

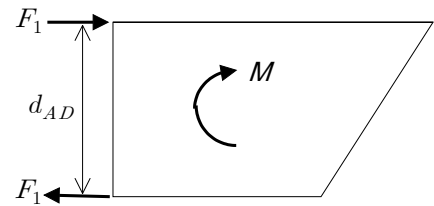
<3.12~3.16 >

3.69  $M = 13.5 \text{ N}\cdot\text{m}$

(a)  $d_{AD} = 0.25 \text{ m}$

$$M = F_1 d_{AD}$$

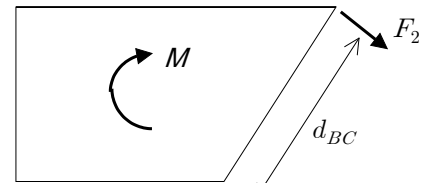
$$F_1 = \frac{M}{d_{AD}} = \frac{13.5 \text{ N}\cdot\text{m}}{0.25 \text{ m}} = 54.0 \text{ N}$$



(b)  $d_{BC} = \sqrt{(0.25 \text{ m})^2 + (0.15 \text{ m})^2} = 0.2915 \text{ m}$

$$M = F_2 d_{BC}$$

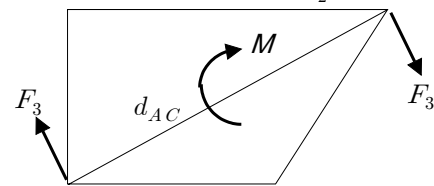
$$F_2 = \frac{M}{d_{BC}} = \frac{13.5 \text{ N}\cdot\text{m}}{0.2915 \text{ m}} = 46.3 \text{ N}$$



(c)  $d_{AC} = \sqrt{(0.4 \text{ m})^2 + (0.25 \text{ m})^2} = 0.4717 \text{ m}$

$$M = F_3 d_{AC}$$

$$F_3 = \frac{M}{d_{AC}} = \frac{13.5 \text{ N}\cdot\text{m}}{0.4717 \text{ m}} = 28.6 \text{ N}$$



3.72  $\mathbf{M}_1 = -(8 \text{ N}\cdot\text{m}) \mathbf{j}$ ,  $\mathbf{M}_2 = -(6 \text{ N}\cdot\text{m}) \mathbf{k}$

$$\mathbf{M} = \mathbf{M}_1 + \mathbf{M}_2 = -8 \mathbf{j} - 6 \mathbf{k} \text{ (N}\cdot\text{m)}$$

$$M = \sqrt{(-8 \text{ N}\cdot\text{m})^2 + (-6 \text{ N}\cdot\text{m})^2} = 10.00 \text{ N}\cdot\text{m} \text{ : magnitude}$$

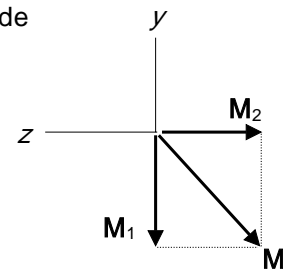
$$\lambda = \frac{\mathbf{M}}{M} = \frac{1}{10.0 \text{ N}\cdot\text{m}} [-8 \mathbf{j} - 6 \mathbf{k} \text{ (N}\cdot\text{m)}]$$

$$= -0.8 \mathbf{j} - 0.6 \mathbf{k}$$

$$\cos\theta_x = 0 \quad \theta_x = 90.0^\circ$$

$$\cos\theta_y = -0.8 \quad \theta_y = \cos^{-1}(-0.8) = 143.1^\circ$$

$$\cos\theta_z = -0.6 \quad \theta_z = \cos^{-1}(-0.6) = 126.9^\circ$$



3.83  $M_C : [(1100 \text{ N}) \sin 60^\circ](3.6 \text{ m}) = (F_A \sin 60^\circ)(9.6 \text{ m})$

$$F_A = \frac{(1100 \text{ N})(3.6 \text{ m})}{(9.6 \text{ m})} = 412 \text{ N}$$

$$\mathbf{F}_A = 412 \text{ N } \swarrow 60^\circ$$

$M_A : [(1100 \text{ N}) \sin 60^\circ](6.0 \text{ m}) = (F_C \sin 60^\circ)(9.6 \text{ m})$

$$F_C = \frac{(1100 \text{ N})(6.0 \text{ m})}{(9.6 \text{ m})} = 687.5 \text{ N}$$

$$\mathbf{F}_C = 688 \text{ N } \swarrow 60^\circ$$

