# Answer on Question #45849

A uniform electric field of 200 N/C is in the x-direction. A point charge of 3C is released from rest at the origin. What is the kinetic energy of the charge when it is at x=4 m?
$24 \cdot 10^2 J$
$16 \cdot 10^2 J$
$36 \cdot 10^2 J$
$48 \cdot 10^2 J$

**Solution.**

$$E = 200\frac{N}{C}, q = 3C, x = 4m;$$
$$E_k - ?$$

$E$ – an electric field;

$q$ – an electric charge;

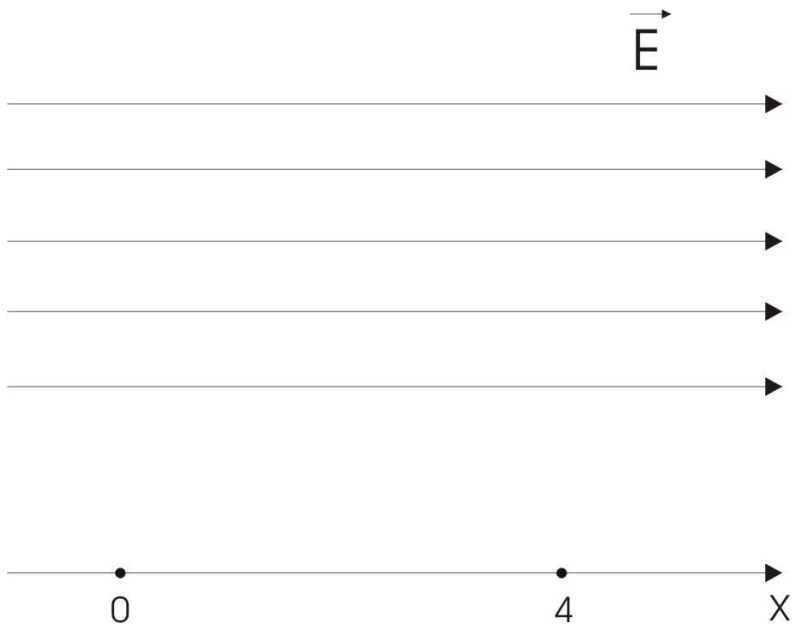
$E_{k0}$ – an initial kinetic energy of the charge;

$E_k$ – a kinetic energy of the charge when it is at x=4 m;

$x_0$ – an initial position of the charge;

$x$ – a final position of the charge;

$W$ – a work produced by the electric field on the movement of a point charge.



The change of the kinetic energy the point charge equal to the work produced by the electric field on the movement of a point charge:

$$\Delta E_k = W;$$

The change of the kinetic energy is:

$$\Delta E_k = E_k - E_{k0}.$$

$E_{k0} = 0$, because a point charge is released from rest.

$$\Delta E_k = E_k;$$

$$E_k = W.$$

A work produced by the electric field on the movement of a point charge:

$$W = Fs,$$

where

$F$ – a force acting on a point charge in an electric field:

$$F = qE.$$

$s$ – a displacement.

$$s = x - x_0,$$

$x_0 = 0$, because a point charge is released from origin.

$$s = x.$$

$$W = qEx.$$

Final for the kinetic energy of the point charge:

$$E_k = qEx.$$

$$E_k = 3C \cdot 200\frac{N}{C} \cdot 4m = 2400J = 24 \cdot 10^2 J\ .$$

**Answer:** $E_k = 24 \cdot 10^2 J.$