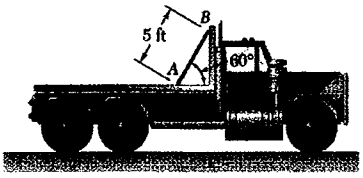
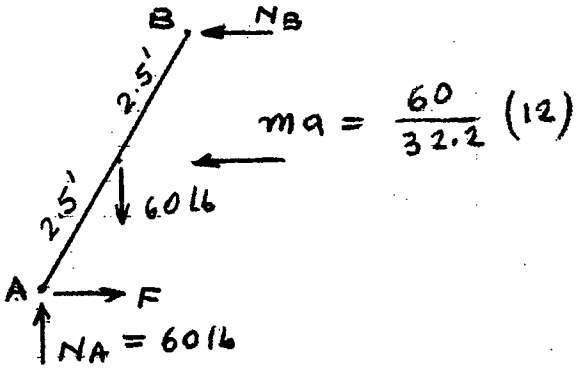


PROBLEM 16.3

A 60-lb uniform thin panel is placed in a truck with end A resting on a rough horizontal surface and end B supported by a smooth vertical surface. Knowing that the deceleration of the truck is 12 ft/s^2, determine (*a*) the reactions at ends A and B, (*b*) the minimum required coefficient of static friction at end A.

SOLUTION



$$+\circlearrowleft \Sigma M_A = N_B(5\text{ ft})(0.866) - (60\text{ lb})(2.5\text{ ft})(0.5)$$

$$= \frac{(60\text{ lb})}{32.2\text{ ft/s}^2}(12\text{ ft/s}^2)(0.866)$$

$$N_B = 28.501\text{ lb}$$

$$\overset{+}{\leftarrow} \Sigma F_x = N_B - F = \frac{60\text{ lb}}{32\text{ ft/s}^2}(12\text{ ft/s}^2)$$

$$F = 6.1404\text{ lb}$$

(*a*) $$R_A = \sqrt{N_A^2 + F^2} = 60.3133\text{ lb}$$

or $R_A = 60.31\text{ lb} \angle 84.2°$ ◀

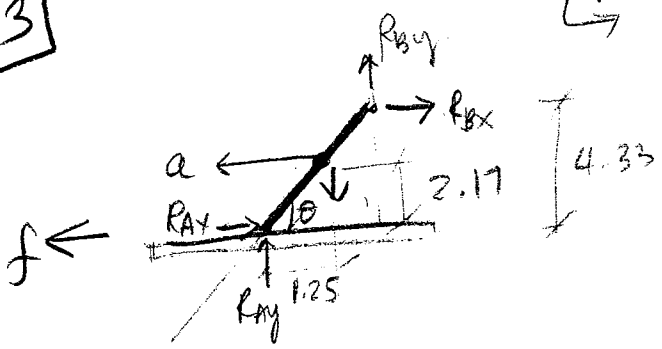
$$\alpha = \tan^{-1}\frac{60.3133}{6.1404} = 84.18°$$

and $N_B = 28.5\text{ lb} \leftarrow$ ◀

(*b*) $$\mu = \frac{F}{N_A} = \frac{6.1404}{60} = 0.10234$$

or $\mu = 0.1023$ ◀

16.3



$a = 12\ ft/s^2$

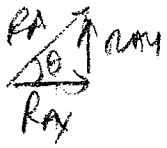
find R_A, R_B, μ_k at A

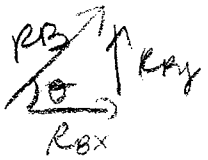
$\theta = 60$, $\ell = 5'$

$W = 60\ lb$

$R_{Ax} = R\cos\theta$

$R_{Ay} = R\sin\theta$





- $\Sigma F_y = R_A\sin\theta + R_B\sin\theta - W = 0$

$$(R_A + R_B)\sin\theta = +W$$

$$\frac{W}{\sin\theta} = \frac{60}{\sin 60} = 69.28$$

- $\Sigma F_x = ma_x = -f + R_A\cos\theta + R_B\cos\theta = \frac{60}{32.2}(-12)$

$$-f + R_A + R_B = \frac{60(-12)}{32.2\cdot\cos\theta} = -44.72$$

- $\Sigma M_A = 0$ (+ ↺) $\quad (2.5)(R_{By}) - (4.33)(R_{Bx}) - W(1.25) = 0$

$$2.5(R_B\sin\theta) - 4.33(R_B\cos\theta) - 60(1.25) = 0$$

$$R_B = 1.18$$

→ $-f + R_A + 1.18 = -44.72$

→ $R_A = 69.28 - R_B = 68.1$

$-f = -44.72 - 1.18 - 68.1 = -114$