Unit 5

Basic Electrical Units

Jan 29-10:29 AM

Recall

Electrical charge is properties related to electrons and protons (how they behave)

Electrical charge on an electron is negative

Electrical charge on a proton is positive

No electrical charge on a neutron

This is a new note:

The practical unit of electrical charge is a coulomb

1 coulomb = the charge of 6.24×10^{18} e^-

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Current

- Denoted by "I"
- rate of flow of electrons through a conductor

- measured in amperes

* # of e- passing given point in 1 second

1 amper = 1 coulomb

means in 1 second you would see 6.24×10^{18} electrons go by

- is measured by ammeter

ammeter measures electron flow in coulombs per second

machines say AMP

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

if you...

↑V then ↑I

↑V then ↓I

↓R then ↑I

↓R then ↓I

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

if you...

↑V then ↑I

↑V then ↓I

↓R then ↑I

↓R then ↓I

Ex) If 8V and 14V are applied to a 80 Ω resistor. The current flow will:

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

R [illegible]

V [illegible]

then

I [illegible]

R is staying the same

Think fractions

Thus current flow is _____ in the 14 V

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$I = \frac{V}{R}$ if you...

↕V then ↕I

↕V then ↕I

↕R then ↕I

Ex) If 15V and 4V are applied to a 12Ω resistor. The current flow will:

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

R is staying the same
Think fractions

R [illegible]
V [illegible]

then

I [illegible]

Thus current flow is _____in the 4 V

Thus current flow is _____in the 15 V

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Voltage

- Denoted by "V"
- the pressure that FORCES the electrons to flow
- measured in volts
- higher the volt the more dangerous
- ABOVE 30V is considered dangerous
- measured by a Voltmeter

must be connected to a voltage source

batteries are voltage sources

(Think pushing, force that moves electrons)

$V = I R$ if you ↕I then ↕V

↕R then ↕V

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1) What is your voltage if your resitance is 50 Ω and current is 30 apmers?

Multiple choice

2) What happens to voltage if your resitance is changes from 150Ω to 300 Ω?

a) Voltage remains the same

b) Voltage decreases

c) Voltage increases

d) None of the above

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Resistance

- Denoted by "R"
- Oppose to the flow of the current (goes against)
- measured in ohm (Ω)
- measured by an ohmmeter
- due to not wanting to get rid of valence e or the fact e- are bumping into to many other electrons
- depends on the size, type and temperature of material
- resistance causes heat in the conductor

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

↑V cause ↑R

↓V cause ↓R

↑I cause ↓R

↓I cause ↑R

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POWER

- Denoted by "P"
- refers to the amount of electrical energy converted to another form of energy in a given length of time

  For example, the rate at which a light bulb transforms electrical energy into heat and light is measured in watts

- Measured in watts (W)
- Power in an electric circuit is found by the following equation:

$$P = VI$$

where: P is power in watts
V is voltage in volts
I is current in ampers

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Example

An electric blender is rated for 49 V and 5 A. Its power rating would be:

=

=

=

remember units

Feb 3-7:01 PM

Energy

- Denoted by "E"
- Measured in joules (J)
- Energy in an electric circuit is found by the following equation:

$$E = VIt$$

where: E is energy in joules
V is voltage in volts
I is current in ampers
t is time in seconds

- Power companies use the non-SI metric unit of measurement
kWh - kilowatt hour (Used in home meters)

$$E = \frac{Pt}{1000}$$

where: E is energy kWh
P is power in watts
t is time in seconds

Electrical energy can be measures in joules, Kilo-watt hours, watt hours

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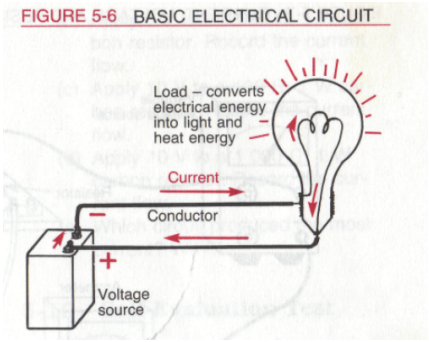
A closed circuit is a complete electric path from one side of a voltage source to another

Consist of source, load and conductor



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Batteries

Dry Cell
-can't be charged

Wet Cell
-can be charged

- Batteries have 2 terminals in which an electrical circuit can be connected to.

- Batteries involve chemical reactions that forces negative "Free electron" to one end of the battery. (and a deficiency of electrons in the other end)

Positive Terminal

has few e-

Negative Terminal

has many e-

- A battery is considered a source of voltage

- When batteries are connected to a conductor, electron will always flow from the negative terminal to the positive terminal.

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Load - is any device that stores electrical energy or changes it into other forms

example) lamp, hair dryer, air condictioner, tv

Conductor - provide a low resistance path from source to load

example) wire

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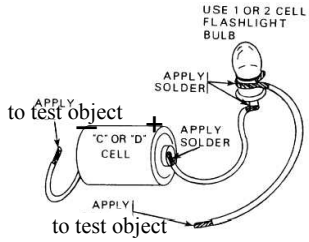
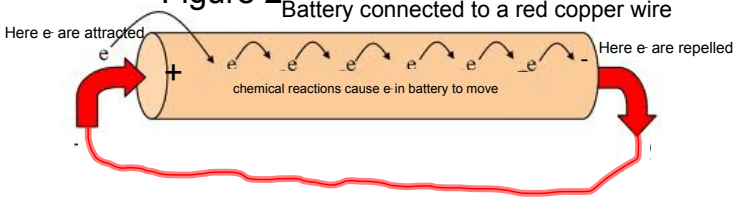
To test Continuity



if light up bright then good conductor

if dull then bad conductor

Figure 2 Battery connected to a red copper wire



Remember copper conducts electricity

You should never connect the battery like above since it can cause a "short circuit" causing the battery to explode. (should connect to conductor piece or resistors)

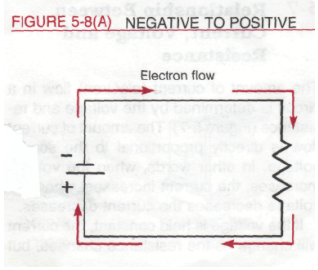
Jan 23-1:51 AM

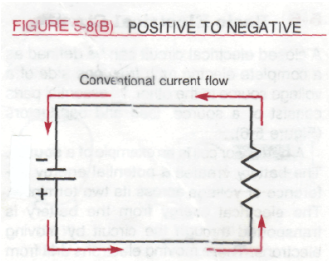
Direction of current flow

The direction of current flow in a curicuit can be marked according to electron flow or conventional flow

electron flow : flows from negative to positive This is what we will use

conventional flow : flows from Positive to negative
fluid flow





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test

last 2
Battery questions can go with unit 5

Current 1-25 in DC Book

also notes to help make up more questions

mc questions

textbook pg 43

Feb 10-4:25 PM