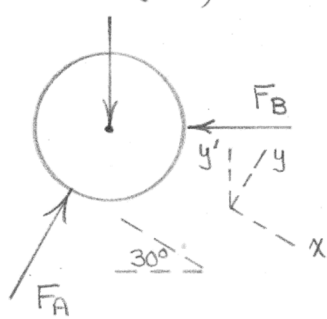


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$50(9.81) \text{ N}$

$\Sigma F_x = 0: 50(9.81) \sin 30^\circ - F_B \cos 30^\circ = 0$

$F_B = 283 \text{ N}$

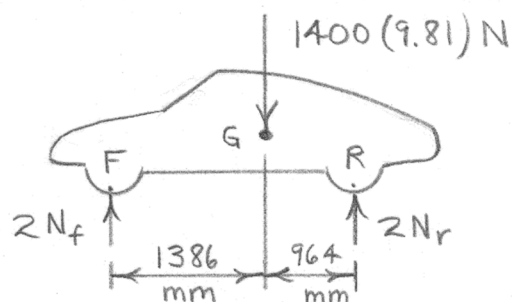


$\Sigma F_{y'} = 0: F_A \cos 30^\circ - 50(9.81) = 0$

$F_A = 566 \text{ N}$

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$$\uparrow \Sigma F = 0 : 2N_f + 2N_r - 1400(9.81) = 0$$

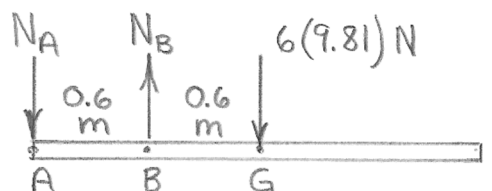
$$\curvearrowright \Sigma M_F = 0 : -1400(9.81)(1386) + 2N_r(1386 + 964) = 0$$

$$\text{Solution : } \begin{cases} N_f = 2820 \text{ N} \\ N_r = 4050 \text{ N} \end{cases}$$

Assumes G midway between left and right wheels.

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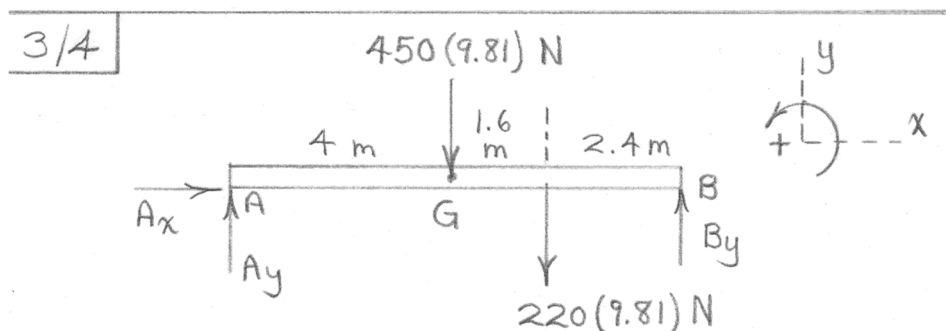
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A horizontal beam is shown with three points labeled A, B, and G. At point A, there is a downward force vector labeled N_A . At point B, there is an upward force vector labeled N_B . At point G, there is a downward force vector labeled $6(9.81) \text{ N}$. The distance between A and B is labeled 0.6 m , and the distance between B and G is also labeled 0.6 m .

$$\curvearrowright + \sum M_A = 0: N_B(0.6) - 6(9.81)(1.2) = 0, \quad \underline{N_B = 117.7 \text{ N}}$$
$$+\uparrow \sum F = 0: -N_A + 117.7 - 6(9.81) = 0, \quad \underline{N_A = 58.9 \text{ N}}$$

