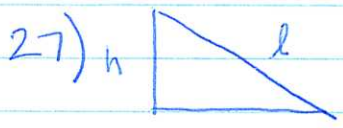


Energy #4

p 223 Problem 27, 30, 79

(4)

p 223 - Problems



mass = m a) $E_o + W = E_f$

$F_f = f$ $K + U_g + W = K$

$v_o = v_i$

$v_f = ?$ $\frac{1}{2}mv_i^2 + mgh - fd = \frac{1}{2}mv_f^2$

(1)

$v_i^2 + 2gh - \frac{2fd}{m} = v_f^2$

$v_f = \sqrt{2gh - \frac{2fd}{m} + v_i^2}$ ← note

b) unit analysis

$$\sqrt{\frac{m}{s^2} \cdot m \quad \frac{kg \cdot m}{s^2} \cdot m}{kg}$$

$$\sqrt{\frac{m^2}{s^2} + \frac{m^2}{s^2}} = \sqrt{\frac{m^2}{s^2}} = m/s$$

4

30) car skids, nearly hits another car
ticket for exceed 35 mi/hr speed limit
Guilty?

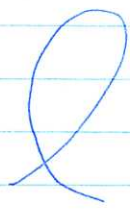
$$\begin{aligned} d &= 18 \text{ m} \\ \mu &= .80 \end{aligned} \quad \textcircled{1} \quad E_o + W_{\text{ext}} = E_p$$
$$K + W = K$$
$$\frac{1}{2}mv^2 = W \quad \frac{1}{2}mv^2 = \mu F_N d$$
$$\frac{1}{2}mv^2 = Fd \quad \frac{1}{2}mv^2 = \mu mgd$$
$$v^2 = \sqrt{2\mu gd}$$
$$= \sqrt{2(.80)(9.81 \text{ m/s}^2)(18 \text{ m})}$$
$$= 16.8 \text{ m/s}$$

(1)

$$\textcircled{2} \quad \frac{16.8 \text{ m}}{\text{s}} \left(\frac{1 \text{ mi}}{1609 \text{ m}} \right) \left(\frac{3600 \text{ s}}{1 \text{ hr}} \right) = 37.6 \text{ mi/hr}$$

③ No, I cannot defend the driver
a) Yes I agree w/ police woman

P 226 79)

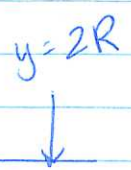


$r = 10\text{m}$ loop the loop
 $v = 24\text{ m/s}$ at bottom

$F_N = ?$ at top loop
 $m = 80\text{kg}$

① $E_o = E_f$
 $K = U_g + K$

$$\frac{1}{2} m v_{\text{bottom}}^2 = mgh + \frac{1}{2} m v_{\text{top}}^2$$



$$v_{\text{top}} = \sqrt{v_{\text{bottom}}^2 - 2gy} = \sqrt{v_{\text{bottom}}^2 - 2g(2R)}$$
$$= \sqrt{(24\text{ m/s})^2 - 2(9.81\text{ m/s}^2)(2(10\text{ m}))}$$

(2)

$$= 13.5\text{ m/s}$$

② $\sum F = ma$ $F_g + F_N = \frac{mv^2}{r}$



$$F_N = \frac{mv^2}{r} - F_g$$
$$= \frac{(80\text{ kg})(13.5\text{ m/s})^2}{10\text{ m}} - (80\text{ kg})(9.81\text{ m/s}^2)$$
$$= 670\text{ N}$$