

Question 1. A bead with mass $2 \cdot 10^{-2} \text{ kg}$ is moving along a wire in the positive direction of an x axis. Beginning at time $t = 0$, when the bead passes through $x = 0$ with speed 12.0 m/s , a constant force acts on the bead. The figure indicates the bead's position at times $t_0 = 0 \text{ s}$, $t_1 = 1 \text{ s}$, $t_2 = 2 \text{ s}$, and $t_3 = 3 \text{ s}$. The bead momentarily stops at $t = 3 \text{ s}$. What is the kinetic energy of the bead at $t = 10 \text{ s}$?

Solution. Consider the point $t = 3 \text{ s}$: the acceleration must be $a = \frac{\Delta v}{\Delta t} = \frac{-12}{3} = -4 \text{ m/s}^2$. So the particle begins at rest at $t = 3 \text{ s}$.

7 s later at $t = 10 \text{ s}$ we have velocity $v = at = -4 \cdot 7 = -28 \text{ m/s}$.

$$E_k = \frac{mv^2}{2} = \frac{0.02 \cdot (-28)^2}{2} = 7.84 \text{ J}.$$

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