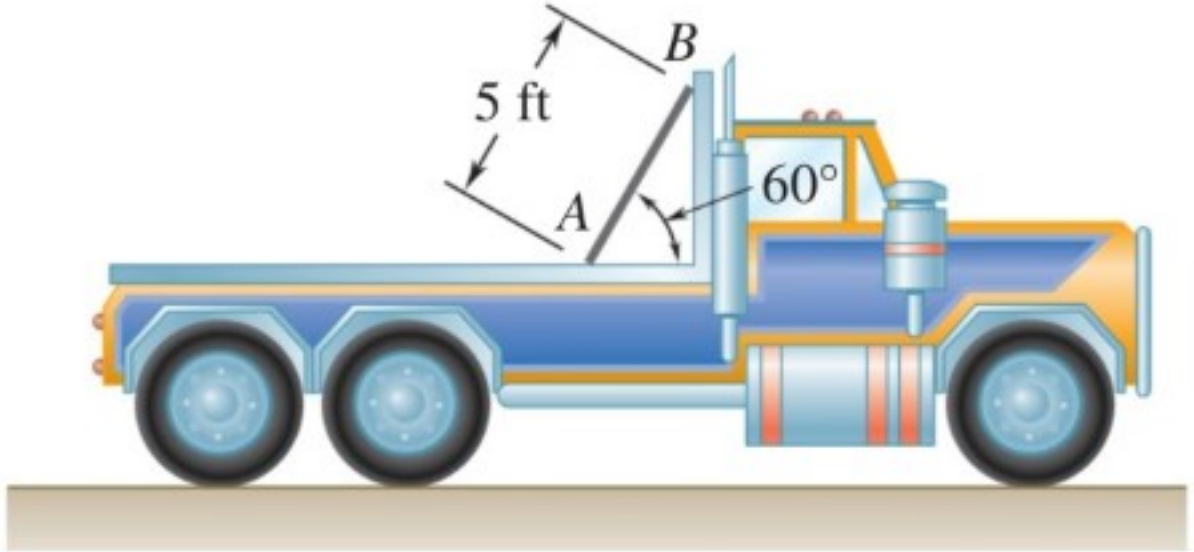
A 60-lb uniform thin panel is placed in a truck with end *A* resting on a rough horizontal surface and end *B* supported by a smooth vertical surface. Knowing that the panel remains in the position shown, determine (*a*) the maximum allowable acceleration of the truck, (*b*) the corresponding minimum required coefficient of static friction at end *A*.



