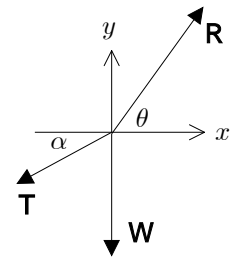


[2.9~2.11]

2.47 $W = 550 \text{ N}, \quad \theta = 65^\circ, \quad \alpha = 30^\circ$

$$F_x = 0 : -T \cos\alpha + R \cos\theta = 0 \quad \dots$$

$$F_y = 0 : -T \sin\alpha + R \sin\theta - W = 0 \quad \dots$$



(a) $x \sin\theta - x \cos\theta$

$$-T \cos\alpha \sin\theta + T \sin\alpha \cos\theta + W \cos\theta = 0$$

$$T = \frac{W \cos\theta}{\cos\alpha \sin\theta - \sin\alpha \cos\theta} = \frac{(550 \text{ N}) \cos 65^\circ}{\cos 30^\circ \sin 65^\circ - \sin 30^\circ \cos 65^\circ} = 405 \text{ N}$$

(b) $x \sin\alpha - x \cos\alpha$

$$R \cos\theta \sin\alpha - R \sin\theta \cos\alpha + W \cos\alpha = 0$$

$$R = \frac{W \cos\alpha}{\sin\theta \cos\alpha - \cos\theta \sin\alpha} = \frac{(550 \text{ N}) \cos 30^\circ}{\sin 65^\circ \cos 30^\circ - \cos 65^\circ \sin 30^\circ} = 830 \text{ N}$$

2.66 $\beta = 30^\circ, \quad \gamma = 20^\circ, \quad T_{BD} = 310 \text{ N}$

(a) equilibrium $T_{BC} + T_{BD} + F_{AB} = 0$

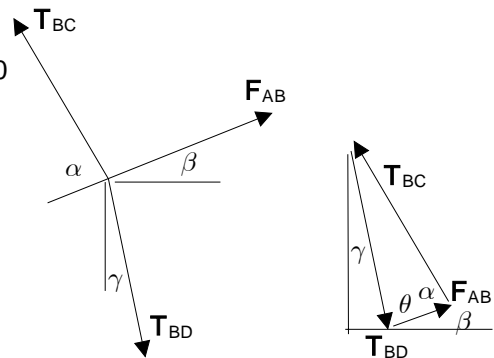
For minimum T_{BC} , $\alpha = 90.0^\circ$

(b) $\theta = 180^\circ - \beta - (90^\circ - \gamma)$

$$= 180^\circ - 30^\circ - (90^\circ - 20^\circ) = 80^\circ$$

$$T_{BC} = T_{BD} \sin\theta$$

$$= (310 \text{ N}) \sin 80^\circ = 305 \text{ N}$$



2.70 $P = 800 \text{ N}, \quad \alpha = 50^\circ, \quad \beta = 30^\circ$

(a) $F_x = 0 : -(P + T) \cos\alpha + T \cos\beta = 0$

$$T = \frac{P \cos\alpha}{\cos\beta - \cos\alpha} = \frac{(800 \text{ N}) \cos 50^\circ}{\cos 30^\circ - \cos 50^\circ}$$

$$= 2304 \text{ N} = 2.30 \text{ kN}$$

(b) $F_y = 0 : (P + T) \sin\alpha + T \sin\beta - Q = 0$

$$Q = (P + T) \sin\alpha + T \sin\beta$$

$$= (800 \text{ N} + 2304 \text{ N}) \sin 50^\circ + 2304 \text{ N} \sin 30^\circ$$

$$= 3529 \text{ N} = 3.53 \text{ kN}$$

