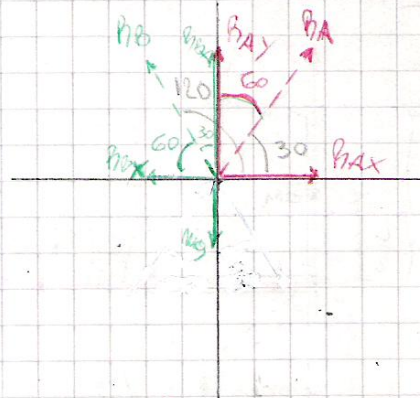
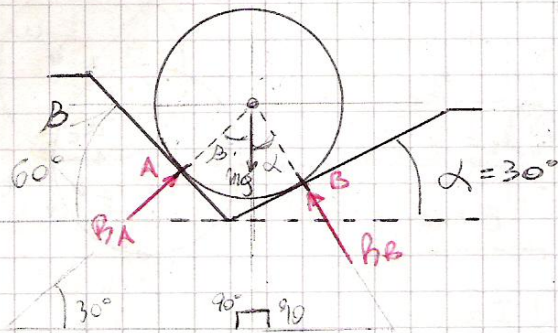


I PÁG. 43

 $R_{By}, R_{Bx}, R_{Ay}, R_{Ax}$

$$① \sum F_y = R_A \sin \alpha + R_B \sin \alpha - P = 0$$

$$② \sum F_x = R_A \cos \alpha - R_B \cos \alpha = 0$$

DE ECU ② RESPONDO R_A

$$\frac{R_B \cos 60}{\cos 30} = R_A \Rightarrow \boxed{R_A = R_B \cdot 0,57}$$

$$\times \begin{cases} \sin \alpha = \frac{O}{H} \\ R_B \sin \alpha \end{cases} \quad \times \begin{cases} \sin \alpha = \frac{O}{H} \\ R_A \sin \alpha = 0 \end{cases}$$

AHORA RESPONDO EN ECU ①

$$\times \begin{cases} \cos \alpha = \frac{A}{H} \\ H \cos \alpha = A \end{cases} \quad \times \begin{cases} \cos \alpha = \frac{A}{H} \\ R_A \cos \alpha = A \end{cases}$$

$$R_B \cdot 0,57 \cdot \sin 30 + R_B \sin 60 - 49 \text{ N} = 0$$

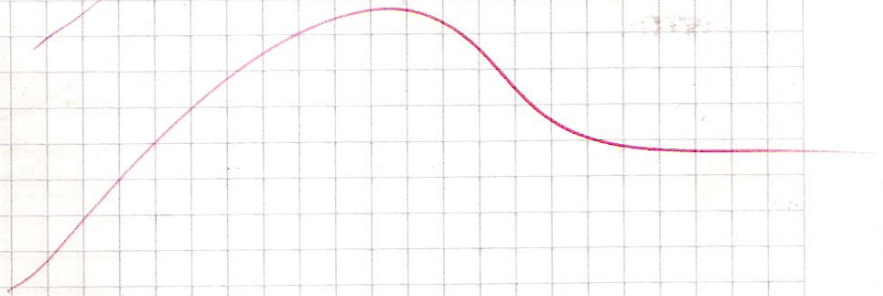
$$R_B (0,57 \cdot \sin 30 + \sin 60) - 49 \text{ N} =$$

$$R_B \cdot 1,51 = 49 \text{ N} \Rightarrow \boxed{R_B = 42,57 \text{ N}}$$

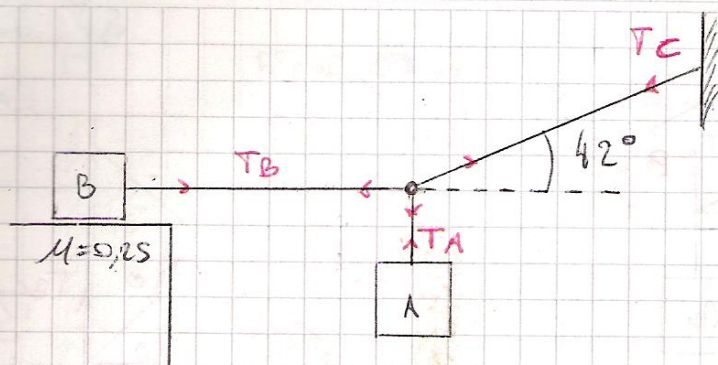
$$R_A = R_B \cdot 0,57 \text{ N} \Rightarrow \boxed{R_A = 24,26 \text{ N}}$$

$$\boxed{R_A = (24,26 + 12,13) \text{ N}}$$

$$\boxed{R_B = (24,26 + 36,86) \text{ N}}$$



2



$B = 712 \text{ N} (71,2 \text{ kg})$
 $\mu = 0,25$
 $A = ?$

DE BCU ① DESPESO T_C ...

