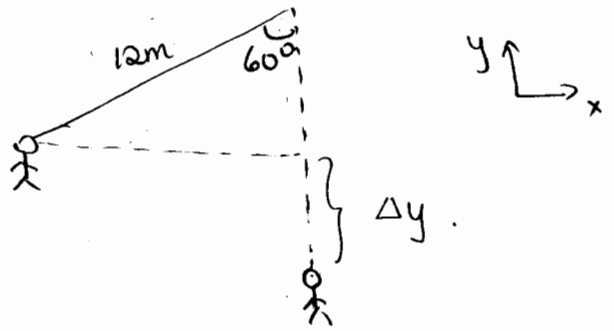
(SP10-1)



-1 error (trig, etc.)
-0.5 sign error.

$\vec{F}_{ww} = mg\hat{j}$ $\quad W_{ww} = \int \vec{F}_{ww} \cdot d\vec{r} = \int_{y_i}^{y_f} mg\, dy$

$= mg\Delta y = (55\text{kg})(9.8\text{m/s}^2)(12 - 12\cos 60°\text{ m})$

$= 3.2\times10^3\text{ J}$ 12.

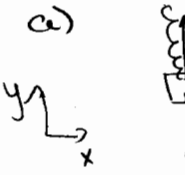
(SP10-2) $|\vec{A}| = \sqrt{1.8^2+3.2^2} = 3.7$

$\angle \vec{A}$ to (+) y-axis: $\tan\phi = \frac{-1.8}{3.2} \Rightarrow \phi = -29°$

(SP10-3) $W_{RC} = -W_{grav} = mg\Delta y$

$P = \frac{W}{\Delta t} = \frac{mg\Delta y}{\Delta t} = \frac{40\text{ kg}\cdot 9.8\text{m/s}^2\cdot 8.3\text{m}}{10\text{ s}} = 5.7\times10^2\text{ W}$

(SP10-4) a)



$\vec{F}_s + \vec{F}_g = 0$

$-ky - mg = 0$

$ky = -mg$ $\quad k = \frac{mg}{-y} = \frac{(5\text{kg})(9.8\text{m/s}^2)}{-(-3.2\times10^{-2}\text{m})}$

$= 1.5\times10^3\text{ N/m}$

$y = \frac{-mg}{k} = \frac{(-2.5\text{kg})(9.8\text{m/s}^2)}{1.5\times10^3\text{ N/m}}$

$= -1.6\times10^{-2}\text{ m}$ 12

$\Rightarrow$ spring stretches (1.6 cm).

b) $W^{ext} = \int_{y_1}^{y_2} ky\, dy = \frac{k}{2}(y_2^2 - y_1^2)^{\nearrow 0} = \frac{1.5\times10^3\frac{N}{m}}{2}(0.060\text{m})^2 = (2.8\text{ J})$ 12

No credit for $W = F\Delta x$ . . . ! Sign -0.5

(SP10-5) a) $W = \Delta K$ $\quad v_i = 0$

$= \frac{1}{2} m v_f^2$

$v_f = \sqrt{\frac{2W}{m}} = \sqrt{\frac{2 \cdot 4 \times 10^3 \text{ J}}{1.5 \times 10^3 \text{ kg}}} = 2.31 \text{ m/s}$ //

b) $W = \int \vec{F} \cdot d\vec{r} = F \Delta x$

$F = W / \Delta x = 4.00 \times 10^3 \text{ J} / 25 \text{ m} = 160 \text{ N}$ //

(SP10-6) $W = \Delta K = \int \vec{F} \cdot d\vec{r} = F \Delta x$

$-\frac{1}{2} m v_i^2 = -\mu m g \Delta x$

$\Delta x = \frac{v_i^2}{2\mu g} = \frac{(.2 \text{ m/s})^2}{2(0.12)(9.8 \text{ m/s}^2)} = 1.7 \text{ m}$ //

(SP10-7)

(a) $W = \int \vec{F} \cdot d\vec{r} = mg \Delta y = (1.25 \times 10^3 \text{ kg})(9.8 \text{ m/s}^2)(30.2 \text{ m})$

$= 3.70 \times 10^5 \text{ J}$ //

$(= K_f.)$.

(b) $\Delta K = -F \Delta x$

$-\frac{1}{2} m v_i^2 = -\mu m g \Delta x$

$\mu = \frac{-\frac{1}{2} m v^2}{-mg \Delta x} = \frac{3.70 \times 10^5 \text{ J}}{(1.25 \times 10^3 \text{ kg})(9.8 \text{ m/s}^2)(21 \text{ m})}$

$= 1.43$ //