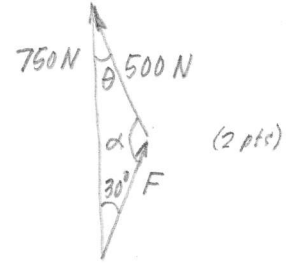
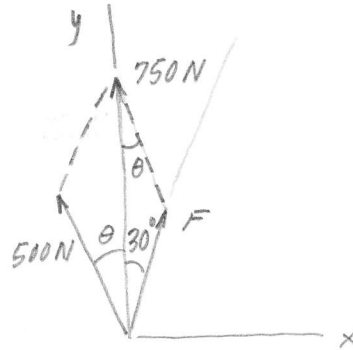
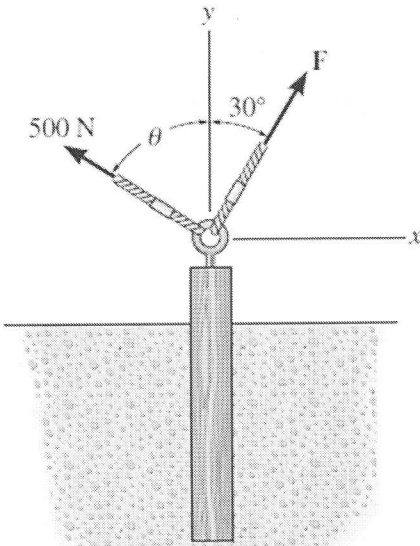


StarID or TechID (no names) Grading

Show your work (you will not receive any credit if all you have is a final answer, right or wrong).
Do one of the two problems shown below (the second problem is on the back).

1. Two forces are applied as shown below. Determine the angle θ ($0^\circ \leq \theta \leq 90^\circ$) and the magnitude of the force F so that the resultant force is directed along the positive y-axis and has a magnitude of 750 N.



$$\frac{\sin \alpha}{750 \text{ N}} = \frac{\sin 30^\circ}{500 \text{ N}} \quad (2 \text{ pts})$$

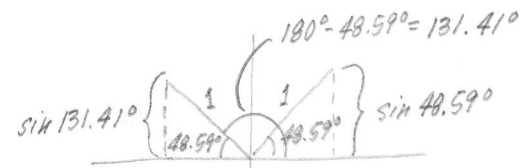
$$\alpha = 48.59^\circ$$

$$\theta = 180^\circ - (48.59^\circ + 30^\circ) \quad (2 \text{ pts})$$

$$\theta = 101.41^\circ \quad \text{not possible}$$

$$0^\circ \leq \theta \leq 90^\circ$$

from diagram α appears to be $> 90^\circ$



$$\sin 48.59^\circ = \sin 131.41^\circ = 0.75$$

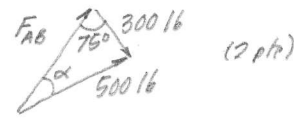
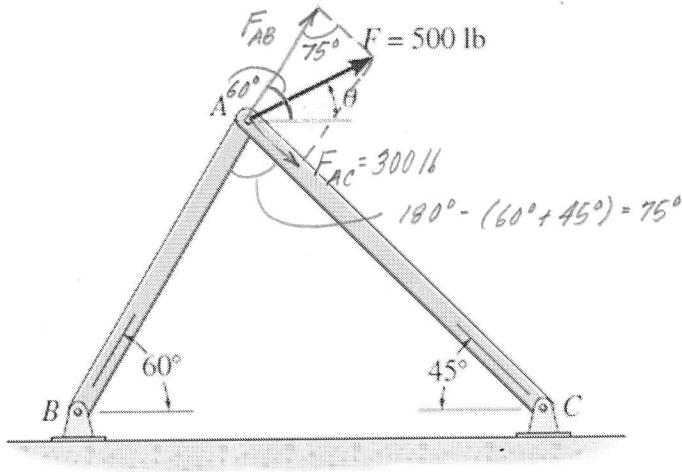
$$\theta = 180^\circ - (131.41^\circ + 30^\circ)$$

$$\theta = 18.59^\circ \rightarrow \boxed{18.6^\circ} \quad (2 \text{ pts})$$

$$\frac{F}{\sin(18.59^\circ)} = \frac{500 \text{ N}}{\sin(30^\circ)}$$

$$F = 318.79 \text{ N} \rightarrow \boxed{319 \text{ N}} \quad (2 \text{ pts})$$

2. The 500 lb force shown below is to be resolved into two components, one acting along the axis defined by member AB and the other acting along the axis defined by member AC. The component of the force acting along the axis defined by member AC is 300 lb and is in a direction from A to C. Determine the magnitude of the force acting along the axis defined by member AB and determine the angle θ .



$$\frac{\sin \alpha}{300 \text{ lb}} = \frac{\sin 75^\circ}{500 \text{ lb}} \quad (2 \text{ pts})$$

$$\alpha = 35.42^\circ$$

$$\theta = 60^\circ - 35.42^\circ = 24.58^\circ$$

$$\rightarrow \boxed{24.6^\circ} \quad (2 \text{ pts})$$

$$\frac{F_{AB}}{\sin(180^\circ - (75^\circ + 35.42^\circ))} = \frac{500 \text{ lb}}{\sin(75^\circ)}$$

$$F_{AB} = 485.1 \text{ lb} \rightarrow \boxed{485 \text{ lb}} \quad (4 \text{ pts})$$