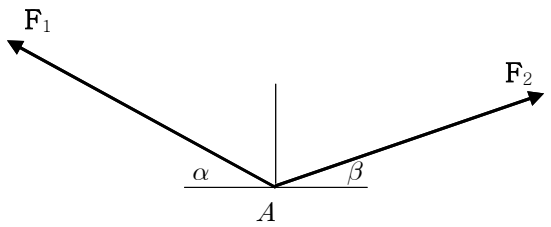
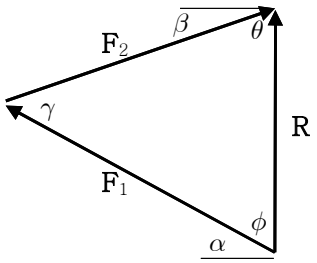
{2.1~6절}

2.8 [힘의 합성, 삼각법]

자유물체도



힘 삼각형



F_1 = 30 N,　R is vertical.　α = 28°,　β = 10°

$\gamma = \alpha + \beta = 28° + 10° = 38°$

$\phi = 90° - \alpha = 90° - 28° = 62°$

$\theta = 90° - \beta = 90° - 10° = 80°$

(a) $\dfrac{F_2}{\sin\phi} = \dfrac{F_1}{\sin\theta}$　⇒　$F_2 = F_1 \dfrac{\sin\phi}{\sin\theta} = (30\text{ N}) \dfrac{\sin 62^\circ}{\sin 80^\circ} = 26.89\text{ N}$

⇒　F_2 = 26.9 N

(b) <방법 1>

$\dfrac{R}{\sin\gamma} = \dfrac{F_1}{\sin\theta}$　⇒　$R = F_1 \dfrac{\sin\gamma}{\sin\theta} = (30\text{ N}) \dfrac{\sin 38^\circ}{\sin 80^\circ} = 18.754\text{ N}$

⇒　R = 18.75 N

<방법 2>

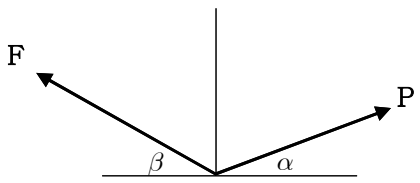
$R^2 = F_1^2 + F_2^2 - 2F_1F_2\cos\gamma$

$= (30\text{ N})^2 + (26.89\text{ N})^2 - 2(30\text{ N})(26.89\text{ N})\cos 38° = 351.695\text{ N}^2$

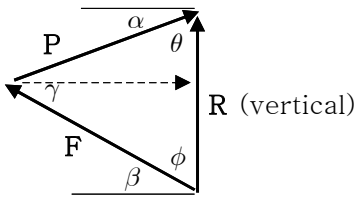
$R = (351.695\text{ N}^2)^{1/2} = 18.753\text{ N}$　⇒　R = 18.75 N

2.13 [힘의 분해, 삼각법]

자유물체도



힘 삼각형



F = 425 N,　β = 30°,　R is vertical.

$\phi = 90° - \beta = 90° - 30° = 60°$

smallest P　⇒　θ = 90°　⇒　α = 0°,　$\gamma = \beta$ = 30°

(a) $P = F\sin\phi = (425\text{ N})\sin 60° = 368.0\text{ N}$

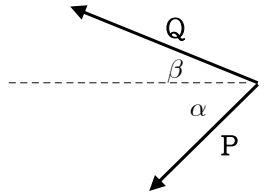
⇒　P = 368 N →

(b) $R = F\cos\phi = (425\text{ N})\cos 60° = 212.5\text{ N}$

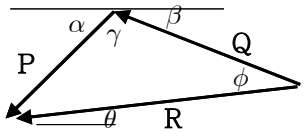
⇒　R = 213 N

2.18 [힘의 합성, 삼각법]

자유물체도



힘 삼각형



P = 75 N, Q = 50 N, α = 50°, β = 25°

γ = 180° − ($\alpha+\beta$) = 180° − (50° + 25°) = 105°

<u>크기</u>

$R^2 = P^2 + Q^2 - 2PQ\cos\gamma$

$= (75\ \text{N})^2 + (50\ \text{N})^2 - 2(75\ \text{N})(50\ \text{N})\cos105° = 10066.1\ \text{N}^2$

$R = (10066.1\ \text{N}^2)^{1/2} = 100.33\ \text{N}$

<u>방향 각도</u>

<방법 1> $\dfrac{P}{\sin\phi} = \dfrac{R}{\sin\gamma}$

$\sin\phi = \dfrac{P}{R}\sin\gamma = \dfrac{75\ \text{N}}{100.33\ \text{N}}\sin105° = 0.7220$

$\phi = \sin^{-1}(0.7220) = 46.22°$

$\theta = \phi - \beta = 46.22° - 25° = 21.22°$

<방법 2> $\dfrac{Q}{\sin\psi} = \dfrac{R}{\sin\gamma}$

$\sin\psi = \dfrac{Q}{R}\sin\gamma = \dfrac{50\ \text{N}}{100.33\ \text{N}}\sin105° = 0.4813$

$\phi = \sin^{-1}(0.4813) = 28.77°$

$\theta = \alpha - \psi = 50° - 28.77° = 21.22°$

⇒ **R** = 100.3 N ↙21.2°