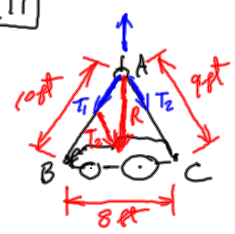
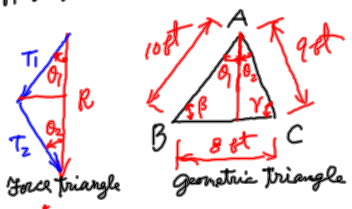
2.11



$T_1 = 4$ kips $\quad T_2 = ?$

$\vec{R} = \vec{T_1} + \vec{T_2} = R\downarrow$

applying the triangle rule, we have



Law of cosines:

$9^2 = 8^2 + 10^2 - 2(8)(10)\cos\beta$

$\therefore \beta = \square$

$\beta + \theta_1 = 90^\circ \quad \therefore \boxed{\theta_1 = \square}$

$10^2 = 8^2 + 9^2 - 2(8)(9)\cos\gamma$

$\therefore \gamma = \square$

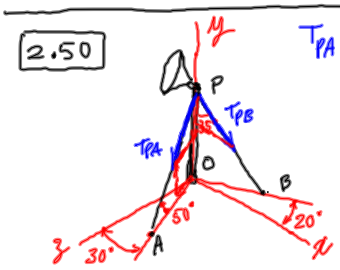
$\gamma + \theta_2 = 90^\circ \quad \therefore \boxed{\theta_2 = \square}$

$T_1 \sin\theta_1 = T_2 \sin\theta_2$

$T_2 = \dfrac{T_1 \sin\theta_1}{\sin\theta_2} = \square$

$\boxed{T_2 = \square \text{ kips}}$

2.50



$T_{PA} = 400\,N, \quad T_{PB} = 600\,N. \quad \vec{R} = ?$

$\vec{R} = \vec{T}_{PA} + \vec{T}_{PB}$

Side view for $\vec{T}_{PA}$:

Top view for $\vec{T}_{PA}$:

$\vec{T}_{PA} = (400\cos 40^\circ)(-\vec{j}) + (400\sin 40^\circ \sin 30^\circ)\vec{i} + (400\sin 40^\circ \cos 30^\circ)\vec{k}$

$\vec{T}_{PA} = \square\,\vec{i} - \square\,\vec{j} + \square\,\vec{k}$

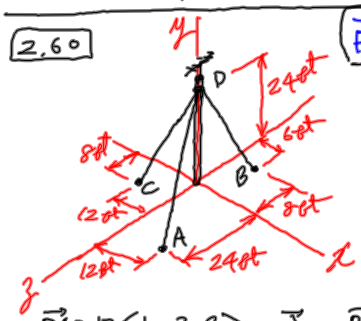
analytical expression for $\vec{T}_{PA}$

Similarly, find $\vec{T}_{PB} = \square\,\vec{i} + \square\,\vec{j} + \square\,\vec{k}$

$\therefore \vec{R} = \vec{T}_{PA} + \vec{T}_{PB} = \square$

$\boxed{\vec{R} = \square\ N}$

2.60



$\boxed{\vec{F}_{DA} + \vec{F}_{DB} + \vec{F}_{DC} = \vec{R}}, \quad \vec{R} = -168\vec{j}$ lb

$F_{DA} = ? \quad F_{DB} = ? \quad F_{DC} = ?$

$\boxed{\vec{F} = F\vec{\lambda}_F}$ V.V. ... I.

$A(12,0,24),\ B(6,0,-8),\ C(-12,0,8)$

$D(0,24,0)$

$\vec{DA} = 12\vec{i} - 24\vec{j} + 24\vec{k} = \langle 12, -24, 24\rangle$

$\vec{DA} = 12\langle 1,-2,2\rangle, \quad \vec{\lambda}_{DA} = \dfrac{\vec{DA}}{DA}, \quad DA = 12\sqrt{1^2+2^2+2^2} = 12(3)$

$\vec{\lambda}_{DA} = \frac{1}{3}\langle 1,-2,2\rangle, \quad \vec{F}_{DA} = F_{DA}\vec{\lambda}_{DA}, \quad \boxed{\vec{F}_{DA} = \frac{F_{DA}}{3}\langle 1,-2,2\rangle}$

Similarly, get $\boxed{\vec{F}_{DB} = \frac{F_{DB}}{\square}\langle \square,\square,\square\rangle}, \quad \boxed{\vec{F}_{DC} = \frac{F_{DC}}{\square}\langle \square,\square,\square\rangle}$

$(\frac{1}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC})\vec{i} + (-\frac{2}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC})\vec{j}$

$+ (\frac{2}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC})\vec{k} = -168\vec{j}$

$\vec{i}: \ \frac{1}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC} = 0$

$\vec{j}: \ -\frac{2}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC} = -168$

$\vec{k}: \ \frac{2}{3}F_{DA} + \frac{\square}{\square}F_{DB} + \frac{\square}{\square}F_{DC} = 0$

Solve the 3 eqs. for the 3 unknowns.

$\boxed{F_{DA} = \square \text{ lb}} \quad \boxed{F_{DB} = \square \text{ lb}} \quad \boxed{F_{DC} = \square \text{ lb}}$