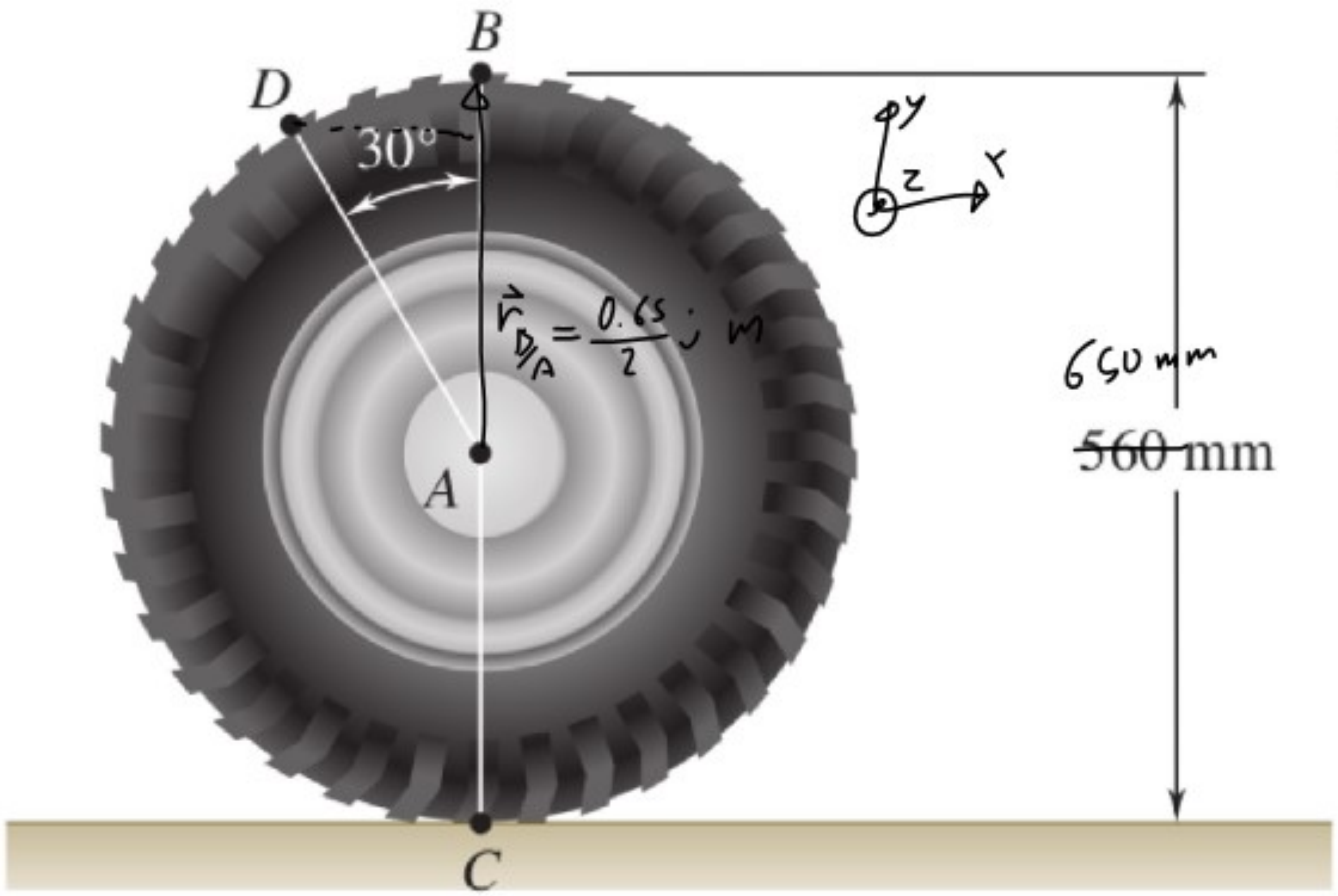
An automobile travels to the left at a constant speed of 90 km/h. Knowing that the diameter of the wheel is 650 mm, determine the acceleration of (*a*) point *B*, (*b*) point *C*, (*c*) point *D*.

