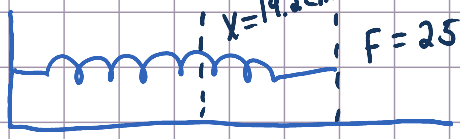
PHYS 1111
Homework 8
Chapter 7 Problems 26, 32, 60, 99, 106

Sunday, November 06, 2011
12:58 PM



$F = kx$

$k = \frac{F}{x} = \frac{25N}{.022m} = 1140\ N/m$

b) $W = \Delta PE = PE_f - \cancel{PE_i}^{0} = \frac{1}{2}kx^2 = \frac{1}{2}(1140\ N/m)(.022m)^2 = .276J$

c) $F = 50N$

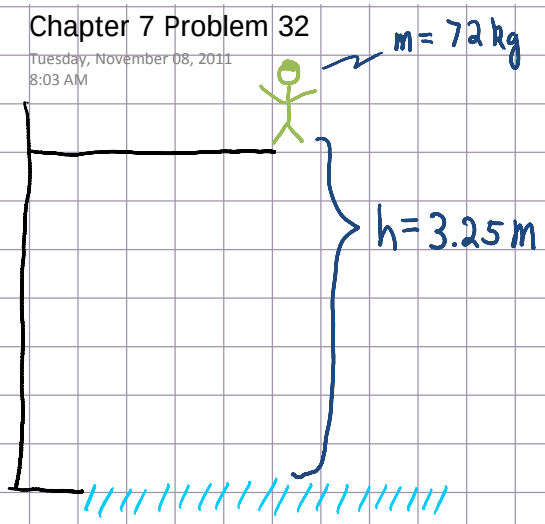
$F = kx$

$x = \frac{50N}{1140\ N/m} = .044m$

total length $= .17m + .044m = .214\ M$

Chapter 7 Problem 32

Tuesday, November 08, 2011
8:03 AM



a) $v_i = 0$

$\Delta KE + \Delta PE = 0$

$KE_f - KE_i + PE_f - PE_i = 0$

$\frac{1}{2}mv_f^2 - mgh_i = 0$

$v_f = \sqrt{2gh_i}$

$v_f = \sqrt{2(9.8\,m/s^2)(3.23\,m)}$

$v_f = 7.98\,m/s$

b) $v_i = +2.5\,m/s$

$\Delta KE + \Delta PE = 0$

$KE_f - KE_i + PE_f - PE_i = 0$

$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 - mgh_i = 0$

$v_f = \sqrt{v_i^2 + 2gh_i}$

$v_f = \sqrt{(2.5\,m/s)^2 + 2(9.8\,m/s^2)(3.23\,m)}$

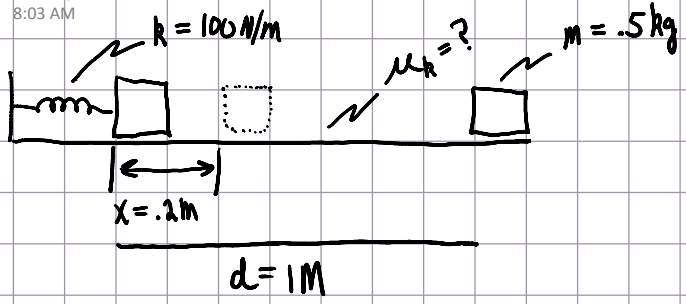
$v_f = 8.36\,m/s$

c) $v_i = -2.5\,m/s$

since v_f depends on v_i^2 the answer will the the same as (b) 8.36 m/s

Chapter 7 Problems 60

Tuesday, November 08, 2011
8:03 AM



$$\Delta KE + \Delta PE = W_t$$

$$\cancel{KE_f}^{\,0} - \cancel{KE_i}^{\,0} + \cancel{PE_f}^{\,0} - PE_i = W_t$$

$$-\tfrac{1}{2}kx^2 = F_k d \cos(180^\circ)$$

