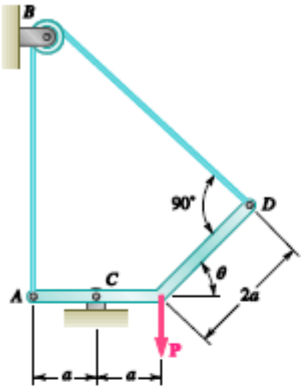
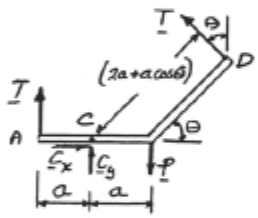


PROBLEM 4.31

Neglecting friction, determine the tension in cable *ABD* and the reaction at *C* when $\theta = 60°$.

SOLUTION



$$+)\Sigma M_C = 0: \quad T(2a + a\cos\theta) - Ta + Pa = 0$$

$$T = \frac{P}{1+\cos\theta} \tag{1}$$

$$\pm \Sigma F_x = 0: \quad C_x - T\sin\theta = 0$$

$$C_x = T\sin\theta = \frac{P\sin\theta}{1+\cos\theta}$$

$$+)\Sigma F_y = 0: \quad C_y + T + T\cos\theta - P = 0$$

$$C_y = P - T(1+\cos\theta) = P - P\frac{1+\cos\theta}{1+\cos\theta}$$

$$C_y = 0$$

Since $C_y = 0$, $C = C_x$

$$\mathbf{C} = P\frac{\sin\theta}{1+\cos\theta} \rightarrow \tag{2}$$

For $\theta = 60°$:

Eq. (1):

$$T = \frac{P}{1+\cos 60°} = \frac{P}{1+\frac{1}{2}}$$

$$T = \frac{2}{3}P \blacktriangleleft$$

Eq. (2):

$$C = P\frac{\sin 60°}{1+\cos 60°} = P\frac{0.866}{1+\frac{1}{2}}$$

$$\mathbf{C} = 0.577P \rightarrow \blacktriangleleft$$