$F = \mu N$

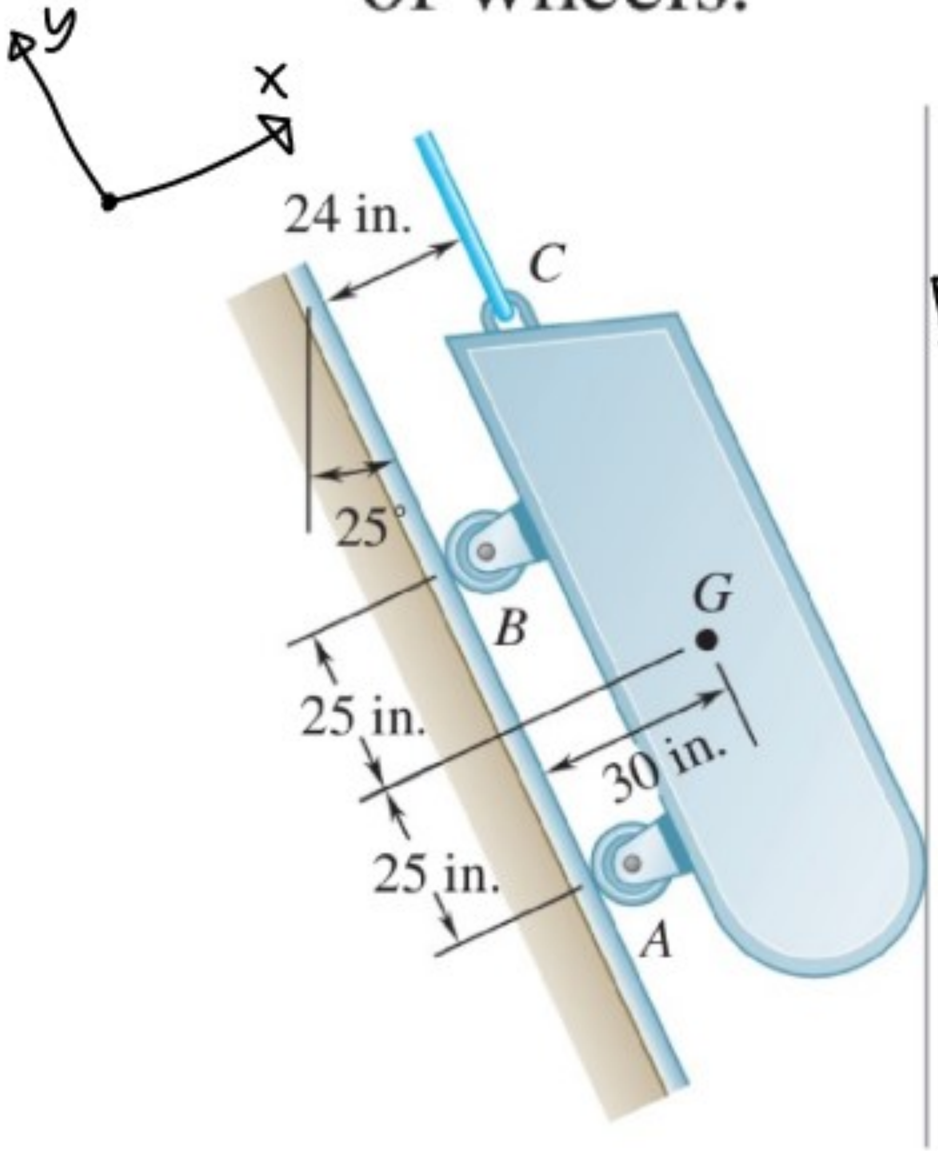
$R_{Ax} = \mu R_{Ay}$

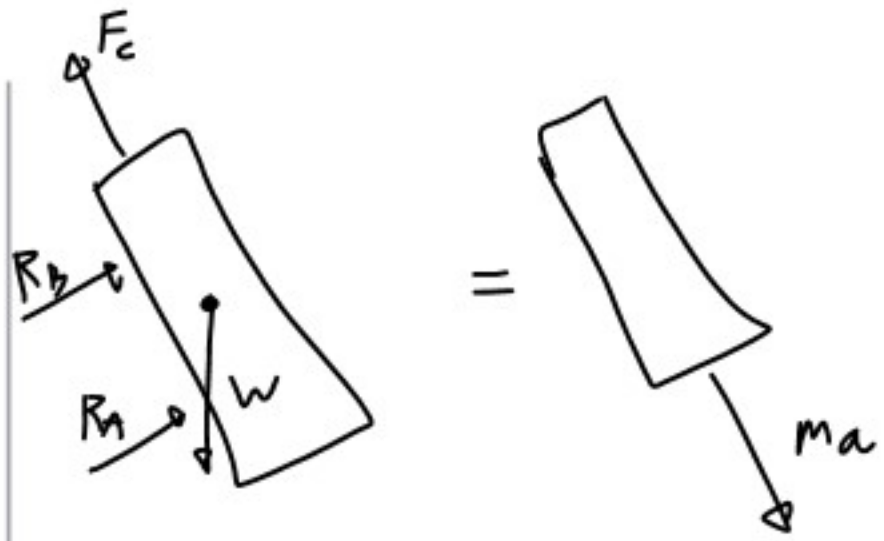
$ma = \mu W \qquad W = mg$

$\frac{ma}{W} = \mu$

$\frac{ma}{mg} = \frac{a}{g} = \mu \qquad \frac{18.6\ ft/s^2}{32.2\ ft/s^2} = \boxed{0.58}$

A loading car is at rest on a track forming an angle of 25° with the vertical. The gross weight of the car and its load is 5500 lb, and it acts at point *G*. Knowing the tension in the cable connected at *C* is 3000 lb, determine (*a*) the acceleration of the car, (*b*) the reaction at each pair of wheels.





