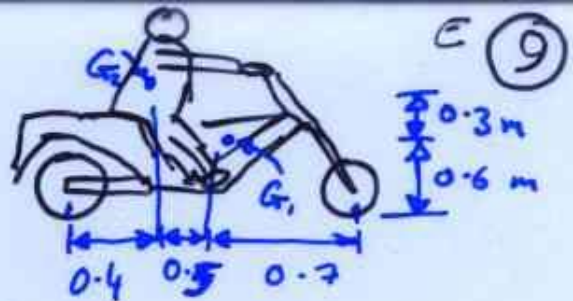


Motorcycle

MASS = 125 kg C.O.G = G_1

RIDER

MASS = 75 kg C.O.G = G_2



Coeff of friction wheel \rightarrow ROAD = $0.8 = \mu_s$

CALCULATE if a wheelie is possible
& if so @ WHAT ACCLN it will occur

Assume mass of wheels small & front wheel free to roll.

First, FIND centre of mass

$$x\text{-coord} = \frac{(125)(0.9) + (75)(0.4)}{200} = 0.7125 \text{ m}$$

$$y\text{-coord} = \frac{(125)(0.6) + (75)(0.9)}{200} = 0.7125 \text{ m}$$

Both relative to B

$$\sum F_x = ma_{Gx} \Rightarrow F_B = ma_G \quad (1)$$

$$\sum F_y = ma_{Gy} = 0 \Rightarrow N_B + N_A - W = 0 \quad (2)$$

$$\sum M_B = ma_{Gy} \Rightarrow (N_A)(1.6) - (W)(0.7125) = -ma_G(0.7125) \quad (3)$$

IF A wheelie is about to occur $\Rightarrow N_A = 0$

$$(2) \Rightarrow N_B = W = (200)(9.81)$$

$$(3) \Rightarrow (0.7125)(200)(9.81) = +(200)(a_G)(0.7125)$$
$$\Rightarrow a_G = 9.81 \text{ m s}^{-2}$$

$$(1) \Rightarrow F_B = ma_G = (200)(9.81)$$

So we have $F_B = (200)(9.81)$ & $N_B = (200)(9.81)$

BUT, $\mu_s = 0.8 \Rightarrow$ MAX value of F_B is $(0.8)(N_B)$

\therefore wheelie CANNOT occur.