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From $\Sigma F_x = 0$, $A_x = 0$

$$\Sigma M_A = 0: -450(9.81)4 - 220(9.81)(5.6)$$

$$+ B_y(8) = 0, \quad \underline{B_y = 3720 \text{ N}}$$

$$\Sigma F_y = 0: A_y - 450(9.81) - 220(9.81) + 3720 = 0$$

$$\underline{A_y = 2850 \text{ N}}$$

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Diagram details: Beam AB, length 12m. Vertical force 150(9.81) N at 2m from A. Cable tension T at 2.5m from A. Support at A (pin), support at B (roller). Vertical height 9m. Horizontal distance from A to B is 12m. Cable attachment point is at horizontal distance 2.5m from A. Vertical distance from A to cable attachment point is 9m. Coordinate system (x, y) at A.

$$\sum F_y = 0; T - 150(9.81) = 0$$

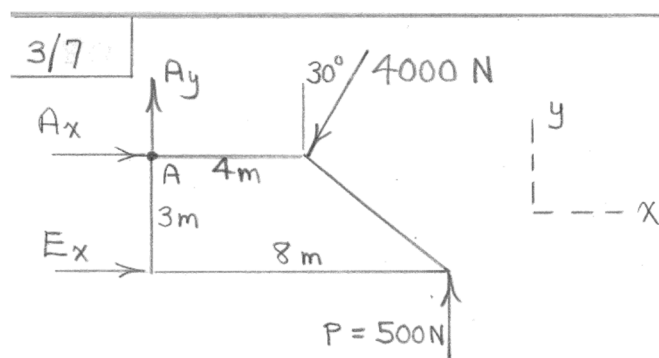
$$T = 1472 \text{ N}$$

$$\sum F_x = 0; A = B$$

$$\sum M = 0; 1472(2) - A(9) = 0$$

$$\underline{A = B = 327 \text{ N}}$$

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$$\sum F_x = 0: A_x + E_x - 4000 \sin 30^\circ = 0$$

$$\sum F_y = 0: A_y - 4000 \cos 30^\circ + 500 = 0$$

$$\sum M_A = 0: E_x(3) + 500(8) - 4000 \cos 30^\circ(4) = 0$$

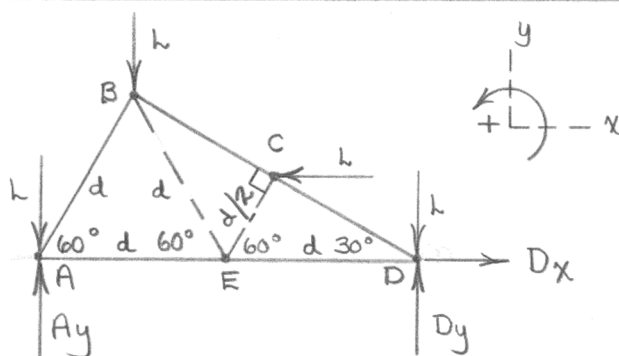
$$\Rightarrow \underline{A_x = -1285 \text{ N}}, \underline{A_y = 2960 \text{ N}}, \underline{E_x = 3290 \text{ N}}$$

$$\text{For maximum } P: E_x = 0 \text{ and } \sum M_A = 0:$$

$$P(8) - 4000 \cos 30^\circ(4) = 0, \underline{P = 1732 \text{ N}}$$

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$$\sum F_x = 0: D_x - L = 0, \quad \underline{D_x = L}$$

$$\sum F_y = 0: A_y + D_y - 3L = 0$$

$$\sum M_A = 0: D_y(2d) + L\left(\frac{d}{2}\frac{\sqrt{3}}{2}\right) - L\left(\frac{d}{2}\right) - L(2d) = 0$$

$$\text{Solving the last 2 equations: } A_y = \frac{L}{4}\left(7 + \frac{\sqrt{3}}{2}\right)$$

$$\underline{D_y = \frac{L}{4}\left(5 - \frac{\sqrt{3}}{2}\right)}$$

$$(\text{or } A_y = 1.967L, \quad D_y = 1.033L)$$

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