2) Electric field is the region around a charge in which another charge can experience electric force. If the test charge is positive, the direction of electric field and elastic force are the same when the test charge is negative, the direction is opposite electric field is not a single vector quantity but an infinite set of vector quantities associated with each point in space. this is called a vector field.

Therefore, if an electric field exists within a conductor the field exerts a force on every charge in the conductor causing the free charges to move. This explains the theory of electric current flow.

Electric current is the free flow of electric charge

$$\vec{E} = \frac{\vec{F}}{q}$$

where $\vec{E}$ = Electric field

F = force

q = charge.

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1) Newton's second law of motion states that the acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force and inversely proportional to the mass of the object.

Therefore, on entering the field, there is a vertical downward force acting on the electron. This is because electric force acts in the opposite direction so the electric field is directed upward.

The magnitude of the force is given by $F = Eq$, where E is the electric field strength and q is the charge of electron. No force acts horizontally hence the magnitude of acceleration is gotten using

$$F = ma$$

where m = mass, f = force, a = acceleration

$$a = \frac{F}{m} = \frac{Eq}{m}$$

$$\Rightarrow a = \frac{Eq}{m}$$

The direction of a is downward proportional just like the way force f is directed because according newton's 2nd law, Force is directly proportional to acceleration.