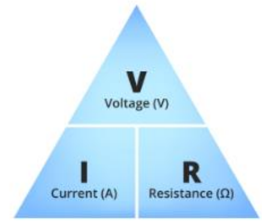
UM AL EMARAT SCHOOL

12 General -Term 2 Review

OHM'S LAW



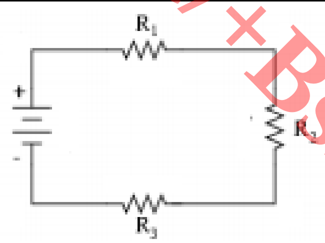
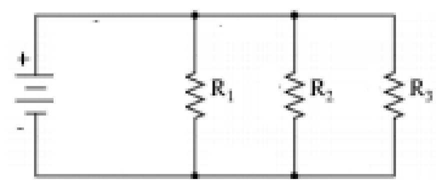
$V = I \times R$

$R = V \div I$

$I = V \div R$

Unit 4-Simple circuits

Important comparison between series and parallel circuits

Series circuit	Parallel circuit
	
There is only one path for the current	There are several paths for the current
The current produced by the battery is the same current passes through each resistor $I = I_1 = I_2 = I_3$	The current produced by the battery is not the same current passes through each resistor $I = I_1 + I_2 + I_3$
The potential difference across the battery is not the same across each resistor $V = V_1 + V_2 + V_3$	The potential difference across the battery is the same across each branch $V = V_1 = V_2 = V_3$
The equivalent resistance is $R_{eq} = R_1 + R_2 + R_3$	The equivalent resistance is $\frac{1}{R_{eq}} = \left[\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right]$
To find the current through the entire circuit $I = \frac{V_{Battery}}{R_{eq}}$ or $I = \frac{V_1}{R_1} = \frac{V_2}{R_2} = \frac{V_3}{R_3}$	To find the current through the entire circuit $I = \frac{V_{Battery}}{R_{eq}}$ To find the current through each branch $I_1 = \frac{V_1}{R_1}, I_2 = \frac{V_2}{R_2}, I_3 = \frac{V_3}{R_3}$
To find the voltage across the battery $V_{Battery} = I \times R_{eq}$ To find the voltage across each resistor $V_1 = I \times R_1,\ V_2 = I \times R_2,\ V_3 = I \times R_3$	To find the voltage across the battery $V_{Battery} = I \times R_{eq}$ Or $V = I_1 \times R_1 = I_2 \times R_2 = I_3 \times R_3$

In series circuits: The equivalent resistance is bigger than the biggest resistance in the circuit. **In parallel circuits:** The equivalent resistance is smaller than the smallest resistance in the circuit.

Kirchhoff's Loop Rule states that the sum of the voltage differences around **the loop** must be equal to ***zero- based on the law of conservation of energy*** ***V=V1+V2***

Kirchhoff's Junction Rule states that In an electric circuit, the **total current into** a junction of that circuit must **equal** the **total current out** of that junction- **based on the law of conservation of charge. I=I1+I2**

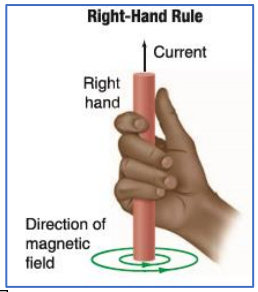
Unit 5-Magnetic fields

FORCE ON A CURRENT-CARRYING WIRE IN A MAGNETIC FIELD
The magnitude of the force on a current-carrying wire in a magnetic field is equal to the product of the current, the length of the wire, the field strength, and the sine of the angle between the current and the magnetic field.

$$F = ILB(\sin\theta)$$

FORCE OF A MAGNETIC FIELD ON A MOVING CHARGED PARTICLE
The amount of force from a magnetic field on a particle equals the product of the particle's charge, its speed, the magnetic field strength, and the sine of the angle between the particle's velocity and the magnetic field.

$$F = qvB(\sin\theta)$$

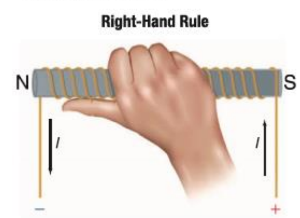


Right Hand Rule 1

If your thumb points in the direction of the conventional (positive) current, as it does in the bottom panel of **Figure 10,** the fingers of your hand encircling the wire will point in the direction of the magnetic field.

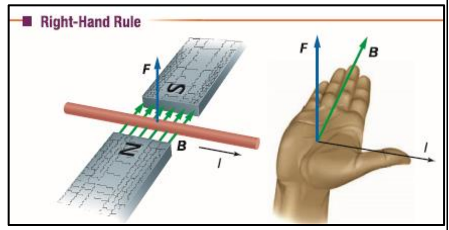
Right Hand Rule 2

Figure 12 Imagine you are holding the solenoid with your right hand. Your thumb will point toward the solenoid's north pole when you curl your fingers in the direction of the conventional current.



Right Hand Rule 3&4

Direction of force You can use a right-hand rule to determine the direction of force on a current-carrying wire in a magnetic field. Point the fingers of your right hand in the direction of the magnetic field. Point your thumb in the direction of the wire's conventional (positive) current. The palm of your hand will face in the direction of the force acting on the wire, as shown in the right part of **Figure 14.**



The direction of the force on a charged particle is perpendicular to that particle's velocity and to the magnetic field. To find the direction of force, you can use the same right-hand rule you use for finding the direction of the force on a current-carrying wire, where the moving charge is the current. If the moving particle is an electron (with a negative charge), the direction of force is reversed.

Quantity	Symbol	Unit
Electric current	I	Ampere(A)
Potential difference	V	Volt(V)
Resistance	R	Ohm(Ω)
Power	P	Watt(W)
Magnetic field	B	Tesla (T)
Velocity	v	Meter per second (m/s)
Length	L	Meter(m)
Force	F	Newton (N)
Charge	q	Coulomb (C)

Multiple	Prefix	Symbol
10^6	mega	M
10^3	kilo	k
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n