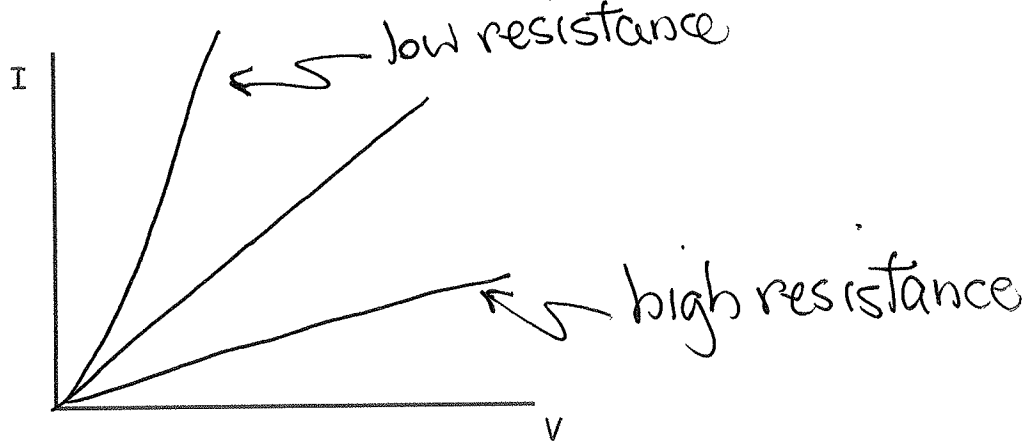
Name: Key

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

1. What drives current? We can think of various devices—such as batteries, generators, wall outlets, and so on—which are necessary to maintain a current. All such devices create a potential difference and are loosely referred to as voltage sources. When a voltage source is connected to a conductor, it applies a potential difference V that creates an electric field, which in turn exerts an electric force on the charges, causing a current to flow.

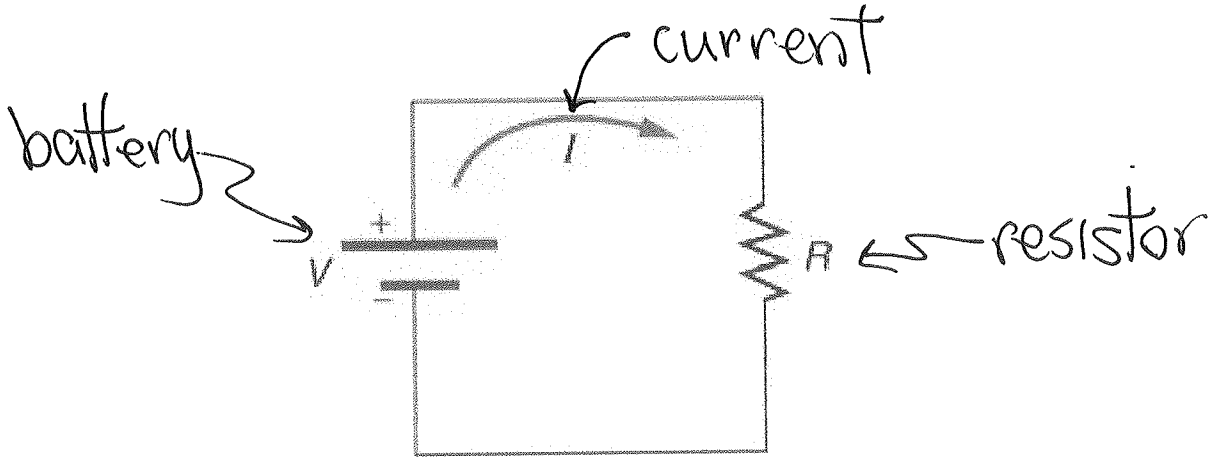
2. The current that flows through most substances is directly proportional to the voltage applied to it. This is known as Ohm's Law.



3. Write the equation for Ohm's Law: $I = \frac{V}{R}$ $(V = IR)$

4. The units for resistance are ohms, Ω.

5.



6. What is the resistance of an automobile headlight through which 2.50 A flows when 12.0 V is applied to it?

$$I = \frac{V}{R} \Rightarrow R = \frac{V}{I} = \frac{12.0\,V}{2.50\,A} = \boxed{4.80\,\Omega}$$

7. Resistances range over many orders of magnitude. Some ceramic insulators, such as those used to support power lines, have resistances of $10^{12}\ \Omega$ or more. A dry person may have a hand-to-foot resistance of $10^{5}\ \Omega$, whereas the resistance of the human heart is about $10^{3}\ \Omega$. A meter-long piece of large-diameter copper wire may have a resistance of $10^{-5}\ \Omega$, and superconductors have 0 resistance at all.

8.

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