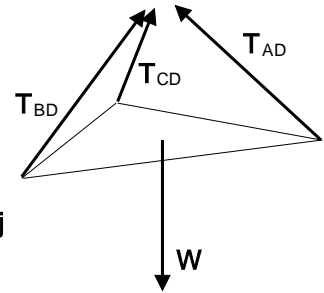


[2.15 ]

2.113  $W = m g = (16 \text{ kg}) (9.81 \text{ m/s}^2) = 156.96 \text{ N}$   
 $\mathbf{W} = - 156.96 \text{ N } \mathbf{j}$



$$d_{AD} = \sqrt{(-400 \text{ mm})^2 + (600 \text{ mm})^2 + 0} = 721.11 \text{ mm}$$

$$\lambda_{AD} = \frac{1}{721.11} [(-400) \mathbf{i} + 600 \mathbf{j}] = -0.5547 \mathbf{i} + 0.8320 \mathbf{j}$$

$$\mathbf{T}_{AD} = T_{AD} \lambda_{AD} = T_{AD} (-0.5547 \mathbf{i} + 0.8320 \mathbf{j})$$

$$d_{BD} = \sqrt{(200 \text{ mm})^2 + (600 \text{ mm})^2 + (-150 \text{ mm})^2} = 650 \text{ mm}$$

$$\lambda_{BD} = \frac{1}{650} [200 \mathbf{i} + 600 \mathbf{j} - 150 \mathbf{k}] = 0.3077 \mathbf{i} + 0.9231 \mathbf{j} - 0.2308 \mathbf{k}$$

$$\mathbf{T}_{BD} = T_{BD} \lambda_{BD} = T_{BD} (0.3077 \mathbf{i} + 0.9231 \mathbf{j} - 0.2308 \mathbf{k})$$

$$d_{CD} = \sqrt{(200 \text{ mm})^2 + (600 \text{ mm})^2 + (150 \text{ mm})^2} = 650 \text{ mm}$$

$$\lambda_{CD} = \frac{1}{650} [200 \mathbf{i} + 600 \mathbf{j} + 150 \mathbf{k}] = 0.3077 \mathbf{i} + 0.9231 \mathbf{j} + 0.2308 \mathbf{k}$$

$$\mathbf{T}_{CD} = T_{CD} \lambda_{CD} = T_{CD} (0.3077 \mathbf{i} + 0.9231 \mathbf{j} + 0.2308 \mathbf{k})$$

plate  $\mathbf{F} = 0 \quad \mathbf{T}_{AD} + \mathbf{T}_{BD} + \mathbf{T}_{CD} + \mathbf{W} = 0$

$$F_x = 0 ; -0.5547 T_{AD} + 0.3077 T_{BD} + 0.3077 T_{CD} = 0 \quad \dots$$

$$F_y = 0 ; 0.8320 T_{AD} + 0.9231 T_{BD} + 0.9231 T_{CD} + (-156.96 \text{ N}) = 0 \quad \dots$$

$$F_z = 0 ; \quad -0.2308 T_{BD} + 0.2308 T_{CD} = 0 \quad \dots$$

$$T_{BD} = T_{CD}$$

$$-0.5547 T_{AD} + 0.6154 T_{BD} = 0 \quad \dots$$

$$0.8320 T_{AD} + 1.8462 T_{BD} = 156.96 \text{ N} \quad \dots$$

$$-1.8462 \times \quad + 0.6154 \times$$

$$[(-1.8462)(-0.5547) + (0.6154)(0.8320)] T_{AD} = (0.6154) (156.96 \text{ N})$$

$$T_{AD} = 62.9 \text{ N}$$

$$0.8320 \times \quad + 0.5547 \times$$

$$[(0.8320)(0.6154) + (0.5547)(1.8462)] T_{BD} = (0.5547) (156.96 \text{ N})$$

$$T_{BD} = 56.7 \text{ N}$$

$$T_{CD} = 56.7 \text{ N}$$

$$2.127 \quad (0.40 \text{ m})^2 + y^2 + z^2 = (1 \text{ m})^2$$

$$y^2 + z^2 = 0.84 \text{ m}^2$$

$$\mathbf{P} = P \mathbf{j} = (680 \text{ N}) \mathbf{j}$$

$$\lambda_{AB} = \frac{1}{1 \text{ m}} \{(0.40 \text{ m}) \mathbf{i} - y \mathbf{j} + z \mathbf{k}\}$$

$$= 0.40 \mathbf{i} - y \mathbf{j} + z \mathbf{k}$$

(a)  $y = 0.3 \text{ m}$

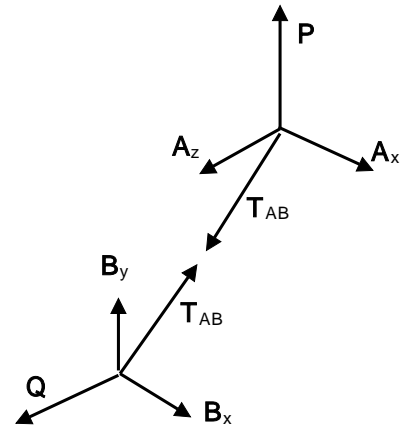
A  $\mathbf{F} = 0$

$$A_x \mathbf{i} + A_z \mathbf{k} + P \mathbf{j} + T_{AB} \lambda_{AB} = 0$$

$$A_x \mathbf{i} + A_z \mathbf{k} + (680 \text{ N}) \mathbf{j} + T_{AB} (0.40 \mathbf{i} - y \mathbf{j} + z \mathbf{k}) = 0$$

$$\mathbf{j} \quad ; \quad (680 \text{ N}) - (0.3) T_{AB} = 0$$

$$T_{AB} = 2267 \text{ N} = 2.27 \text{ kN}$$



(b)  $z = \sqrt{0.84 \text{ m}^2 - (0.3 \text{ m})^2} = 0.8660 \text{ m}$

B  $\mathbf{F} = 0$

$$B_x \mathbf{i} + B_y \mathbf{j} + Q \mathbf{k} - T_{AB} \lambda_{AB} = 0$$

$$B_x \mathbf{i} + B_y \mathbf{j} + Q \mathbf{k} - T_{AB} (0.40 \mathbf{i} - y \mathbf{j} + z \mathbf{k}) = 0$$

$$\mathbf{k} \quad ; \quad Q - (0.8660) (2267 \text{ N}) = 0$$

$$Q = 1963 \text{ N} = 1.963 \text{ kN}$$