[2.7~8절]

2.35 [직각성분 합에 의한 힘의 합성]
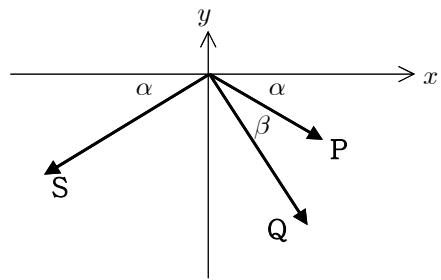
P = 100 N,　　Q = 150 N,　　S = 200 N

α = 35°,　　β = 30°,

$\gamma = \alpha + \beta$ = 35° + 30° = 65°

$R_x = P_x + Q_x + S_x$

　　$= P \cos\alpha + Q \cos\gamma - S \cos\alpha$

　　$=$ (100 N) cos35° + (150 N) cos65° − (200 N) cos35°

　　$=$ (81.92 N) + (63.40 N) − (163.83 N)　=　−18.51 N

$R_y = P_y + Q_y + S_y$

　　$= -P \sin\alpha - Q \sin\gamma - S \sin\alpha$

　　$=$ −(100 N) sin35° − (150 N) sin65° − (200 N) sin35°

　　$=$ −(57.36 N) − (135.95 N) − (114.72 N)　=　−308.03 N

$R = \sqrt{R_x^2 + R_y^2} = \sqrt{(-18.51\,\text{N})^2 + (-308.03\,\text{N})^2}$ = 308.59 N

$\tan\theta = \dfrac{R_y}{R_x} = \dfrac{-308.03\,\text{N}}{-18.51\,\text{N}}$ = 16.641　⇒　$\theta = \tan^{-1}(16.641)$ = 86.56°

R = 309 N ⟋86.6°
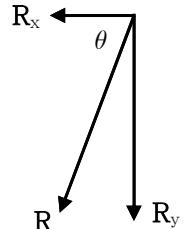
2.36 [직각성분 합에 의한 힘의 합성]

T = 365 N

P = 500 N,　　Q = 200 N

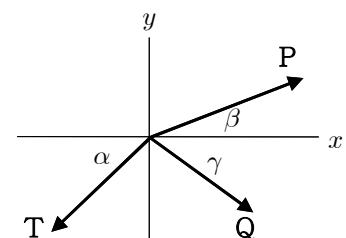$\tan\alpha = \dfrac{110}{96}$ = 1.1458　⇒　$\alpha = \tan^{-1}(1.1458)$ = 48.89°

$\cos\beta = \dfrac{24}{25}$,　$\sin\beta = \dfrac{7}{25}$,　　$\cos\gamma = \dfrac{4}{5}$,　$\sin\gamma = \dfrac{3}{5}$

$R_x = T_x + P_x + Q_x$

　　$= -T \cos\alpha + P \cos\beta + Q \cos\gamma$

　　$=$ −(365 N) cos48.89° + (500 N) $\dfrac{24}{25}$ + (200 N) $\dfrac{4}{5}$

　　$=$ −(240.0 N) + (480 N) + (160 N)　=　400.0 N

$R_y = T_x + P_x + Q_x$

　　$= -T \sin\alpha + P \sin\beta - Q \sin\gamma$

　　$=$ −(365 N) sin48.89° + (500 N) $\dfrac{7}{25}$ − (200 N) $\dfrac{3}{5}$

　　$=$ −(275.0 N) + (140 N) − (120 N)　=　−255.0 N
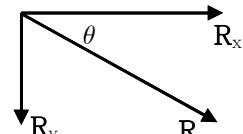
$R = \sqrt{R_x^2 + R_y^2} = \sqrt{(400.0\,\text{N})^2 + (-255.0\,\text{N})^2}$ = 474.4 N

$\tan\theta = \dfrac{R_y}{R_x} = \dfrac{-255.0\,\text{N}}{400.0\,\text{N}}$ = −0.6375　⇒　$\theta = \tan^{-1}(-0.6375)$ = −32.52°

R = 474 N ⟍32.5°