

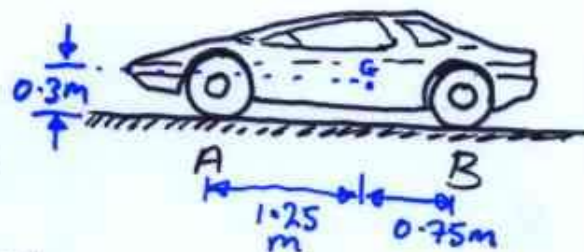
Example

E(5)

car has mass 2000 kg

REAR WHEEL DRIVE

CALCULATE accln if rear wheels ARE SLIPPING & FRONT ROTATE FREELY

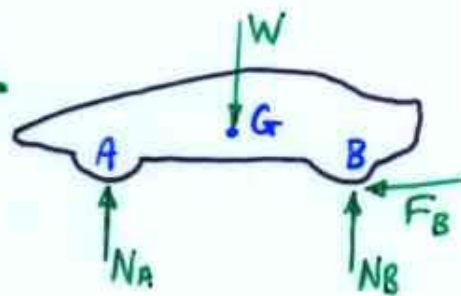


coeff of kinetic friction $\mu_k = 0.25$

DRAW FREE BODY DIAGRAM

$$W = mg = (2000)(9.81) = 19.62 \text{ kN}$$

$$F_B = \mu_k N_B \quad \Sigma F_y = ma_y = m(0)$$



$$+\uparrow \Sigma F_y = 0 \Rightarrow N_A + N_B - W = 0 \quad (1)$$

$$+\rightarrow \Sigma F_x = ma_{Gx} \Rightarrow \mu_k N_B = 2000 a_{Gx} \quad (2)$$

$$+\circlearrowleft \Sigma M_G = 0 \Rightarrow -1.25 N_A + 0.75 N_B - (0.3) \mu_k N_B = 0 \quad (3)$$

Substitute (1) into (3) for ~~N_B~~ N_A

$$\Rightarrow -1.25 [W - N_B] + 0.75 N_B - 0.3 \mu_k N_B = 0$$

$$\Rightarrow N_B = \frac{1.25 W}{1.25 + 0.75 - 0.3 \mu_k} = \frac{(1.25)(2000)(9.81)}{1.25 + 0.75 - (0.3)(0.25)} = 12740 \text{ N}$$

$$a_{Gx} = \frac{\mu_k N_B}{m} = \frac{(0.25)(12740)}{(2000)} = \underline{1.59 \text{ m/s}^2}$$

