \frac{V}{R} = \frac{200 \times 10^3 V}{1.00 \times 10^9 \Omega} = \boxed{2.00 \times 10^{-4} A}$

$= 0.200 mA$