

2, Ch 7-34 0.300 kg cart

cart initially has $\vec{v}_i = 0.600 \hat{i} \text{ m/s} \rightarrow KE_i = \frac{1}{2}mv_i^2 = 0.0540 \text{ J}$

a) get work from graph and use it to figure out change in KE
- area under F vs x curve

$$\text{work by magnet on cart} = (2 \text{ N})(0.01 \text{ m}) = +0.02 \text{ J}$$

$$\Rightarrow KE \text{ after magnet} = 0.074 \text{ J}$$

$$\text{work by sand on cart} = +\frac{1}{2}(-3 \text{ N})(0.07 - 0.03 \text{ m}) = -0.060 \text{ J}$$

$$\Rightarrow KE \text{ after sand would be } +0.014 \text{ J}$$

this is fine, so the cart does roll all the way through

b) Final speed $\frac{1}{2}mv_f^2 = K_f \rightarrow v_f = \sqrt{\frac{2K_f}{m}}$

$$= \sqrt{\frac{2(0.014 \text{ J})}{0.3 \text{ kg}}} = 0.306 \text{ m/s}$$