$$\Sigma F_y = -ma$$

$$F_c - W\cos 25 = -ma$$

$$3000 - 5500\cos 25 = \frac{-5500}{32.2}\,a$$

$$\frac{-32.2}{5500}(3000 - 5500\cos 25) = a = \boxed{11.6\ \text{ft/s}^2}$$

$$\Sigma F_x = \cancel{ma_x} = 0$$

$$R_B + R_A - W\sin 25 = 0$$

$$R_B + 720 + R_B = 5500\sin 25$$

$$2R_B = 2324 - 720 = 1604$$

$$\boxed{R_B = 802\ \text{lb}}$$

$$\Sigma M_G = \cancel{I\alpha} = 0$$

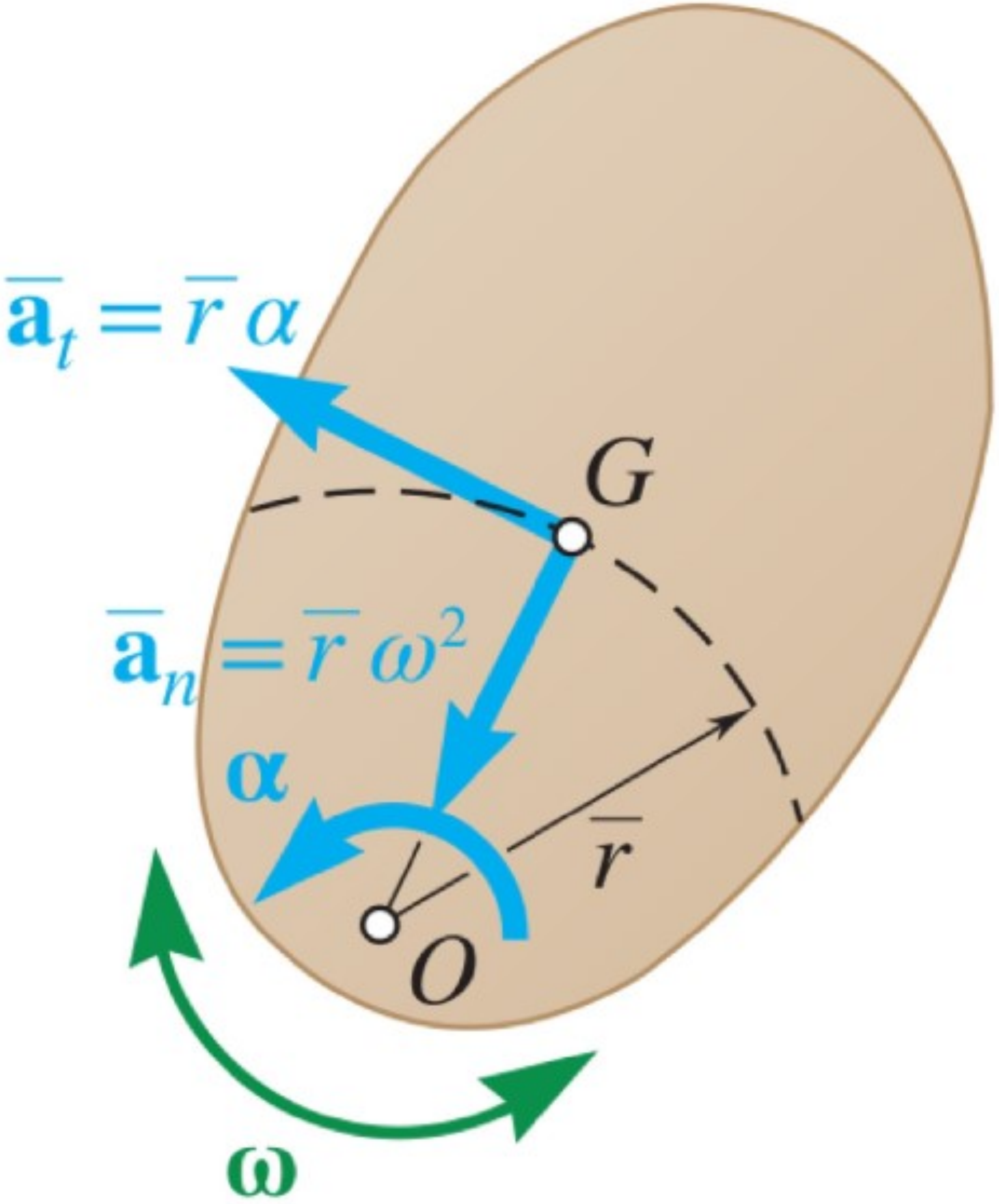
$$-25R_B + 25R_A - 6F_c = 0$$

$$R_A - R_B = \frac{6F_c}{25} = 720$$

$$R_A = 720 + R_B$$

$$= 720 + 802 = \boxed{1522\ \text{lb}}$$

Constrained Plane Motion



Rotating about O

Center of mass G

$\bar{a}_t = \bar{r}\alpha$

$\bar{a}_n = \bar{r}\omega^2$

$\Sigma M_O = I_O \alpha$

A uniform rod of length L and mass m is supported as shown. If the cable attached at end B suddenly breaks, determine (a) the acceleration of end B, (b) the reaction at the pin support.

$\Sigma F = m\bar{a}$