$$T_C \cos 42 - T_B = 0$$

$$T_C = \frac{\mu \cdot m_B \cdot g}{\cos 42} \Rightarrow T_C = \frac{178 \text{ N}}{\cos 42} \Rightarrow T_C = 239,52 \text{ N}$$

Y AHORA DE BCU ② DESPESO T_A ...

$$T_C \sin 42 - T_A = 0$$

$$T_A = T_C \sin 42 \Rightarrow T_A = 239,52 \text{ N} \cdot \sin 42$$

$$T_A = 160,27 \text{ N}$$

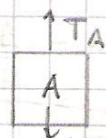
$$T_A = P_A$$

$$\sum F_y = 0 \Rightarrow T_{Cy} - T_B = 0$$

$$\textcircled{1} \Rightarrow T_C \cos 42 - T_B = 0$$

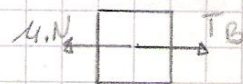
$$\sum F_x = 0 \Rightarrow T_{Cx} - T_A = 0$$

$$\textcircled{2} \Rightarrow T_C \sin 42 - T_A = 0$$



$$T_A - m_A g = 0$$

$$\textcircled{3} T_A = m_A g$$



$$\mu \cdot N - T_B = 0$$

$$\mu \cdot N = T_B$$

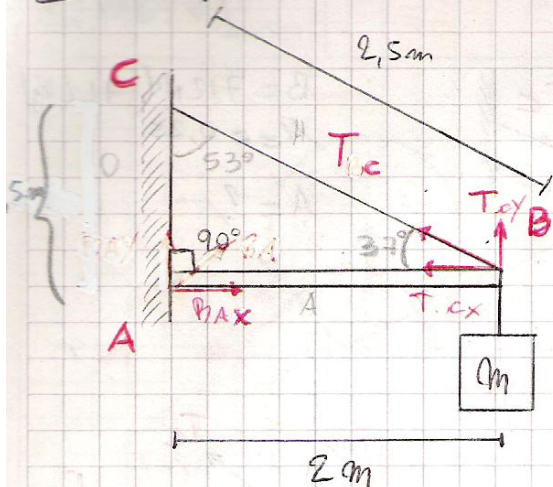
$$\mu \cdot m_B g = T_B$$

$$\sum \text{Sen } 37 = 0$$

Sol 4 CAH TOA

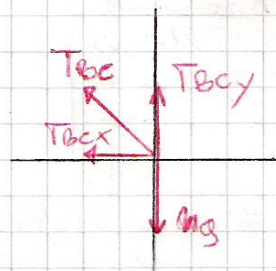
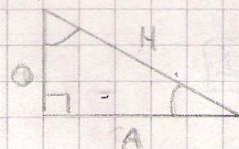
$$m = 20 \text{ kg}$$

3) PAG. 43



$$CA = CB \cdot \text{Sen } 37$$

$$1,5 \text{ m}$$

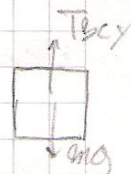


$$\sum F_y = 0 \Rightarrow T_{cy} + mg$$

$$mg = T_{cy} \quad (1)$$

$$\sum F_x = 0 \Rightarrow T_{cx} - P_{Ax} = 0$$

$$T_{cx} = P_{Ax} \quad (2)$$



$$T_{bcy} = mg$$

$$\text{Sen } \alpha = \frac{O}{H} \Rightarrow H = \frac{O}{\text{Sen } 37} \Rightarrow T_c = \frac{T_{cy}}{\text{Sen } 37}$$

$$\Rightarrow T_c = 325,68 \text{ N} \quad \checkmark$$

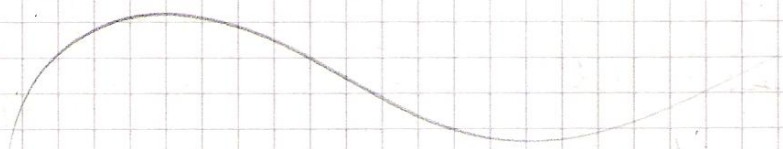
$$P_{Ax} = 260 \text{ N}$$

$$392 \text{ N}$$

$$\text{Cos } \alpha = \frac{A}{H} \Rightarrow (\text{Cos } 37) \cdot H = A \Rightarrow T_c \cdot \text{Cos } 37^\circ = T_{cx}$$

