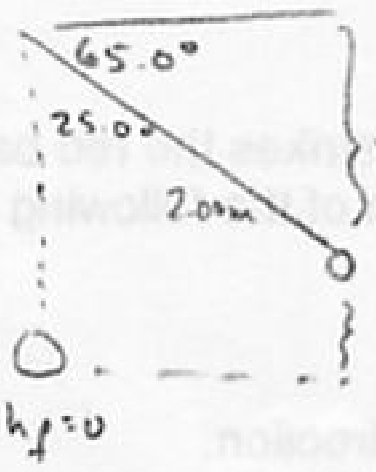
(12)



$\sin 65° = \frac{h_1}{2.00}$ $h_1 = 1.81$

$h_i = 2.00 - 1.81 = .19\,m$

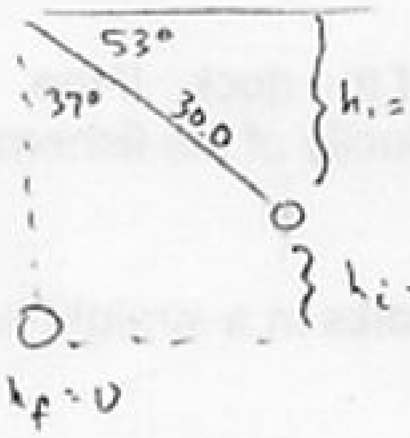
$\frac{1}{2}\cancel{m}v_i^2 + \cancel{m}gh_i = \frac{1}{2}\cancel{m}v_f^2 + \cancel{mgh_f}$

$v_f = \sqrt{2gh_i}$

$= \sqrt{2(9.80)(.19)}$

$\boxed{= 1.9\,m/s}$

(13)



a) $v_i = 0$

$v_f = \sqrt{2gh_i}$

$= \sqrt{2(9.80)(6.0)}$

$\boxed{= 11\,m/s}$

b) $v_i = 4.0\,m/s$

$\frac{1}{2}\cancel{m}v_i^2 + \cancel{m}gh_i = \frac{1}{2}\cancel{m}v_f^2 + \cancel{mgh_f}$

$v_f^2 = v_i^2 + 2gh_i$

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

$= \sqrt{4.0^2 + 2(9.80)(6.0)}$

$\boxed{= 11.6\,m/s}$

(14) $h_i = 1.0\,m$

$v_i = 0$

$\frac{1}{2}\cancel{mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$v_f = \sqrt{2gh_i}$

a) $= \sqrt{2(9.80)(1.0)}$

$\boxed{= 4.4\,m/s}$

b) $v_f = 0$

$Fd\cos\theta = \cancel{\frac{1}{2}mv_f^2} - \frac{1}{2}mv_i^2$

$F = \frac{-\frac{1}{2}mv_i^2}{d\cos\theta}$

$= \frac{-\frac{1}{2}(75)(4.4)^2}{(.0050)(\cos 180°)}$

$\boxed{= 1.45 \times 10^5\,N}$

(17.) $h_i = .32\,m$

$h_f = 0\,m$

$v_i = 0\,m/s$

$\frac{1}{2}\cancel{mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$v = \sqrt{2gh_i}$

