



A plate with uniform weight W lbs is supported by three cables A , B , and C . If the max tension of a single cable is T_{max} , find the maximum force F_{max} that can be supported by the plate and the cable with the largest tension.

$$\Sigma(M_x)_A = 0 \rightarrow \frac{d_1}{2} \cdot W - d_1 T_B = 0 \rightarrow T_B = \frac{W}{2}$$

$$\Sigma(M_y)_B = 0 \rightarrow 2d_2 \cdot T_A - d_2 \cdot (F + W) = 0 \rightarrow T_A = \frac{F + W}{2}$$

$$\Sigma(M_y)_O = 0 \rightarrow d_2 \cdot T_A - d_2 \cdot (T_B + T_C) = 0 \rightarrow T_C = T_A - T_B = \frac{F}{2}$$

$$T_A > T_B, T_C$$

$$\rightarrow F = 2T_A - W$$

$$\rightarrow F_{max} = 2T_{max} - W$$

Find the tensions in the cables at F_{max} .

$$T_A = T_{max}$$

$$T_B = \frac{W}{2}$$

$$T_C = \frac{F_{max}}{2}$$