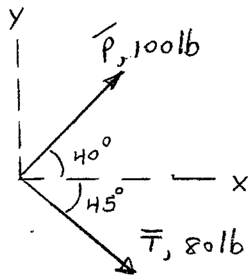
2A. Using the x-y coordinate system shown.
Find the **i** and **j** components of force **P**.
Find the **i** and **j** components of force **T**
Find the resultant force **R** = **P** + **T** in **i** and **j** component form



$\bar{P} = \bar{P}_x + \bar{P}_y$

$\bar{P}_x = 100\,lb \cos 40° (\bar{i})$

$\bar{P}_x = 76.6\,lb (\bar{i})$

$\bar{P}_y = 100\,lb \sin 40° (\bar{j})$

$\bar{P}_y = 64.3\,lb (\bar{j})$

$\bar{P} = 76.6 (\bar{i}) + 64.3 (\bar{j})\ lb$

$\bar{T} = \bar{T}_x + \bar{T}_y$

$\bar{T}_x = 80\,lb \cos 45° (\bar{i})$

$\bar{T}_x = 56.6\,lb (\bar{i})$

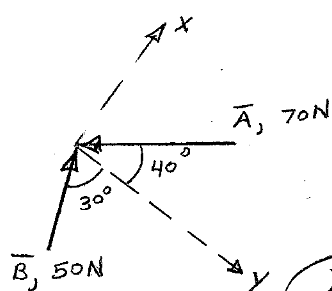
$\bar{T}_y = 80\,lb \sin 45° (-\bar{j})$

$\bar{T}_y = 56.6\,lb (-\bar{j})$

$\bar{T} = 56.6(\bar{i}) + 56.6(-\bar{j})\ lb$

$\bar{R} = \bar{P} + \bar{T} = 133(\bar{i}) + 7.7(\bar{j})\ lb$

2B. Using the x-y coordinate system shown.
Find the **i** and **j** components of force **A**.
Find the **i** and **j** components of force **B**
Find the resultant force **R** = **A** + **B** in **i** and **j** component form



$\bar{A} = \bar{A}_x + \bar{A}_y$

$\bar{A}_x = 70N \sin 40° (-\bar{i})$

$\bar{A}_x = 45.0N (-\bar{i})$

$\bar{A}_y = 70N \cos 40° (-\bar{j})$

$\bar{A}_y = 53.6N (-\bar{j})$

$\bar{A} = 45(-\bar{i}) + 53.6(-\bar{j})\ N$

$\bar{B} = \bar{B}_x + \bar{B}_y$

$\bar{B}_x = 50N \sin 30° (\bar{i})$

$\bar{B}_x = 25N (\bar{i})$

$\bar{B}_y = 50N \cos 30° (-\bar{j})$

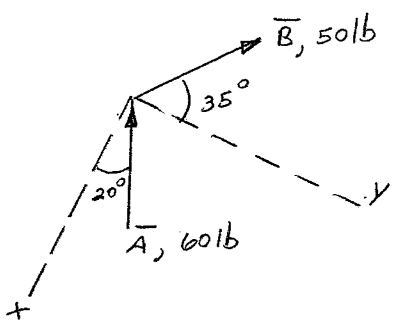
$\bar{B}_y = 43.3N (-\bar{j})$

$\bar{B} = 25(\bar{i}) + 43.3N(-\bar{j})$

$\bar{R} = \bar{A} + \bar{B} = (-45+25)(\bar{i}) + (-53.6-43.3)(\bar{j})$

$\bar{R} = 20(-\bar{i}) + 96.9(-\bar{j})\ N$

2C. Using the x-y coordinate system shown.
Find the **i** and **j** components of force **A**.
Find the **i** and **j** components of force **B**
Find the resultant force **R** = **A** + **B** in **i** and **j** component form



$\bar{A} = \bar{A}_x + \bar{A}_y$

$\bar{A}_x = 60\,lb \cos 20° (-\bar{i})$

$\bar{A}_x = 56.4\,lb (-\bar{i})$

$\bar{A}_y = 60\,lb \sin 20° (-\bar{j})$

$\bar{A}_y = 20.5\,lb (-\bar{j})$

$\bar{A} = 56.4(-\bar{i}) + 20.5(-\bar{j})\ lb$

$\bar{B} = \bar{B}_x + \bar{B}_y$

$\bar{B}_x = 50\,lb \sin 35° (-\bar{i})$

$\bar{B}_x = 28.7\,lb (-\bar{i})$

$\bar{B}_y = 50\,lb \cos 35° (\bar{j})$

$\bar{B}_y = 41.0\,lb (\bar{j})$

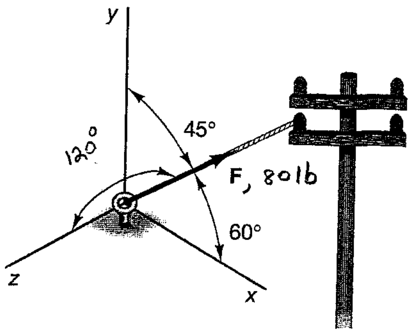
$\bar{B} = 28.7(-\bar{i}) + 41(\bar{j})\ lb$

$\bar{R} = \bar{A} + \bar{B}$

$\bar{R} = (-56.4 - 28.7)\bar{i} + (-20.5 + 41)\bar{j}$

$\bar{R} = 85.1(-\bar{i}) + 20.5(\bar{j})\ lb$

Find the **i**, **j**, and **k** components for the force shown below.



$\bar{F}_x = F\cos 60°(\bar{i})$

$\bar{F}_x = 40lb(\bar{i})$

$\bar{F}_y = F\cos 45°(\bar{j})$

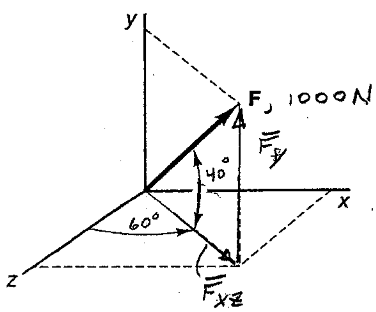
$\bar{F}_y = 56.5lb(\bar{j})$

$\bar{F}_z = F\cos 120°(\bar{k})$

$\bar{F}_z = 40lb(-\bar{k})$

$\bar{F} = 40(\bar{i}) + 56.5(\bar{j}) + 40(-\bar{k})\ (lb)$

Find the **i**, **j**, and **k** components for the force shown below.
Find the values of the direction cosine angles α, β, and γ associated with this force vector and draw them on the figure.



$\bar{F} = \bar{F}_{xz} + \bar{F}_y$

$F_{xz} = 1000N\cos 40° = 766N$

$F_y = 1000N\sin 40° = 643N$

$\bar{F}_y = 643N(\bar{j})$

$\bar{F}_{xz} = \bar{F}_x + \bar{F}_z$

$\bar{F}_x = F_{xz}\sin 60°(\bar{i}) = 663N(\bar{i})$

$\bar{F}_z = F_{xz}\cos 60°(\bar{k}) = 383N(\bar{k})$

$\bar{F} = 663(\bar{i}) + 643(\bar{j}) + 383(\bar{k})\ (N)$

$F\cos\alpha = F_x$

$\cos\alpha = \frac{F_x}{F} = \frac{663}{1000} = .663$

$\alpha = 48.5°$

$\cos\beta = \frac{F_y}{F} = \frac{643}{1000} = .643$

$\beta = 50°$

$\cos\gamma = \frac{F_z}{F} = \frac{383}{1000} = .383$

$\gamma = 67.4°$