

Chapter 2 Problem 32 †

Given

$$v = 88 \text{ km/h}$$

$$t = 12 \text{ s}$$

Solution

a) Find the acceleration.

First convert the velocity into m/s .

$$v = 88 \text{ km/h} \left(\frac{1 \text{ h}}{3600 \text{ s}} \right) \left(\frac{1000 \text{ m}}{1 \text{ km}} \right) = 24.4 \text{ m/s}$$

From the definition of acceleration

$$\bar{a} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{24.4 \text{ m/s} - 0 \text{ m/s}}{12 \text{ s} - 0 \text{ s}} = 2.03 \text{ m/s}^2$$

b) Find the distance traveled during this time.

Using the kinematic equation relating position with time gives

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$

$$x = 0 \text{ m} + (0 \text{ m/s})(12 \text{ s}) + \frac{1}{2}(2.03 \text{ m/s}^2)(12 \text{ s})^2 = 146 \text{ m}$$

†Problem from Essential University Physics, Wolfson