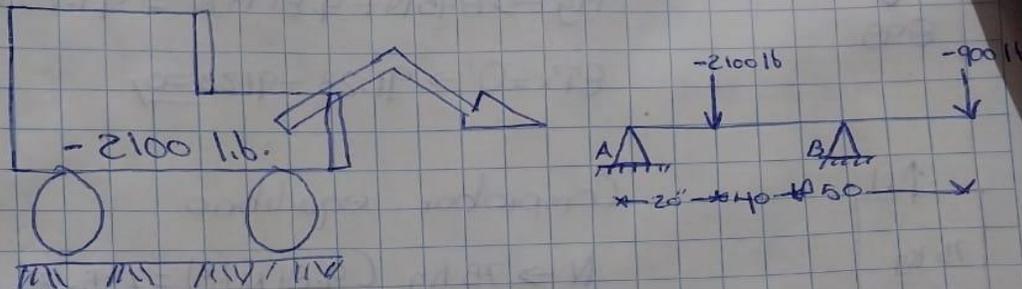




UNIVERSIDAD DEL SURESTE

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estática de la arquitectura
ejercicios
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Un tractor de 2100 libras se utiliza para levantar 900 libras de grava, determina la Reacciones de Cada uno de sus ejes de sus llantas



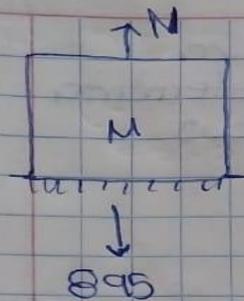
$\sum M$

$$\begin{aligned} M_A &= [(-2100 \text{ lb})20'] + [(-900 \text{ lb})110'] + [(R_B) \cdot 60''] = 0 \\ -42000 \text{ lb.}'' - 99.000 \text{ lb.}'' + R_B \cdot 60'' &= 0 \\ -141.000 \text{ lb.}'' + R_B \cdot 60'' &= 0 \\ R_B &= \frac{141.000 \text{ lb.}''}{60''} = 2350 \text{ lb} \end{aligned}$$

$\sum F_y = 0$

$$\begin{aligned} R_A - 2100 \text{ lb} - 900 \text{ lb} + 2350 \text{ lb} &= 0 \\ R_A - 3000 \text{ lb} + 2350 \text{ lb} &= 0 \\ R_A - 650 \text{ lb} &= 0 \\ R_A &= 650 \text{ lb} \end{aligned}$$

Comprobación: $[(650 \text{ lb} - 2100 \text{ lb} - 900 \text{ lb}) = 0$
 $0 = 0$

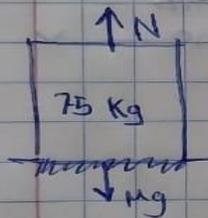


Encontrar la Masa y comprobar el Equilibrio

$$N \rightarrow 895 \text{ N} \div 9.81 \text{ m/s}^2 = 91.23 \text{ kg}$$

$$Mg \rightarrow 895 \text{ N} \div 9.81 \text{ m/s}^2 = 91.23 \text{ kg}$$

$$\sum F_x = 0 \rightarrow 91.23 - 91.23 = 0$$

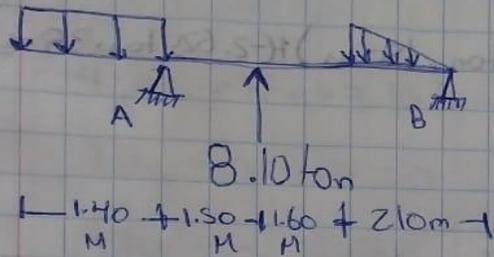


Comprobar equilibrio

$$N \rightarrow 75 \text{ kg} (9.81 \text{ m/s}^2) = 735.75$$

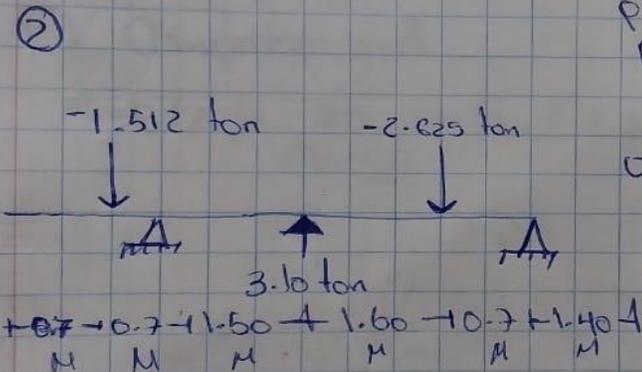
$$Mg \rightarrow 75 \text{ kg} (9.81 \text{ m/s}^2) = 735.75$$

$$\sum F_x = 0 \rightarrow \sum F_x = 735.75 - 735.75 = 0$$



① $p = w \cdot l$
 $p = (1.08 \text{ t/m}) (1.40 \text{ m}) = 1.512 \text{ t}$
 $p = \frac{1}{2} \cdot l \cdot w$
 $w_p = \frac{2.625 \text{ t}}{1.60 \text{ m}} = 1.6406 \text{ t/m}$
 $w_{p1} = 0$
 $w_{p2} = 1.6406 \text{ t/m}$
 $w_{p3} = 2.625 \text{ t/m}$
 $w_{p4} = 0$

