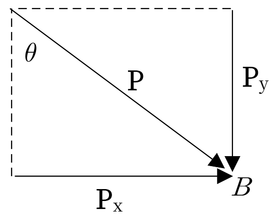
[2.7~2.8절]

2.28 [힘의 직각성분]

P_x = 260 N, θ = 50°



(a) $P_x = P\ \sin\theta$

$\Rightarrow \quad P = \dfrac{P_x}{\sin\theta} = \dfrac{260\ \mathrm{N}}{\sin 50^\circ} = 339\ \mathrm{N}$

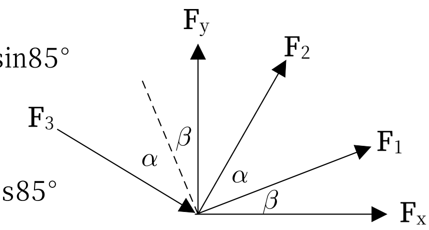
(b) $\dfrac{P_x}{P_y} = \tan\theta$

$\Rightarrow \quad P_y = \dfrac{P_x}{\tan\theta} = \dfrac{260\ \mathrm{N}}{\tan 50^\circ} = 218\ \mathrm{N} \quad \Rightarrow \quad \mathbf{P}_y = 218\ \mathrm{N}\ \downarrow$

2.37 [직각성분 힘의 합성]

α = 65°, β = 20°, F_1 = 300 N, F_2 = 400 N, F_3 = 600 N

<방법1>



$F_x = F_1\ \cos\beta\ +\ F_2\ \cos(\alpha+\beta)\ +\ F_3\ \sin(\alpha+\beta)$

$= (300\ \mathrm{N})\ \cos 20^\circ + (400\ \mathrm{N})\ \cos 85^\circ + (600\ \mathrm{N})\ \sin 85^\circ$

$= 914.5\ \mathrm{N}$

$F_y = F_1\ \sin\beta\ +\ F_2\ \sin(\alpha+\beta)\ -\ F_3\ \cos(\alpha+\beta)$

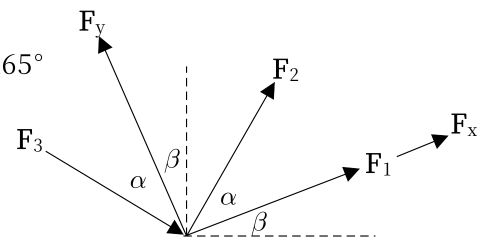
$= (300\ \mathrm{N})\ \sin 20^\circ + (400\ \mathrm{N})\ \sin 85^\circ - (600\ \mathrm{N})\ \cos 85^\circ$

$= 448.8\ \mathrm{N}$

$R = \sqrt{F_x^2+F_y^2} = \sqrt{(914.5\ \mathrm{N})^2+(448.8\ \mathrm{N})^2} = 1019\ \mathrm{N}$

$\theta = \tan^{-1}\dfrac{F_y}{F_x} = \tan^{-1}\dfrac{448.8\ \mathrm{N}}{914.5\ \mathrm{N}} = \tan^{-1}(0.4908) = 26.1^\circ \quad \Rightarrow \quad \mathbf{R} = 1019\ \mathrm{N}\ \angle 26.1^\circ$

<방법2>



$F_x = F_1\ +\ F_2\ \cos\alpha\ +\ F_3\ \sin\alpha$

$= (300\ \mathrm{N}) + (400\ \mathrm{N})\ \cos 65^\circ + (600\ \mathrm{N})\ \sin 65^\circ$

$= 1012.8\ \mathrm{N}$

$F_y = F_2\ \sin\alpha\ -\ F_3\ \cos\alpha$

$= (400\ \mathrm{N})\ \sin 65^\circ - (600\ \mathrm{N})\ \cos 65^\circ$

$= 108.95\ \mathrm{N}$

$R = \sqrt{F_x^2+F_y^2} = \sqrt{(1012.8\ \mathrm{N})^2+(108.95\ \mathrm{N})^2} = 1019\ \mathrm{N}$

$\gamma = \tan^{-1}\dfrac{F_y}{F_x} = \tan^{-1}\dfrac{108.95\ \mathrm{N}}{1012.8\ \mathrm{N}} = \tan^{-1}(0.1076) = 6.14^\circ$

$\theta = \beta + \gamma = 20^\circ + 6.14^\circ = 26.1^\circ \quad \Rightarrow \quad \mathbf{R} = 1019\ \mathrm{N}\ \angle 26.1^\circ$