$= \sqrt{2(9.80)(.32)}$

$= 2.50\,m/s$

$v_f = 0$

$Fd\cos\theta = \cancel{\frac{1}{2}mv_f^2} - \frac{1}{2}mv_i^2$

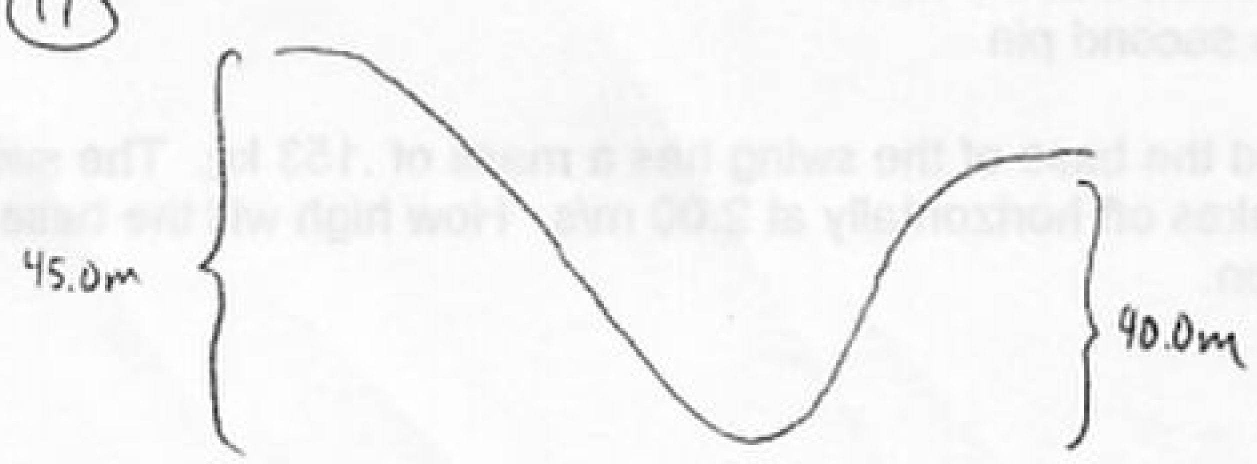
$d = \frac{\frac{1}{2}mv_i^2}{F\cos\theta}$

$= \frac{\frac{1}{2}(.80)(2.50)^2}{(2.0)\cos 180°}$

$\boxed{= 1.3\,m}$

p. 297

(17)



at bottom: $\frac{1}{2}\cancel{mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$v_f = \sqrt{2gh_i}$

$= \sqrt{2(9.80)(45.0)} = \boxed{29.7\,m/s}$

at top: $\frac{1}{2}\cancel{mv_i^2} + \cancel{m}gh_i = \frac{1}{2}\cancel{m}v_f^2 + \cancel{m}gh_f$

$v_f = \sqrt{2(gh_i - gh_f)}$

$\boxed{= 9.90\,m/s}$

(18) KE diver 1: $\cancel{\frac{1}{2}mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$\frac{1}{2}mv_f^2 = (136)(9.80)(3.00)$

$= 4.00 \times 10^3\ J$

In order for diver 2 to have same KE:

$4.00 \times 10^3\ J = mgh_i$

$h_i = \frac{4.00 \times 10^3}{(102)(9.80)}$

$= 4.00\ m$

$4.00 - 3.00 = \boxed{1.00\ m \text{ above the platform}}$

p. 301. (27)

$\cancel{\frac{1}{2}mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$KE_F = 882\ J$

actual KE:

$KE = \frac{1}{2}mv^2$

$= \frac{1}{2}(36.0)(3.0)^2$

$= 162\ J$

$882 - 162 = \boxed{720\ J}$

p. 307 (52)

$\cancel{\frac{1}{2}mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$v^2 = 2gh_i$

$v = \sqrt{2gh_i}$

$\boxed{\text{for } 2v \text{ the hill should be } 4h_i}$

p. 309 (81)

$\frac{1}{2}mv_i^2 + \cancel{mgh_i} = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

$h_i = 2.0\ m$

$v_f = 7.5\ m/s$

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

$= \sqrt{(7.5)^2 - 2(9.80)(2.0)}$

$\boxed{= 4.1\ m/s}$

(82)

$m = 28\ kg$

$h_i = 4.8\ m$

$v_f = 3.2\ m/s$

$\cancel{\frac{1}{2}mv_i^2} + mgh_i = \frac{1}{2}mv_f^2 + \cancel{mgh_f}$

w/o friction:

$KE = mgh$

$= (28)(9.80)(4.8)$

$= 1300\ J$

w/ friction:

$KE_f = \frac{1}{2}mv^2$

$= \frac{1}{2}(28)(3.2)^2$

$= 140\ J$

$1300 - 140 = \boxed{-1200\ J}$