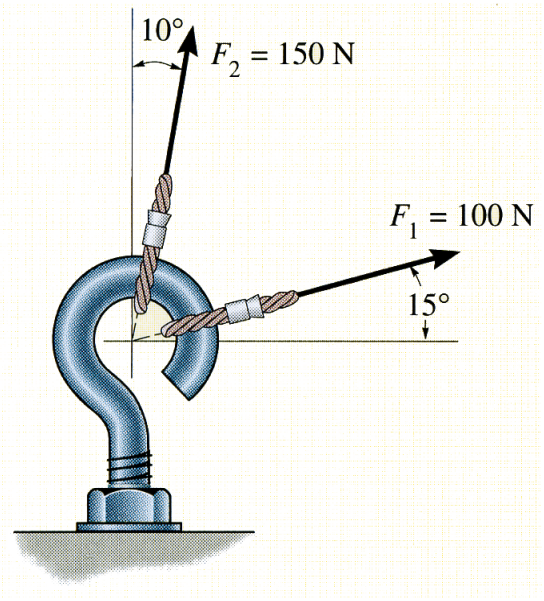
CMGT 350 Principles of Statics and Strength of Materials

Supplemental Problems

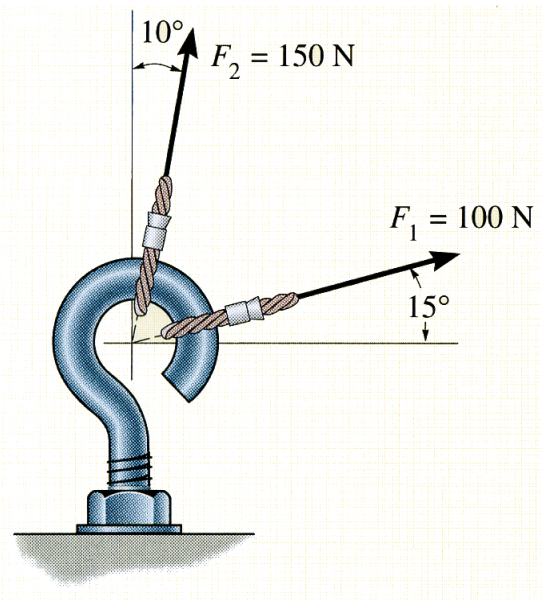
Chapter 2 - Resultant of Coplanar Force Systems

