

{4.6~4.7절}

4.68 [두 힘의 평형, 세 힘의 평형, 세 힘의 작용선이 한 점에서 만남]

$$\alpha = 45^\circ, \quad P = 80 \text{ N}$$

$$\tan \theta = \frac{160 + 120 \text{ mm}}{250 \text{ mm}} = 1.120$$

$$\Rightarrow \theta = \tan^{-1}(1.120) = 48.24^\circ$$

$$\beta = \theta - \alpha = 48.24^\circ - 45^\circ = 3.24^\circ$$

$$\gamma = 90^\circ - \theta = 90^\circ - 48.24^\circ = 41.76^\circ$$

$$\frac{R}{\sin(180^\circ - \alpha)} = \frac{P}{\sin \beta}$$

$$\Rightarrow R = P \frac{\sin(180^\circ - \alpha)}{\sin \beta} = (80 \text{ N}) \frac{\sin 135^\circ}{\sin 3.24^\circ}$$

$$= 1000.9 \text{ N}$$

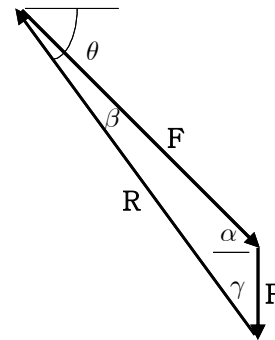
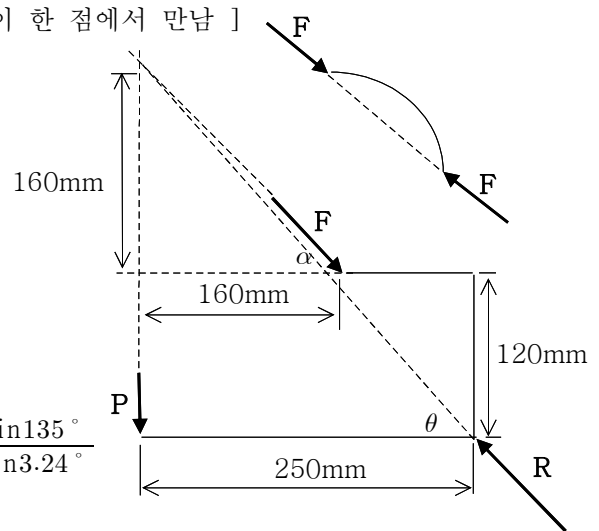
$$\Rightarrow \mathbf{R} = 1001 \text{ N } \searrow 48.2^\circ$$

$$\frac{F}{\sin \gamma} = \frac{P}{\sin \beta}$$

$$\Rightarrow F = P \frac{\sin \gamma}{\sin \beta} = (80 \text{ N}) \frac{\sin 41.76^\circ}{\sin 3.24^\circ}$$

$$= 942.7 \text{ N}$$

$$\Rightarrow \mathbf{F} = 943 \text{ N } \swarrow 45.0^\circ$$



4.72 [세 힘의 평형, 세 힘의 작용선이 한 점에서 만남]

$$W = 200 \text{ N}$$

$$\tan \alpha = \frac{EF}{AF} = \frac{460 \text{ mm}}{240 \text{ mm}} = \frac{23}{12} = 1.917$$

$$\Rightarrow \alpha = \tan^{-1}(1.917) = 62.45^\circ$$

$$\tan \beta = \frac{EH}{DH} = \frac{100 \text{ mm}}{240 \text{ mm}} = \frac{5}{12} = 0.417$$

$$\Rightarrow \beta = \tan^{-1}(0.417) = 22.62^\circ$$

$$\frac{A}{\sin(90^\circ - \beta)} = \frac{T}{\sin(90^\circ - \alpha)} = \frac{W}{\sin(\alpha + \beta)}$$

$$A = W \frac{\sin(90^\circ - \beta)}{\sin(\alpha + \beta)}$$

$$= (200 \text{ N}) \frac{\sin(90^\circ - 22.62^\circ)}{\sin(62.45^\circ + 22.62^\circ)} = 185.3 \text{ N}$$

$$\Rightarrow \mathbf{A} = 185.3 \text{ N } \nearrow 62.4^\circ$$

$$T = W \frac{\sin(90^\circ - \alpha)}{\sin(\alpha + \beta)}$$

$$= (200 \text{ N}) \frac{\sin(90^\circ - 62.45^\circ)}{\sin(62.45^\circ + 22.62^\circ)} = 92.8 \text{ N}$$