$$-\tfrac{1}{2}kx^2 = -\mu_k N d$$

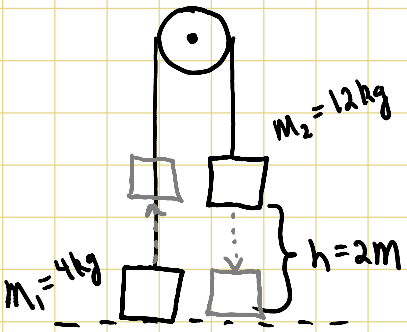
$$\tfrac{1}{2}kx^2 = \mu_k mgd$$

$$\mu_k = \frac{kx^2}{2mgd} = \frac{(100\,N/m)(.2\,m)^2}{2(.5\,kg)(9.8\,m/s^2)(1\,m)}$$

$$\mu_k = .41$$

Chapter 7 Problem 99

Tuesday, November 08, 2011
8:03 AM



$$\Delta KE_1 + \Delta KE_2 + \Delta PE_1 + \Delta PE_2 = 0$$

$$KE_{1f} - \cancel{KE_{1i}}^{0} + KE_{2f} - \cancel{KE_{2i}}^{0} + PE_{1f} - \cancel{PE_{1i}}^{0} + \cancel{PE_{2f}}^{0} - PE_{2i} = 0$$

$$\frac{1}{2} m_1 v_f^2 + \frac{1}{2} m_2 v_f^2 + m_1 g h_f - m_2 g h_i = 0$$

$$\frac{1}{2} v_f^2 (m_1 + m_2) + h_f g (m_1 - m_2) = 0$$

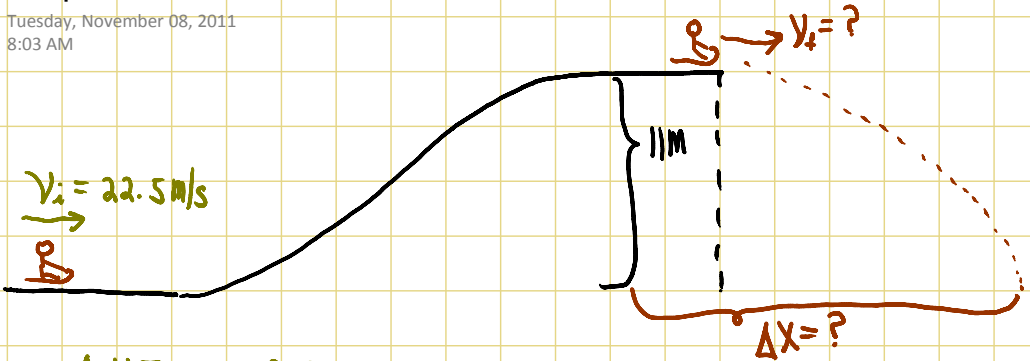
$$v_f = \sqrt{\frac{2 h_f g (m_2 - m_1)}{m_1 + m_2}}$$

$$v_f = \sqrt{\frac{2(2m)(9.8 m/s^2)(12kg - 4kg)}{16kg}}$$

$$v_f = 4.43 m/s$$

Chapter 7 Problem 106

Tuesday, November 08, 2011
8:03 AM



$$\Delta KE + \Delta PE = 0$$
$$KE_f - KE_i + PE_f - PE_i = 0$$
$$\tfrac{1}{2}mv_f^2 - \tfrac{1}{2}mv_i^2 + mgh = 0$$

$$v_f = \sqrt{v_i^2 - 2gh}$$

$$v_f = \sqrt{(22.5 m/s)^2 - 2(9.8 m/s^2)(11 m)}$$

$$v_f = 17.1 m/s$$

$$\Delta x = v_x t$$
$$\Delta y = v_{y_0} t + \tfrac{1}{2} a_y t^2$$
$$t = \sqrt{\frac{2\Delta y}{a_y}} = \sqrt{\frac{2(-11m)}{-9.8 m/s^2}} = 1.5 s$$

So $\Delta x = (17.1 m/s)(1.5 s)$

$\Delta x = 25.6 m$