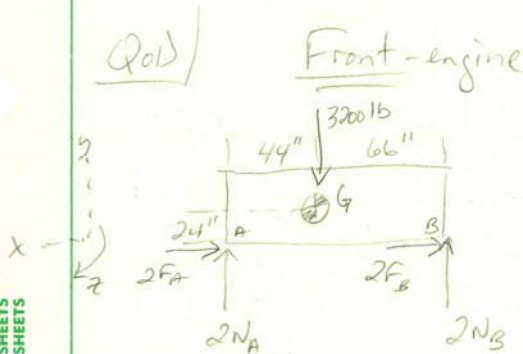


## Question of the Day

The **3200-lb** front-engine car is traveling forward at a constant velocity when the brakes lock up all four wheels. The coefficient of kinetic friction is 0.8 between the tire and the road.

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



$$\begin{aligned} \textcircled{1} \quad \Sigma F_x &= m a_{bx} \\ -2F_A - 2F_B &= \frac{3200}{32.2} a_{bx} \\ \textcircled{2} \quad \Sigma F_y &= m a_{by} \\ 2N_A + 2N_B - 3200 &= 0 \\ \textcircled{3} \quad \Sigma M_G &= I_G \alpha \\ -(2F_A + 2F_B)(24) &+ 2N_A(44) - 2N_B(66) = 0 \end{aligned}$$

before skid:

$$\begin{aligned} F_A &= F_B = 0 \\ \text{From } \textcircled{1} \quad -2F_A - 2F_B &= \frac{3200}{32.2} a_{bx} \\ a_{bx} &= 0 \text{ ft/s}^2 \\ \textcircled{2} \quad 2N_A + 2N_B - 3200 &= 0 \\ + \textcircled{3} \quad [2N_A(44) - 2N_B(66)] &= 0 \quad \left/ \frac{1}{26} \right. \\ \hline (2 + 1.33)N_A - 3200 &= 0 \\ N_A &= 960 \text{ lb} \quad 60\% \\ \textcircled{2} \quad 2(960) + 2N_B - 3200 &= 0 \\ 2N_B &= 1280 \\ N_B &= 640 \text{ lb} \quad 40\% \end{aligned}$$

during skid:

$$\begin{aligned} \textcircled{4} \quad F_A &= \mu N_A = 0.8N_A \\ \textcircled{5} \quad F_B &= \mu N_B = 0.8N_B \\ \textcircled{1} \quad -2(0.8N_A) - 2(0.8N_B) - \frac{3200}{32.2} a_{bx} &= 0 \\ \textcircled{2} \quad 2N_A + 2N_B - 3200 &= 0 \quad \text{3 eqs.} \\ \textcircled{3} \quad [-2(0.8N_A)24 + 2N_A(44)] + [-2(0.8N_B)24 - 2N_B(66)] &= 0 \quad \text{3 unknowns} \\ \hline -38.4N_A + 88N_A - 38.4N_B - 132N_B &= 0 \\ \textcircled{2} \quad 2N_A + 2N_B - 3200 &= 0 \\ + \textcircled{3} \quad [49.6N_A - 170.4N_B] &= 0 \quad \left/ \left( \frac{2}{170.4} \right) \right. \\ \hline (2 + 0.58)N_A - 3200 &= 0 \\ N_A &= 1240 \text{ lb} \quad 77.5\% \\ \textcircled{2} \quad 2(1240) + 2N_B - 3200 &= 0 \\ 2N_B &= 720 \\ N_B &= 360 \text{ lb} \quad 22.5\% \end{aligned}$$

$$\textcircled{1} \rightarrow a_{bx} = -25.8 \text{ ft/s}^2$$