

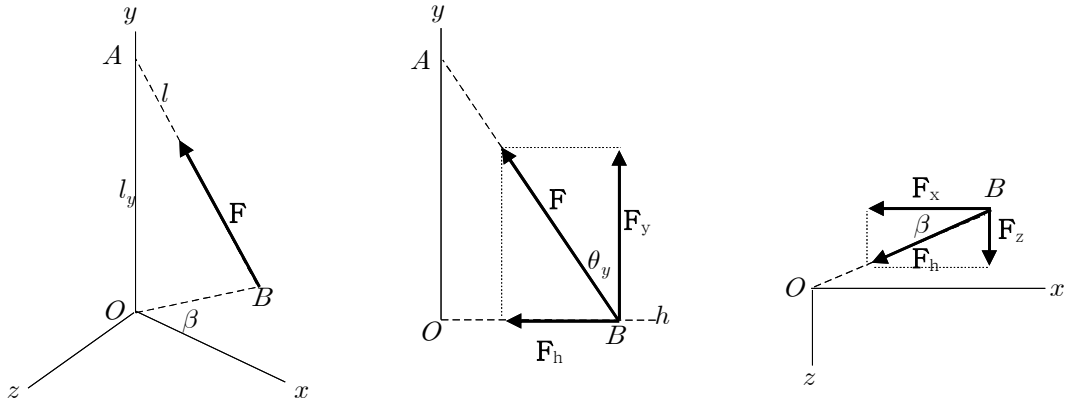
[2.4절]

2.77 $T = F = 15 \text{ kN}$, $l = 32.5 \text{ m}$, $l_y = 28 \text{ m}$, $\beta = 20^\circ$

S; known F , l , l_y , β , unknown F_x , F_y , F_z , θ_x , θ_y , θ_z

⇒ 공간에서 힘의 직각성분 (각도 이용)

M;



A; 방향여현 $\cos\theta_y = \frac{l_y}{l} = \frac{28 \text{ m}}{32.5 \text{ m}} = 0.8615$

$$\Rightarrow \theta_y = \cos^{-1}(0.8615) = 30.51^\circ$$

$$(a) F_y = F \cos\theta_y = (15 \text{ kN})(0.8615) = 12.923 \text{ kN} \quad \Rightarrow \quad \mathbf{F}_y = 12.92 \text{ kN } \mathbf{j}$$

$$F_h = F \sin\theta_y = (15 \text{ kN}) \sin 30.51^\circ = 7.615 \text{ kN}$$

$$F_x = -F_h \cos\beta = -(7.615 \text{ kN}) \cos 20^\circ = -7.156 \text{ kN} \quad \Rightarrow \quad \mathbf{F}_x = -7.16 \text{ kN } \mathbf{i}$$

$$F_z = F_h \sin\beta = (7.615 \text{ kN}) \sin 20^\circ = 2.604 \text{ kN} \quad \Rightarrow \quad \mathbf{F}_z = 2.60 \text{ kN } \mathbf{k}$$

$$(b) \theta_y = 30.5^\circ$$

$$\cos\theta_x = \frac{F_x}{F} = \frac{-7.16 \text{ kN}}{15 \text{ kN}} = -0.4773 \quad \Rightarrow \quad \theta_x = \cos^{-1}(-0.4773) = 118.5^\circ$$

$$\cos\theta_z = \frac{F_z}{F} = \frac{2.60 \text{ kN}}{15 \text{ kN}} = 0.17333 \quad \Rightarrow \quad \theta_z = \cos^{-1}(0.17333) = 80.0^\circ$$

R; 과정의 타당성 (가령, B 지점에서 힘의 방향)

T; 결과 검토 (가령, 힘 성분의 부호와 방향 각도의 범위)