$$\Rightarrow T_{cx} = 260 \text{ N}$$

$$T_{cx} = P_{Ax}$$

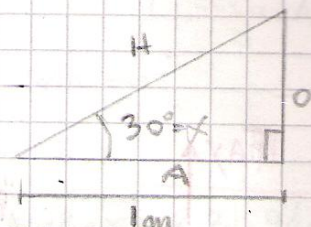
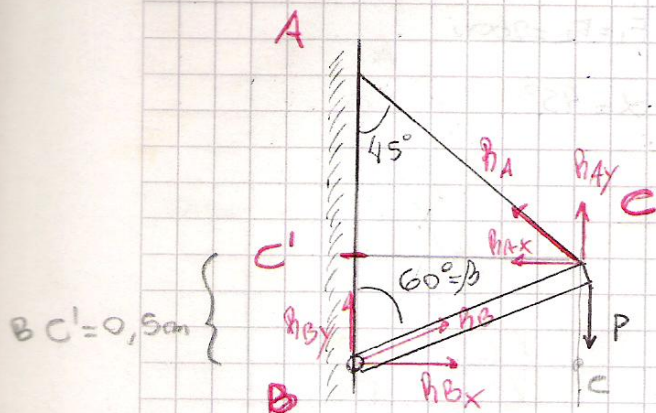


4. PÁG. 43

$$BC = 1m$$

$$P = 1000N$$

$$Q = 9,8$$



$$\tan \alpha = \frac{O}{A}$$

$$BC' = 0,57m$$

$$\sum F_y = 0 \Rightarrow R_{AY} + R_{BY} - P = 0$$

$$R_{BY} = P - R_{AY} \quad (4)$$

$$\sum F_x = 0 \Rightarrow R_{BX} - R_{AX} = 0$$

$$R_{BX} = R_{AX} \quad (1)$$

$$\sum M_B = 0 \Rightarrow R_{AY} \cdot BC + R_{AX} \cdot BC' - P \cdot BC = 0$$

$$(R_A \cdot \cos 45^\circ) \cdot 1 + (R_A \cdot \sin 45^\circ) \cdot 0,57 - 1000 \cdot 1 = 0$$

$$1,57 R_A (\cos 45^\circ + \sin 45^\circ) = 1000N$$

$$R_A \cdot 0,707 + R_A \cdot 0,40 = 1000N$$

$$R_A (1,10) = 1000N$$

$$R_A = 909N$$

~~ESTA ES LA RESPUESTA~~

$$\begin{aligned} 2) R_{AY} & \left[\begin{aligned} \bullet \cos 45^\circ &= \frac{A}{H} \\ R_A \cdot \cos 45^\circ &= R_{AY} \end{aligned} \right. \end{aligned}$$

$$\begin{aligned} 3) R_{AX} & \left[\begin{aligned} \bullet \sin 45^\circ &= \frac{O}{H} \\ R_A \cdot \sin 45^\circ &= R_{AX} \end{aligned} \right. \end{aligned}$$

BCU 2) $R_{AY} = 636N$

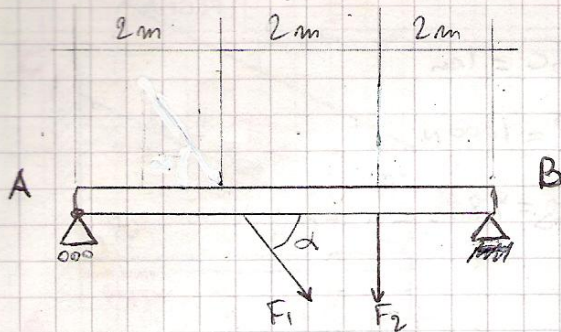
BCU 3) $R_{AX} = 636N$

$$R_{BX} = R_{AX} = 636N$$

BCU 4) $R_{BY} = 364N$

$$\tan \alpha = \frac{O}{A} \Rightarrow \tan \alpha = \frac{R_{BY}}{R_{BX}} \Rightarrow R_{BX} \cdot \tan \alpha = R_{BY} \Rightarrow R_{BY} = 367N$$

