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Question 1

Using the Concept of Newton's Second law of motion, describes the magnitude and direction of the acceleration of an electron being short horizontally into a closed ~~system~~ space with a uniform field being directed upward.

Answer to question 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 downwards force acting on the electron, this is because electric force acts in the opposite direction as the electric field and the electric field is directed upward.

The magnitude of the force is given by $F = \mathcal{E}q$, where $\mathcal{E}$ is the electric field strength and q is the charge of the electron, No force acts horizontally. Hence, the magnitude of acceleration ~~a~~ is ~~given~~ gotten using Newton's 2nd law

$F = ma$, where m = mass, F = force, a = acceleration

$$a = \frac{F}{m} = \mathcal{E}\frac{q}{m}$$

$$\boxed{a = \frac{\mathcal{E}q}{m}}$$

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

(2) Describe Electric Field and electric Current with respect to Charges

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 electric force are the same. when the test charge is negative, the direction is opposite. Electric field is not a single vector quantity associated with each point in space, this is called the vector field.

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

Electric current is the flow of electric charge.

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

where $\vec{E}$ = Electric field

F = force

q = charge.