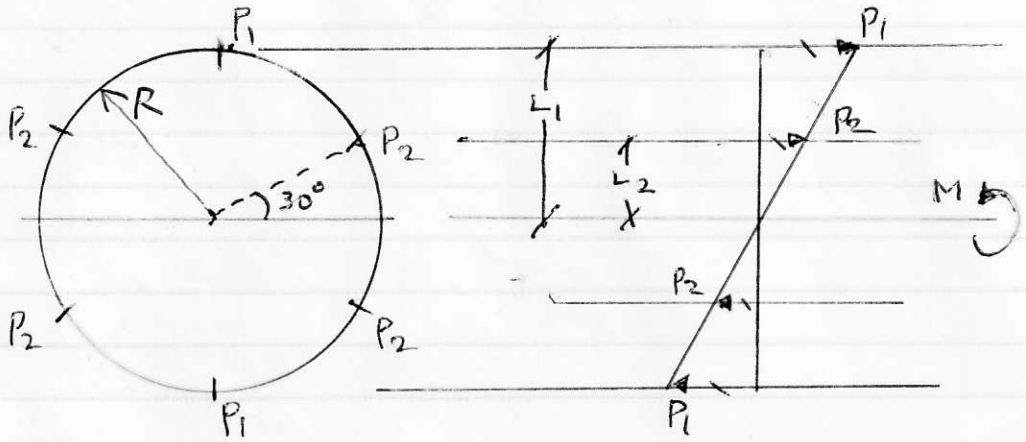
COUPLER JOINT - SIX FASTENERS
- CALCULATE MAXIMUM SHEAR FORCE



$$\Sigma M = 0 = 2P_1 L_1 - 4P_2 L_2 \quad \text{---} (1)$$

ALSO $$\frac{P_1}{L_1} = \frac{P_2}{L_2} \Rightarrow P_2 = P_1 \frac{L_2}{L_1} \quad \text{---} (2)$$

FROM (1) & (2) $$M = 2P_1 L_1 + 4 L_2 P_1 \frac{L_2}{L_1}$$

$$= 2P_1 \left(L_1 + 2\frac{L_2^2}{L_1}\right)$$

Solving for P_1 $$P_1 = \frac{M}{2\left(L_1 + 2\frac{L_2^2}{L_1}\right)} = \frac{M}{2L_1\left[1 + 2\left(\frac{L_2}{L_1}\right)^2\right]}$$

$$\Rightarrow P_1 = \frac{M}{4L_1\left[\frac{1}{2} + \left(\frac{L_2}{L_1}\right)^2\right]}$$

AS $L_1 = R$ AND $L_2 = \sin 30° (R) = R/2$

$$P_1 = \frac{M}{4R\left[\frac{1}{2} + \left(\frac{R}{2R}\right)^2\right]} = \frac{M}{4(3/4)R} = \frac{1}{3}\frac{M}{R}$$