Solutions to Quiz2, Chapter 2

NOTE! The problems in masteringphysics.com had their numbers altered slightly for each individual student. The solutions below use the same numbers as those used in the book for that problem!

2.12. Solve: (a) Using the equation

$$x_f = x_i + \text{area under the velocity-versus-time graph between } t_i \text{ and } t_f$$

we have

$$\begin{aligned} x(\text{at } t = 1 \text{ s}) &= x(\text{at } t = 0 \text{ s}) + \text{area between } t = 0 \text{ s and } t = 1 \text{ s} \\ &= 2.0 \text{ m} + (4 \text{ m/s})(1 \text{ s}) = 6 \text{ m} \end{aligned}$$

Reading from the velocity-versus-time graph, $v_x(\text{at } t = 1 \text{ s}) = 4$ m/s. Also, $a_x = \text{slope} = \Delta v/\Delta t = 0$ m/s^2.

(b) $x(\text{at } t = 3.0 \text{ s}) = x(\text{at } t = 0 \text{ s}) +$ area between $t = 0$ s and $t = 3$ s

$$= 2.0 \text{ m} + 4 \text{ m/s} \times 2 \text{ s} + 2 \text{ m/s} \times 1 \text{ s} + (1/2) \times 2 \text{ m/s} \times 1 \text{ s} = 13.0 \text{ m}$$

Reading from the graph, $v_x(t = 3 \text{ s}) = 2$ m/s. The acceleration is

$$a_x(t = 3 \text{ s}) = \text{slope} = \frac{v_x(\text{at } t = 4 \text{ s}) - v_x(\text{at } t = 2 \text{ s})}{2 \text{ s}} = -2 \text{ m/s}^2$$