6 PAG. 44

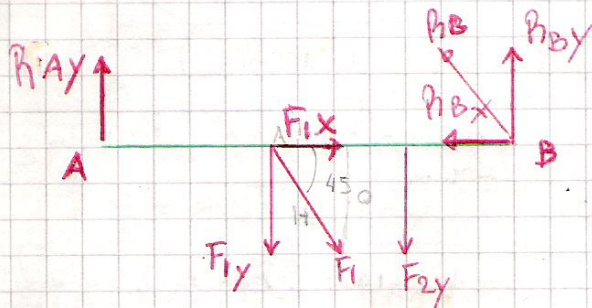


Permite F en solo un eje

Permite F en los 3 ejes.

$$F_1 = F_2 = 200\text{N}$$

$$\alpha = 45^\circ$$



$$F_{1x} \Rightarrow \cos \alpha = \frac{A}{H} \Rightarrow F_1 \cdot \cos \alpha = F_{1x}$$

$$F_{1y} \Rightarrow \sin \alpha = \frac{O}{H} \Rightarrow F_1 \cdot \sin \alpha = F_{1y}$$

$$\sum F_y = 0 \Rightarrow R_{Ay} + R_{By} - F_{2y} - F_{1y} = 0$$

$$R_{Ay} = F_{2y} + F_{1y} - R_{By} \quad (1)$$

$$\sum F_x = 0 \Rightarrow F_{1x} - R_{Bx} = 0$$

$$F_{1x} = R_{Bx} \quad (2)$$

$$\sum M_A^{\text{TO}} = 0 \Rightarrow -F_{1y} \cdot 2\text{m} - F_{2y} \cdot 4\text{m} + R_{By} \cdot 6\text{m} = 0$$

$$\Rightarrow -200 \cdot \cos 45^\circ \cdot 2\text{m} - 200\text{N} \cdot 4\text{m} + R_{By} \cdot 6\text{m} = 0$$

$$\Rightarrow -282,84\text{Nm} - 800\text{Nm} + R_{By} \cdot 6\text{m} = 0$$

$$R_{By} \cdot 6\text{m} = 1082,84 \Rightarrow R_{By} = \frac{1082,84\text{ N}\cdot\text{m}}{6\text{m}} \Rightarrow R_{By} = 180,47\text{N}$$

DE BCU (1) ...

$$R_{Ay} = F_{2y} + F_{1y} - R_{By} \Rightarrow 200\text{N} \cdot \cos \alpha + 200\text{N} - 180,47\text{N} = R_{Ay} \Rightarrow R_{Ay} = 160,95\text{N}$$

DE BCU (2) ...

$$R_{Bx} = F_{1x} \Rightarrow F_{1x} = F_1 \cdot \sin \alpha \Rightarrow F_{1x} = 141,42\text{N}$$

$$R_{Bx} = -141,42\text{N}$$



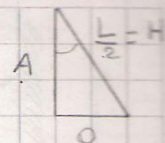
$$H \cdot \sin \alpha = 0$$

HOJA N° 219

FECHA

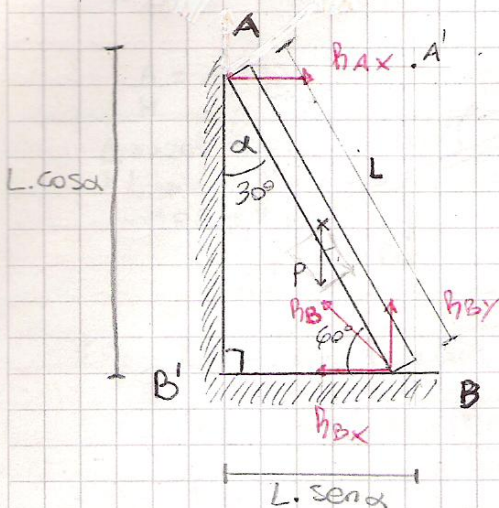
8 PAG. 44

$$P = 800N$$



$$\frac{L}{2} \sin \alpha = 0$$

$$L \cdot \cos \alpha = A$$



$$\sum F_y = 0 \Rightarrow H_{BY} - P = 0$$

$$H_{BY} = P \quad (2)$$

$$\sum F_x = 0 \Rightarrow H_{AX} - H_{BX} = 0$$

$$H_{AX} = H_{BX} \quad (1)$$

$$\sum M_B = P \cdot \frac{L}{2} \sin \alpha - H_{AX} L \cos \alpha = 0$$

$$P \cdot \frac{L}{2} \sin \alpha = H_{AX} L \cos \alpha$$

$$\frac{P \sin \alpha}{2 \cos \alpha} = H_{AX} \Rightarrow H_{AX} = 230,94N$$

DE BCU (2)

