Electric current:

\[ I = \frac{Q}{t} \]

and it measured by Amp

Resistance (R):

Resistance is an electric device resist the current flow. and it measured by (Ω)

Electric circuit:

an electric circuit is a different electric devices such as capacitor and resistance connected together with a battery (see figure)

Ohm's law:

is the law describe the relation between the current flow in a circuit and the resistance and the volt.

\[ V = I \times R \]

I , is measured by Amp. (A)

R is measured by ohm (Ω)

V is measured by volt (v)
**Resistance law:**

Series connection \[ R_t = R_1 + R_2 \]

Parallel connection \[ R_t = \frac{1}{R_1} + \frac{1}{R_2} \]

**Capacitor law:**

Series connection \[ C_t = \frac{1}{C_1} + \frac{1}{C_2} \]

Parallel connection \[ C_t = C_1 + C_2 \]
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**Electromagnetism:**

when current flow (I) through a wire it make a magnetic field (H) around the wire

![Diagram of current and magnetic field]

**Effect of current on the skin:**

- 1 mA awareness threshold
- 5 mA max harmless current
- 10-20 mA sustained muscular contraction
- 50 mA Pain
- 100 – 300 mA ventricular fibrillation
- 6000 mA temporary paralysis, possible burns.

**Magnet:**

is a material has the ability to attract metals
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**Magnetic field:**

is the space surround a magnet or wire
Light

Theories of light:

Corpuscular theory:
light consists of particles called “Photons”

Wave theory:
light consists of waves

Waves:
are disturbances have an amplitude A and frequency f and wave length $\lambda$

Amplitude: is the intensity of the disturbance
Frequency: is the no. of cycles per second and it measured by Hz
Wavelength: is the distance between two successive maxima
**Reflection of light:**
is the change of light wave direction at an interface between two media

\[ \theta_i = \theta_r \]

**Refraction of light:**
is the change of light wave direction due to the change in its speed when passes from medium to medium.

\[ \frac{n_1}{n_2} = \frac{\sin \theta_i}{\sin \theta_r} = \frac{v_1}{v_2} \]

**Interference of light:**
is the interfere of two or more light waves.
1-Destructive interference: interference of two out of phase waves

2-Constructive interference: interference of two in phase waves

Examples of interference:
young interference – newton interference
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**Diffraction of light:**

is the bending of light waves around small obstacles.

1-Fraunhofer's diffraction
2-Fresnel diffraction

**Examples of diffraction:**

![Single slit diffraction diagram]

**Optical instruments:**

lenses:

1-convex lens.

![Convex lens diagram]
2-Concave lens

Microscope:

an optical device consists of 4 convex lenses putted together to get large magnification power up to 50 to 100x and it used to see a very small objects.
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**Telescope:**

is an optical device consists of two convex lenses putted together to get a magnification power suited to see far stars and planets.