1. The screw eye is subjected to two forces, F_1 and F_2. Determine the magnitude and direction of the resultant force.



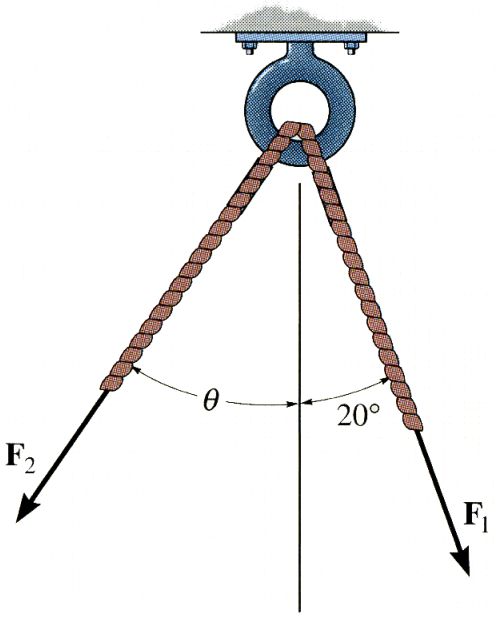
Solution. Use the Parallelogram Law

2. The screw eye is subjected to two forces, F_1 and F_2. Determine the magnitude and direction of the resultant force.



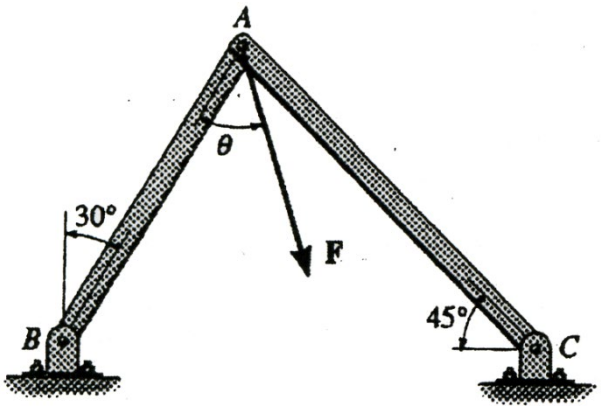
Solution. Use the Triangle Rule

3. The ring shown is subjected to two forces, $\mathbf{F}_1$ and $\mathbf{F}_2$. If it is required that the resultant force have a magnitude of 1 kN and be directed vertically downward, determine (a) the magnitudes of $\mathbf{F}_1$ and $\mathbf{F}_2$ provided $\theta = 30°$, and (b) the magnitudes of $\mathbf{F}_1$ and $\mathbf{F}_2$ if $\mathbf{F}_2$ is to be a minimum.



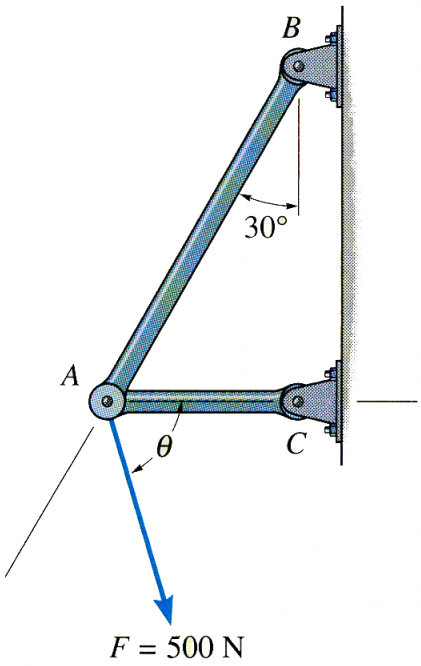
Solution.

4. Determine the magnitude and direction θ of **F** so that this force has components of 40 N acting from A toward B and 60 N acting from A toward C on the frame.



Solution.

5. The force **F** acting on the frame has a magnitude of 500 N and is to be resolved into two components acting along members AB and AC. Determine the angle θ, measured below the horizontal, so that the component $\mathbf{F}_{AC}$ is directed from A toward C and has a magnitude of 400 N.



Solution.

Adding Force Vectors Graphically
[You will need a protractor and ruler to complete this problem]

6. Determine the magnitude and direction of the resultant for the forces acting on the flange shown in Fig 1 graphically (Graph paper is attached.)

