Answer on Question#41356, Physics, Mechanics

Question:

A particle of mass m and charge is placed at rest in a uniform electric field E. If gravity is neglected, its path will be:

(1) Parabolic

(2) Helical

(3) Straight line

(4) Circular

Answer:

Newton's second law of motion:

The acceleration of a body is directly proportional to, and in the same direction as, the net force acting on the body, and inversely proportional to its mass. Thus,

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

If electric field is uniform, acceleration will be directed along straight line, for example axis X:

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

If initial velocity is zero, after time t velocity equals:

$$v = v_x = \frac{Eq}{m}t$$

directed along axis X.

Answer: (3) Straight line