$$H_{BY} = P \Rightarrow H_{BY} = 800N$$

$$H_{BX} = -230,94N$$

ACLAARACION: EN EL PUNTO A SOLO EXISTE H_{AX} . NO EXISTEN OTRAS REACCIONES PORQUE EN ESTE PUNTO NO HAY MOVIMIENTO

$$F_r = \mu_e N \Rightarrow F_r = \mu_e mg$$

$$H_{BX} = \mu \cdot H_{BY} \Rightarrow \frac{H_{BX}}{H_{BY}} = \mu$$

$$\mu = 0,288$$

19) PAG 44

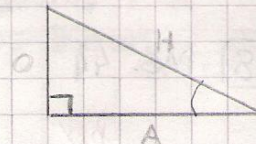
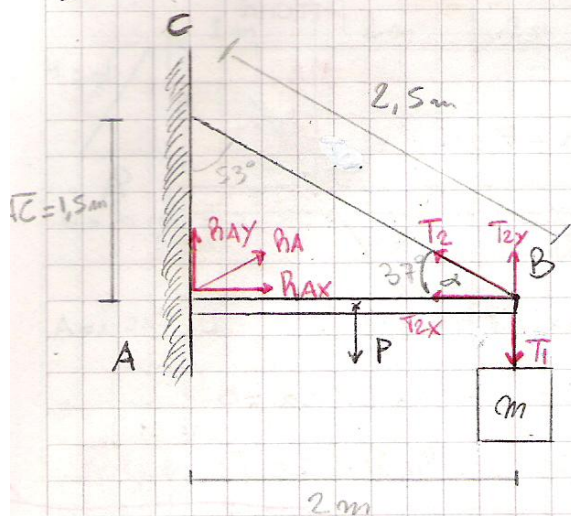
$P = 100 \text{ N}$

$m = 20 \text{ kg} (196 \text{ N})$

$\overline{AB} = 2 \text{ m}$

$\overline{BC} = 2,5 \text{ m}$

$\overline{AC} = 1,5 \text{ m}$



$\cos \alpha = \frac{A}{H}$

$\alpha = \cos^{-1} \frac{A}{H}$

$\alpha = 37^\circ$



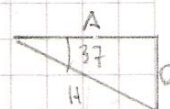
$T_1 = mg = 196 \text{ N}$

$\sum F_y = 0 \Rightarrow T_{2y} + R_{Ay} - T_1 - P = 0$
 $R_{Ay} = T_1 + P - T_{2y}$ (1)

$\sum F_x = 0 \Rightarrow R_{Ax} - T_{2x} = 0$
 $R_{Ax} = T_{2x}$ (2)

$\sum M_A^{\text{TO}} = 0 \Rightarrow -P \cdot 1 \text{ m} - T_1 \cdot 2 \text{ m} + T_{2y} \cdot 2 \text{ m} = 0$
 $-100 \text{ Nm} - 392 \text{ Nm} + T_{2y} \cdot 2 \text{ m} = 0$

$T_{2y} = \frac{492 \text{ Nm}}{2 \text{ m}} \Rightarrow T_{2y} = 246 \text{ N}$ ✓



$\tan \alpha = \frac{A}{H}$

$A = \frac{O}{\tan \alpha}$

$T_{2x} = \frac{T_{2y}}{\tan \alpha}$ (3)

DS BCU (1) ...

$R_{Ay} = 196 \text{ N} + 100 \text{ N} - 246 \text{ N} \Rightarrow R_{Ay} = 50 \text{ N}$ ✓

DS BCU (3) ...