$90 \frac{km}{h} = 25 \frac{m}{s}$

$\vec{a}_B = \vec{a}_A + \vec{\alpha}_{D/A} = -\omega^2 \vec{r}_{B/A}$ ($\vec{a}_A \to 0$)

$\vec{a}_{B/A} = \alpha k \times \vec{r}_{B/A} - \omega^2 \vec{r}_{B/A}$ ($\alpha \to 0$)

$\vec{a}_B = -77^2 \frac{0.65}{2} j = -1923 \, m/s^2$



$\omega = 77 k \; rad/s = \frac{25 \, m/s}{\frac{0.65}{2} m} = \frac{V_A}{AC}$

$\alpha = 0$

Kinematics of rigid bodies

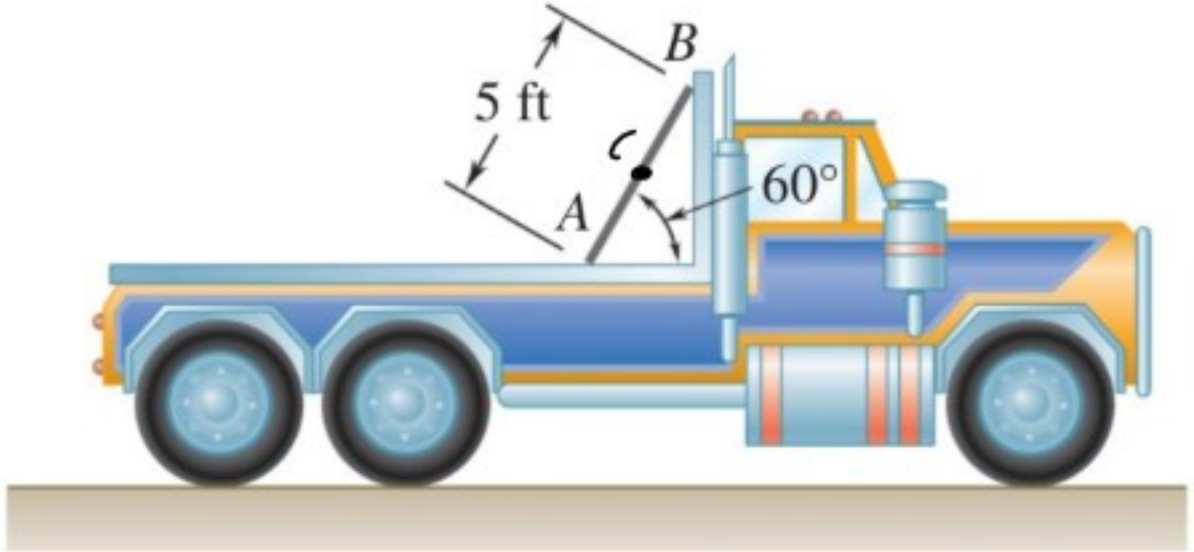
$\Sigma F = m\bar{a}$ $\bar{a}$ acceleration of mass centroid

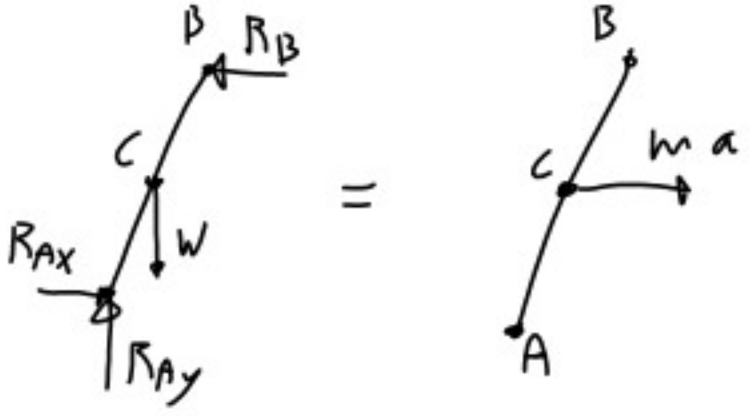
$\Sigma M_G = \dot{H}_G$ $H_G = I\omega$ $H_G = r \times mv$

$\dot{H}_G = I\dot{\omega} = I\alpha$ $\dot{H}_G = r \times ma$

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.

max accel when $R_B = 0$





$\Sigma F_y = m a_y$

$R_{Ay} - W = 0 \Rightarrow R_{Ay} = 60$ lb

$\Sigma F_x = m a_x$

$R_{Ax} = ma$

$\Sigma M_A = \dot{H}_A$

$\dot{H}_A = r \times ma = \frac{5}{2} \sin 60\, ma$

$\frac{5}{2} \cos 60\, W = \frac{5}{2} \sin 60\, ma$

$$\frac{\cos 60\, W}{\sin 60\, m} = a = \frac{g}{\tan 60} = \frac{32.2\ ft/s^2}{\tan 60} = \boxed{18.6\ ft/s^2}$$