

Starter #03

Chapter 23

1) **What is electric current?**

Flow of Electric Charge

2) **What is the unit we use for electric current?**

Amperes (Coulombs per Second)

3) **What is electrical resistance?**

Resistance to Electric Current

4) **What is the symbol and name of the unit we use for electrical resistance?**

Greek Letter "Omega" Ω = Ohm (Volts per Ampere)

5) **What is the formula for Ohm's Law?**

$$\text{Current} = \frac{\text{voltage}}{\text{resistance}} \quad I = \frac{V}{R}$$

Quiz #03

Chapter 23

- 1) A water pipe that has a flow of 10 gallons per minute branches off into 2 smaller pipes. One of the pipes flows at a rate of 4 gallons per minute. What is the flow in the other pipe?

$$\begin{aligned}Flow_{total} &= Flow_1 + Flow_2 \\10 &= 4 + Flow_2 \\Flow_2 &= 6 \text{ gal/min}\end{aligned}$$

- 2) In order for anything to flow, what must you have on opposite sides of the circuit, water, pipe, or any other object you wish to create the flow?

A difference in potential across the object

- 3) How much current will pass thru a 12 volt battery if a resistance of 6 ohms is placed on it?

$$I = \frac{V}{R} = \frac{12}{6} = 2 \text{ Amperes}$$

- 4) If a 20 amp current passes thru a circuit with a 120 volt potential, what is the resistance within the circuit?

$$R = \frac{V}{I} = \frac{120}{20} = 6 \text{ Ohms}$$

- 5) How many volts would it take to get a 40 A current thru a 60 Ω resistor?

$$V = IR = 40 \times 60 = 2400 \text{ Volts}$$

Starter #04

Chapter 23

- 1) **What is the difference between DC (direct current) and AC (alternating current)?**

Direct Current = Flow of electrons in one direction

Alternating Current = Flow of electrons alternates directions

- 2) **Why is AC used instead of DC?**

AC can be stepped up and transmitted over large distances with little loss of energy

DC loses large amounts of energy if stepped up and transmitted over large distances

- 3) **What are the two major misconceptions about electricity?**

The speed of electrons in a circuit

The source of electrons in a circuit

- 4) **What is electric power?**

The rate at which electric energy is converted into another form

- 5) **What is the unit of electric power?**

Watt (joules/second)

- 6) **What is the formula for electric power?**

$$\text{Power} = \text{current} \times \text{voltage} \qquad P = IV$$

- 7) **What is the difference between a CFL and an incandescent bulb?**

CFL produces the same amount of light with much less loss of energy to heat, which saves large amounts of energy and they last up to 10 times longer than an incandescent

Quiz #04

Chapter 23

1) **What is the common thing people think cause electrical shock?**

Voltage (volts)

2) **What actually causes electrical shock?**

Current (amps)

3) **What has more resistance, car headlights using 40 W on low beam or the same car headlights using 50 W on high beam?**

40 W on low beam has more resistance

4) **Explain your answer for #3**

Headlights are both using the same voltage, so the 50 W has higher current. Only way to have a higher current using same volts is with less resistance.

5) **How much power is drawn by a curling iron, hooked to a 110 V source drawing 9 A of current?**

$$P = IR = 9 \times 110 = 990 \text{ W}$$

6) **How much energy would the object use in 30 seconds?**

$$W = \frac{J}{s} = \frac{990 \text{ J}}{1 \text{ s}} \times 30 \text{ s} = 29,700 \text{ J}$$

Starter #05

Chapter 23

1) **What is a series circuit?**

Circuit where all devices are connected end-to-end making a single path for electrons

2) **How does the total resistance change in the line as you add resistors in a series circuit?**

Total resistance increases because it is the sum of all resistances

3) **What is a parallel circuit?**

Circuit where devices are connected to the same point, making multiple paths for electrons

4) **How does the total resistance change in the line as you add resistors in a parallel circuit?**

Total resistance decreases because the inverse of the total resistance is the sum of the inverses of all resistances

5) **How do parallel circuits overload?**

If the sum of the parallel currents is equal to or greater than the line current

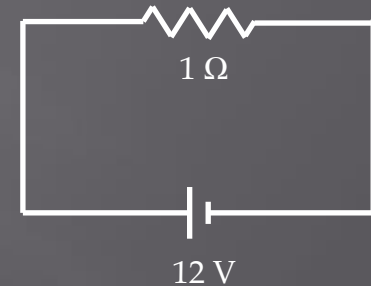
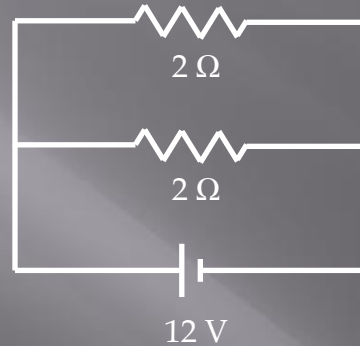
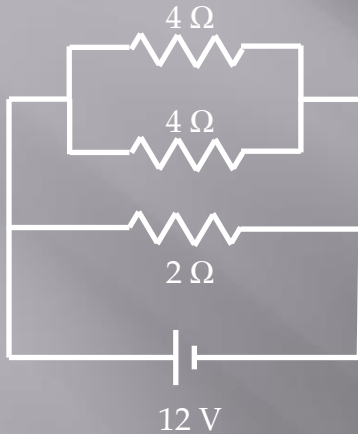
6) **What is the difference between a fuse and a circuit breaker?**

Fuse = Uses a substance that will melt if too much current is drawn, which opens the circuit, stopping the flow of electrons

Circuit Breaker = Detects too much current being drawn, and opens a switch, stopping the flow of electrons

Quiz #05

Chapter 23



- 1) **Simplify the circuit to an equivalent circuit with only one resistor?**

Step #1 = Both 4 Ω resistors in parallel act as a single 2 Ω resistor

Step #2 = Both 2 Ω resistors in parallel act as a single 1 Ω resistor

- 2) **How much current passes thru the battery in the diagram above?**

$$I = \frac{V}{R} = \frac{12\text{ V}}{1\ \Omega} = 12\text{ A}$$

- 3) **How much current passes thru the original 2 Ω resistor?**

$$\frac{1}{2} \text{ of } 12\text{ A} = 6\text{ A} \quad \text{or} \quad I = \frac{V}{R} = \frac{12}{2} = 6\text{ A}$$

- 4) **How much current passes thru the original 4 Ω resistors?**

$$\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } 12\text{ A} = 3\text{ A} \quad \text{or} \quad I = \frac{V}{R} = \frac{12}{4} = 3\text{ A}$$

- 5) **Show the calculation of how the 4 Ω resistors combine to become the new resistor**

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \quad \frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \quad \frac{1}{R_T} = \frac{1}{2} \quad R_T = 2\ \Omega$$