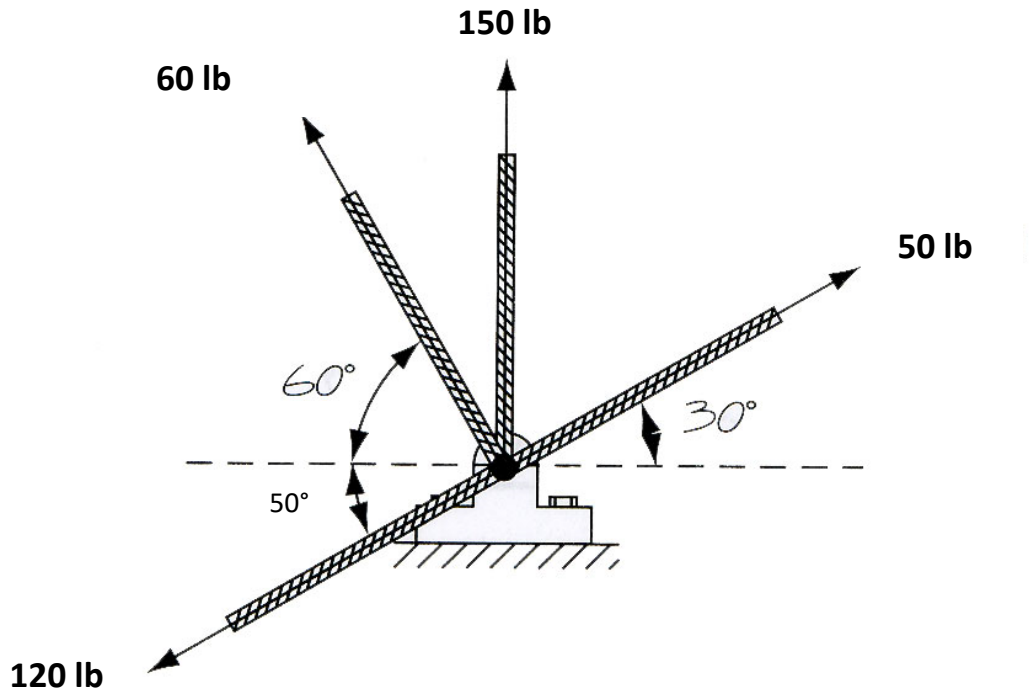
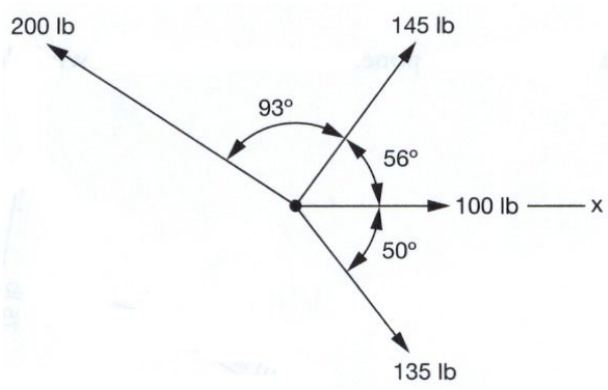


Fig. 1

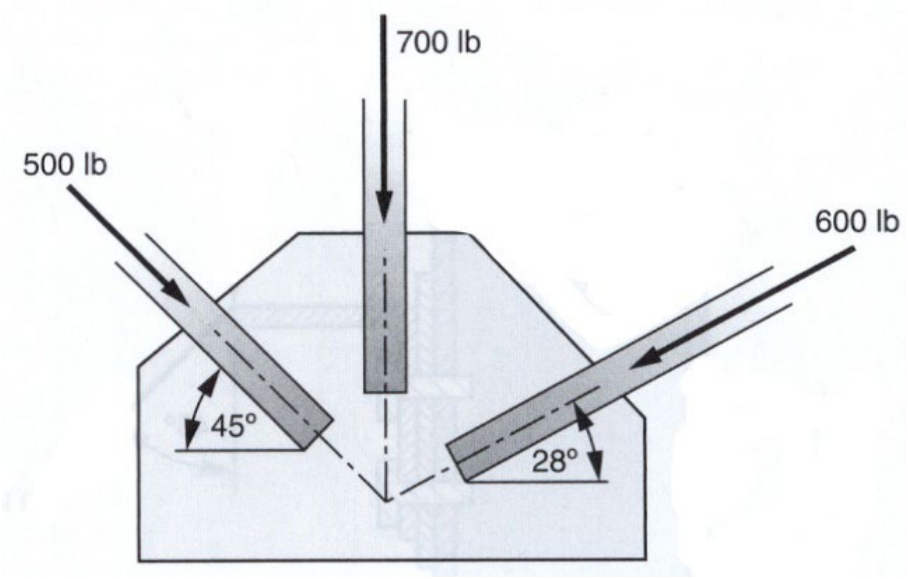
7. Using the method of rectangular components, find the **resultant** of the following concurrent forces.



Solution.
Note: All angles measured CCW from the +x axis

Force (lb)	**Direction (θ)**	**$F_x = F \cos \theta$ (lb)**	**$F_y = F \sin \theta$ (lb)**
		$\Sigma F_x =$	$\Sigma F_y =$

8. Three plates are connected using welds with concurrent forces applied as shown. Calculate the **resultant** of the forces.



Solution.

Note: All angles measured CCW from the +x axis

Force (lb)	**Direction (θ)**	**F_x = F cos θ (lb)**	**F_y = F sin θ (lb)**
		$\Sigma F_x =$	$\Sigma F_y =$