② $p = w \cdot l / 2$
 $p = \frac{(2.625 \text{ t/m}) (2.10 \text{ m})}{2} = 2.756 \text{ t}$
 $w_p = \frac{2}{3} L = \frac{2}{3} (2.10) = 1.40 \text{ m}$
 $w_p = \frac{1}{3} L = \frac{1}{3} (2.10) = 0.70 \text{ m}$



③ $R_A \rightarrow \sum F_y = 0$

$-1.512 \text{ ton} \cdot (0.70 \text{ m}) + (3.10 \text{ ton} \cdot 1.50 \text{ m}) + (-2.625 \text{ ton} \cdot 3.80 \text{ m}) + R_B \cdot 5.20 \text{ m} = 0$

- RB

$1 + 1.0584 \text{ ton} \cdot \text{m} + 4.65 \text{ ton} \cdot \text{m} - 9.975 \text{ ton} \cdot \text{m} + R_B \cdot 5.20 \text{ m} = 0$

$-4.2666 \text{ ton} \cdot \text{m} + (R_B \cdot 5.20 \text{ m}) = 0$

$R_B = \frac{4.267 \text{ ton} \cdot \text{m}}{5.20 \text{ m}} = 0.82 \text{ ton}$

④ $R_A \rightarrow \sum F_y = 0$

$-1.512 \text{ t} + R_A + 3.10 \text{ ton} - 2.625 \text{ ton} + 0.82 \text{ ton} = 0$

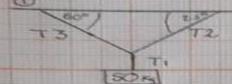
$R_A - 0.217 = 0$

$R_A = 0.217 \text{ ton}$

⑤ Comprobación

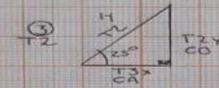
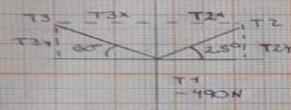
$-1.512 \text{ ton} + 0.217 \text{ ton} + 3.10 \text{ ton} - 2.625 \text{ ton} + 0.82 \text{ ton} = 0$
 $0 = 0$

Un saco de cemento de 50 kg de masa cuelga en equilibrio de 3 cuerdas 2 de las cuerdas forman ángulos de 60° y 25° grados con lo horizontal. Hallar la tensión de las cuerdas

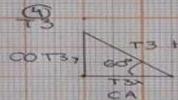


$50 \text{ kg} \cdot 9.81 \text{ m/s}^2 = 490.5 \text{ N}$
 $T_1 + T_2 = 0$ $T_1 + T_2 + T_3 = 0$

② DCL



$\text{Sen } 25^\circ = \frac{T_{2y}}{T_2}$
 $\frac{T_{2y}}{T_2} = \text{Sen } 25^\circ \Rightarrow T_{2y} = \text{Sen } 25^\circ (T_2)$
 $\text{Cos } 25^\circ = \frac{T_{2x}}{T_2}$
 $T_{2x} = \text{Cos } 25^\circ (T_2)$



$\text{Sen } 60^\circ = \frac{T_{3y}}{T_3}$
 $\frac{T_{3y}}{T_3} = \text{Sen } 60^\circ \Rightarrow T_{3y} = \text{Sen } 60^\circ (T_3)$
 $\text{Cos } 60^\circ = \frac{T_{3x}}{T_3}$
 $T_{3x} = \text{Cos } 60^\circ (T_3)$

③ $\sum F_x = 0$

$T_{2x} + T_{3x} - T_1 = 0$
 $\text{Cos } 25^\circ (T_2) - \text{Cos } 60^\circ (T_3) = 0$
 $\text{Cos } 25^\circ (T_2) = \text{Cos } 60^\circ (T_3)$
 $T_2 = \frac{\text{Cos } 60^\circ (T_3)}{\text{Cos } 25^\circ} = 0.551 (T_3)$

④ $\sum F_y = 0$

$T_{2y} + T_{3y} - T_1 = 0$
 $\text{Sen } 25^\circ (T_2) + \text{Sen } 60^\circ (T_3) - 490.5 \text{ N} = 0$
 $\text{Sen } 25^\circ (0.551 T_3) + \text{Sen } 60^\circ (T_3) = 490.5 \text{ N}$
 $0.233 T_3 + 0.866 T_3 = 490.5 \text{ N}$
 $1.099 T_3 = 490.5 \text{ N}$
 $T_3 = 446.315 \text{ N}$

⑤

$T_2 = 0.551 \cdot (446.315 \text{ N}) = 245.919 \text{ N}$
 $T_1 = 490.5 \text{ N}$
 $T_2 = 245.919 \text{ N}$