

Answer on Question #45984 – Physics – Electromagnetism

Question.

A uniform electric field of 200 N/C is in the x-direction. A point charge of $3\mu\text{C}$ is released from rest at the origin. What is the kinetic energy of the charge when it is at $x = 4 \text{ m}$?

Given:

$$E = 200 \frac{\text{N}}{\text{C}}$$

$$q = 3 \mu\text{C} = 3 \cdot 10^{-6} \text{ C}$$

$$l = 4 \text{ m}$$

Find:

$$W = ?$$

Solution.

By definition the kinetic energy is:

$$W = F \cdot l$$

We consider that $l = 4 \text{ m}$, because the distance from the origin to $x = 4$ will be 4 meters.

Force, which acts on the charge q by the electric field, is equal to:

$$F = qE$$

So, the kinetic energy of the charge is equal to:

$$W = F \cdot l = q \cdot E \cdot l$$

Calculate:

$$W = 3 \cdot 10^{-6} \cdot 200 \cdot 4 = 2.4 \cdot 10^{-3} \text{ J}$$

Answer.

$$W = q \cdot E \cdot l = 2.4 \cdot 10^{-3} \text{ J}$$