

## Electric Field and Charge Flow

In this short chapter

- What is Electric
- What is Electric current
- What is Charge
- What is Electric Field
- What is Potential Difference

### Electric

Electric is basically a phenomena where electric charges moves along a two points with difference potential difference

### Electric Current

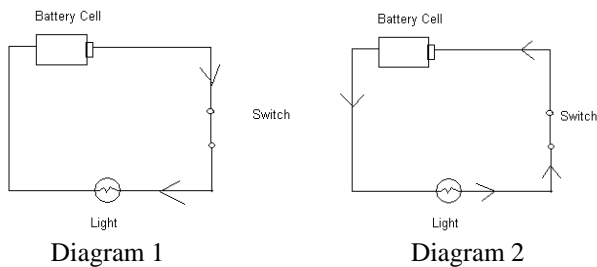


Diagram 1 shows the conventional believe that positive charge flow from the positive terminal to negative terminal. The actual fact is shown in Diagram 2, electrons moves from negative terminal to positive terminals. The flow of electrons forms electric currents.

$$I = \frac{Q}{t}$$

I : Electric Current

Q: Charge

t : time in seconds

Note: The charge of electrons is  $-1.6 \times 10^{-19} \text{ C}$

Electric current is typically number of charge moving a long a close circuit for a given period of time.

### Electric Field

The interesting concept of electric field was derived from what you guys learn in Form 4 with the following equations below:

$$F = G \frac{M_1 M_2}{r^2}$$

The Law of Gravitation basically explains that every object exerts a force on each other. The force is directly proportional to the square of both masses and indirectly proportional to squared of the distance.

Unlike the Electric force, it does not depend on the mass of the object but rely on the charge of the object.

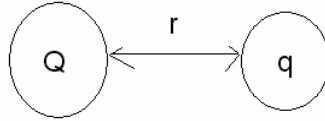
$$F = K \frac{Q \cdot q}{r^2}$$

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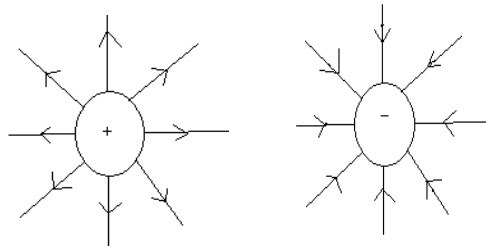
Definition of Electric Field

$$E = \frac{F}{q} \quad \text{E: Electric Field, F: Force, q: Charge}$$

This equation describes Electric field action on the charge Q



Electric Field can be defined as electric force per unit charge. A positive electric charge radii outward while the negative charge radii inward



### Electric Potential

Potential difference can be noted by V, Looking back at the previous chapter on the Gravitational Potential Energy, we can note that

$$PE = mgh = W$$

However, in Electric Potential Energy the formula will be represented as below

$$PE = qEr$$

E: Electric Field , r : distance , q: charge , PE : Potential Energy

Electric Potential can be represented as the work done to move the charge from A to B.

$$PE = QV$$

$$V = \frac{PE}{Q} = \frac{W}{Q}$$

V : Voltage , PE = W : Work done , Q : Charge

Simplified the equation

$$V = \frac{W}{Q}$$