

Physics 101Rec
 Quiz#5-Sect 06
 Chapter 7

Name: _____

Key

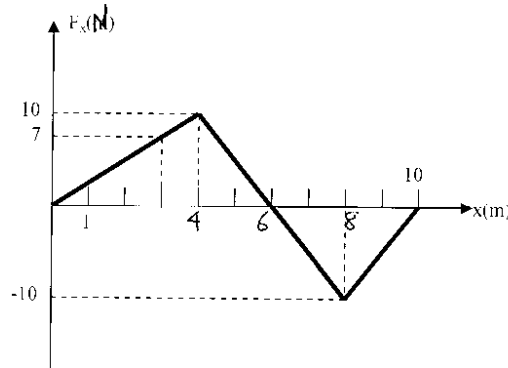
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The only force acting on an object of mass $m = 2.0$ kg as it moves along the x-axis varies as shown in the figure. The object starts from rest at $t = 0$.

- (a) Find the Work done by the force when the object is moved from the origin to $x = 10$ m.

Work = area under the F_x vs. x curve.

$$W = \frac{1}{2} (10 \times 4) + \frac{1}{2} (10 \times 2) - \frac{1}{2} (10 \times 4) = 10 \text{ J}$$



- (b) What is the speed of the object at $x = 10$ m?

$$W = \Delta K = K_f - K_i = \frac{1}{2} m v_f^2$$

$$v_f^2 = \frac{2W}{m} = \frac{2 \times 10}{2} = 10 \Rightarrow v = 3.2 \text{ m/s}$$

- (c) What is the instantaneous power delivered by the force when the object is at $x = 3$ m from the origin?

$$P_{\text{inst}} = F_x v$$

From the graph, at $x = 3$ m $F_x = 7$ N $W = \frac{1}{2} (3 \times 7) = \frac{21}{2} \text{ J} = 10.5 \text{ J}$

$$W = \Delta K = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \Rightarrow v_f = \sqrt{10.5} = 3.2 \text{ m/s}$$

$$P_{\text{inst}} = 7 \times 3.2 = 22.4 \text{ Watts}$$