Simple Circuit Analysis
Ohm's Law

Lesson 6

EET 150

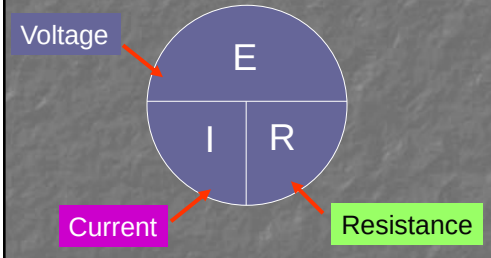
Ohm's Law
Learning Objectives

- In this lesson you will see:
- the mathematical relationship between voltage, current and resistance call Ohm's Law.
- the Ohm's Law circle and use it to find the three forms of the formula
- examples using Ohm's Law to find voltage, current and resistance
- the linear mathematical relationship between voltage and current
- the relationship between current and resistance is non-linear
- low resistance causes current to increase quickly

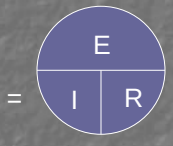
Ohm's Law

Ohm's Law – a mathematical formula that relates voltage, current and resistance

Three forms of Relationship
Ohm's Law Circle



1.) $E = IR$

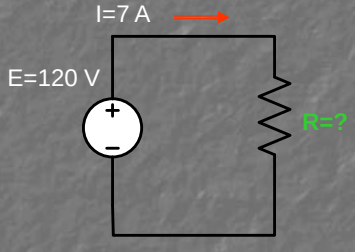


2.) $R = \frac{E}{I}$

3.) $I = \frac{E}{R}$

Ohm's Law
Example Calculations

- An electric heater draws 7 A from a 120 V dc source. What is the resistance of the heater coil?

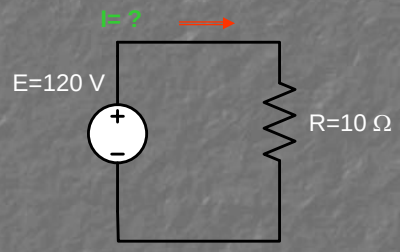


$$R = \frac{E}{I}$$

$$R = \frac{120\ V}{7\ A} = 17.14\ \Omega\ (\text{Ohms})$$

Ohm's Law
Example Calculations

- A water heater has a resistance of 10 Ω. What current will it draw from a 120 V dc source?

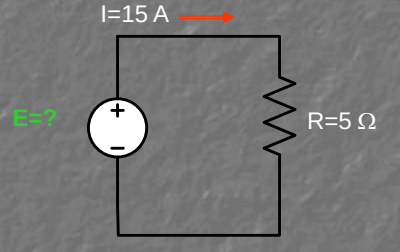


$$I = \frac{E}{R}$$

$$I = \frac{120\ \text{V}}{10\ \Omega} = 12\ \text{A}$$

Ohm's Law
Example Calculations

- An iron draws 15 A and has a 5 ohm heating element resistance. What is the supply voltage to the iron?

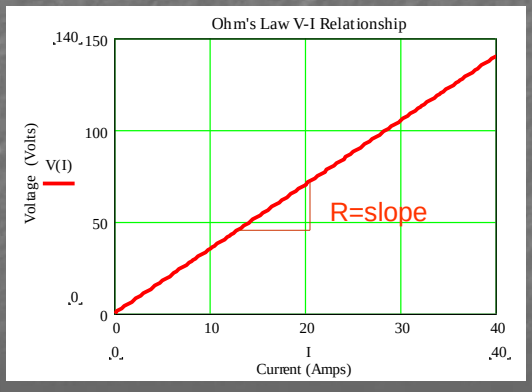


$$E = IR$$

$$E = (15\ \text{A})(5\ \Omega) = 75\ \text{V}$$

Ohm's Law
Voltage-Current Relationship

Voltage is proportional to current (Linear relationship)



$$E = RI$$

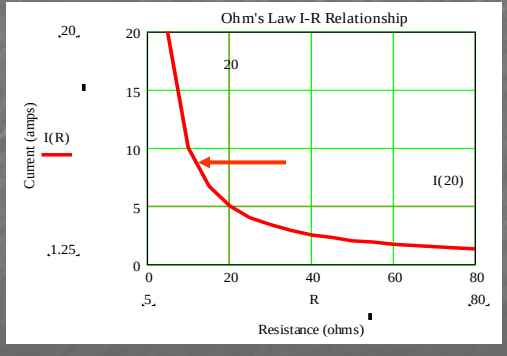
x

y

As current, I increase, voltage, V increases proportionally.

Ohm's Law
Current-Resistance Relationship

Current, I, is inversely proportional to, R, Resistance



$$I = V\left(\frac{1}{R}\right)$$

x

y

As resistance decreases current increases quickly

Note: R=0 is short circuit

End Lesson 6 EET 150

Coming Next: Basic Electric Circuits- Series Connections

SIMPLE CIRCUIT ANALYSIS OHM'S LAW