$T_{2x} = \frac{T_{2y}}{\tan 37} \Rightarrow T_{2x} = 326 \text{ N}$ ✓

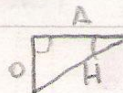
$R_A = (-326i + 50j) \text{ N}$

DS BCU (2) TONGO $R_{Ax} = T_{2x} \Rightarrow R_{Ax} = 326 \text{ N}$ ✓

$R_A = \sqrt{(R_{Ax})^2 + (R_{Ay})^2} \Rightarrow R_A = 329,81 \text{ N}$

$T_2 = \sqrt{(T_{2x})^2 + (T_{2y})^2} \Rightarrow T_2 = 408,4 \text{ N}$ ✓

SEN CAN TOA



$$\cos \alpha = \frac{BC}{AB} \Rightarrow \alpha = \arccos \frac{BC}{AB}$$

$$\alpha = 37^\circ$$

HOJA N°

FECHA

110 PÁG. 44

$$P_{AB} = 200 \text{ N}$$

$$m = 80 \text{ kg}$$

$$\overline{AB} = 2,5 \text{ m}$$

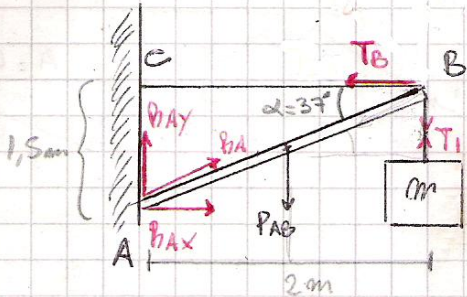
$$\overline{BC} = 2 \text{ m}$$

$$\overline{CA} = 1,5 \text{ m}$$

$$P_A = ?$$

$$T_2 = ?$$

$$T_1 = m \cdot g \Rightarrow T_1 = 784 \text{ N}$$



$$\sum F_y = P_{AY} - P_{AB} - T_1 = 0$$

$$P_{AY} = P_{AB} + T_1 \Rightarrow P_{AY} = 984 \text{ N}$$

$$\sum F_x = P_{AX} - T_B = 0$$

$$P_{AX} = T_B \quad (1)$$

$$\sum M_A^{\circ} = -P_{AB} \cdot 1 \text{ m} - T_1 \cdot 2 \text{ m} + T_B \cdot 1,5 \text{ m} = 0$$

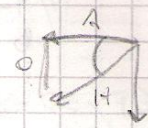
$$-200 - 1568 + T_B \cdot 1,5 = 0$$

$$T_B = \frac{1768}{1,5} \Rightarrow T_B = -1178 \text{ N}$$

DE ECU (1) ...

$$P_{AX} = T_B \Rightarrow P_{AX} = 1178 \text{ N}$$

$$P_A = (1178i + 984j) \text{ N}$$



$$\tan \alpha = \frac{BC}{CA}$$

$$\alpha = \arctan \frac{BC}{CA}$$

$$\delta = \frac{P}{V}$$

$$\delta = \frac{m}{V}$$

$$\delta \cdot V = m$$

HOJA N°

FECHA

12 PAG. 45

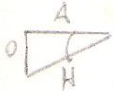
$$L_1 = 1,5 \text{ m}$$

$$L_2 = 2,5 \text{ m}$$

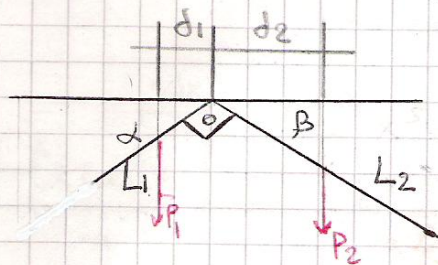
$$\alpha = ?$$

$$\beta = ?$$

$$H \cdot \cos \alpha = A$$



$$H \cdot \cos \beta = A$$



$$d_1 = \frac{L_1 \cos \alpha}{2}$$

$$d_2 = \frac{L_2 \cos \beta}{2}$$

DENSIDAD

$$\delta = \frac{P}{V} \Rightarrow P = \delta \cdot V$$

$$\delta_1 = \delta_2 \rightarrow \text{DENSIDAD}$$

$$M_{P_1}^O = M_{P_2}^O = 0$$

$$P_1 \cdot d_1 = P_2 \cdot d_2$$

$$d_2 = \frac{L_2 \sin \alpha}{2}$$

CUANDO LOS ANGULOS SON COMPLEMENTARIOS EL SENO DE UNO ES EL COSENO DEL OTRO

$$(\delta \pi r^2 L_1) \frac{L_1 \cos \alpha}{2} = (\delta \pi r^2 L_2) \frac{L_2 \sin \alpha}{2}$$

$$L_1^2 \cos \alpha = L_2^2 \sin \alpha$$

$$\frac{L_1^2}{L_2^2} = \frac{\sin \alpha}{\cos \alpha} \Rightarrow \frac{L_1^2}{L_2^2} = \tan \alpha \Rightarrow \alpha = 19^\circ 47'$$

$$\beta = 180 - (90 + 119)$$

$$\beta = 71$$

