

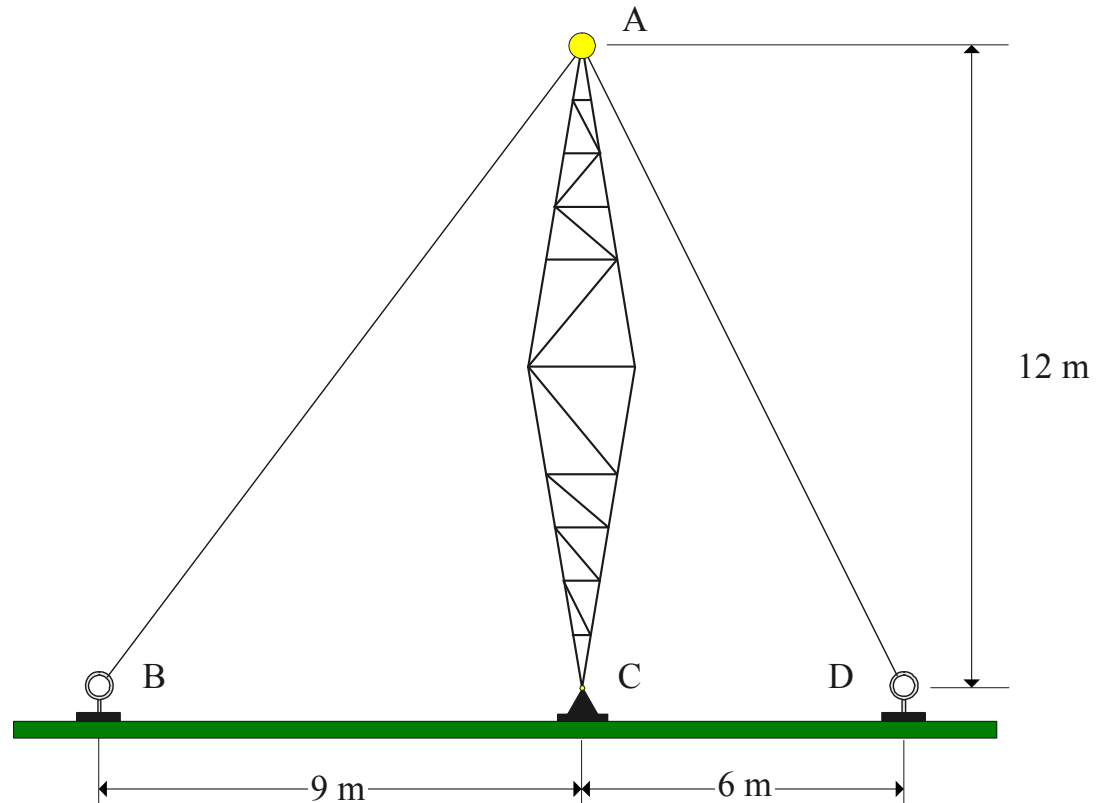
# Example 2.2

J. Frye

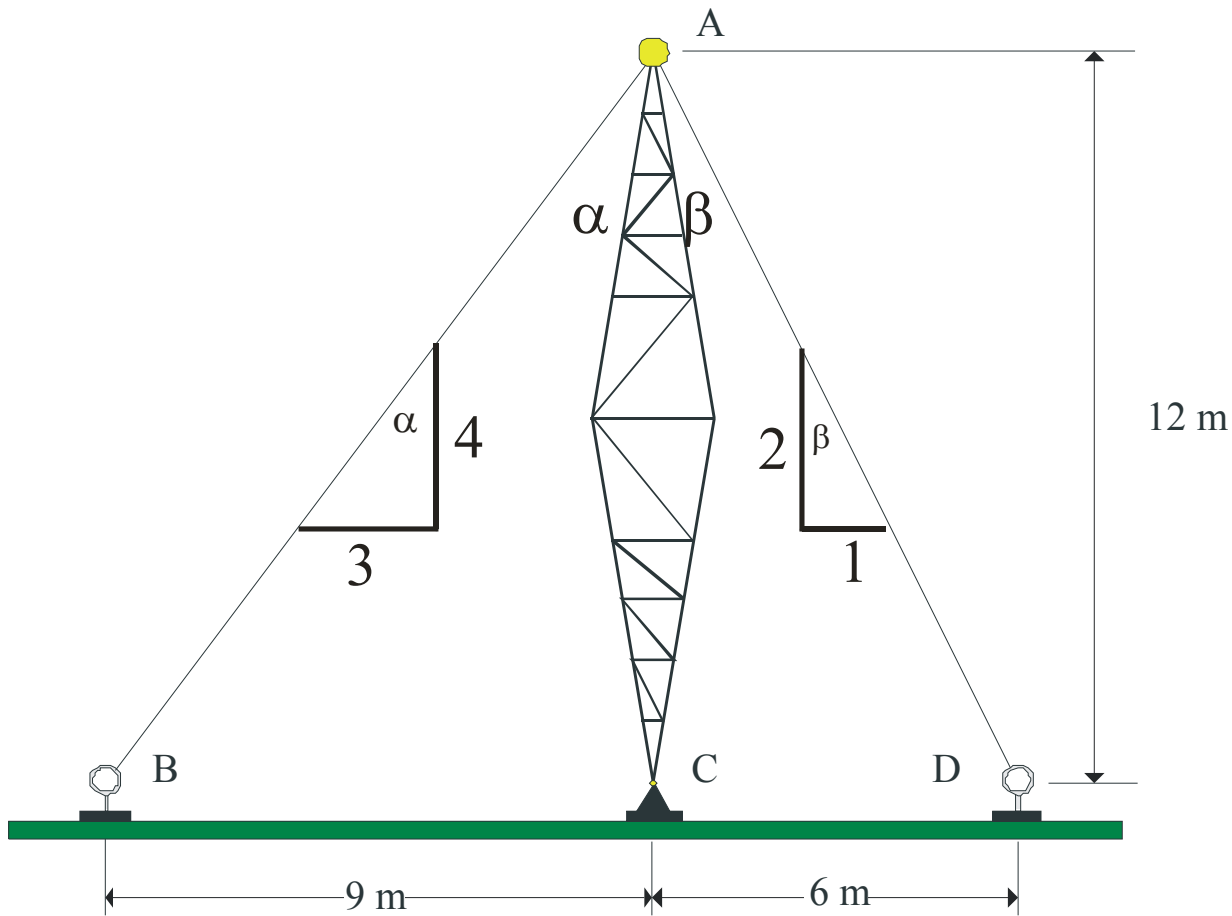
### Example 2.2:

The cable stays AB and AD support a transmission pole AC. Knowing that the tension is 1500 N in AB and 600 N in AD, determine the magnitude and direction of the resultant,  $\mathbf{R}$ , of the forces exerted by the stays at A;

- (a) graphically by the parallelogram or triangle rule;
- (b) Using trigonometry (sine and cosine laws).



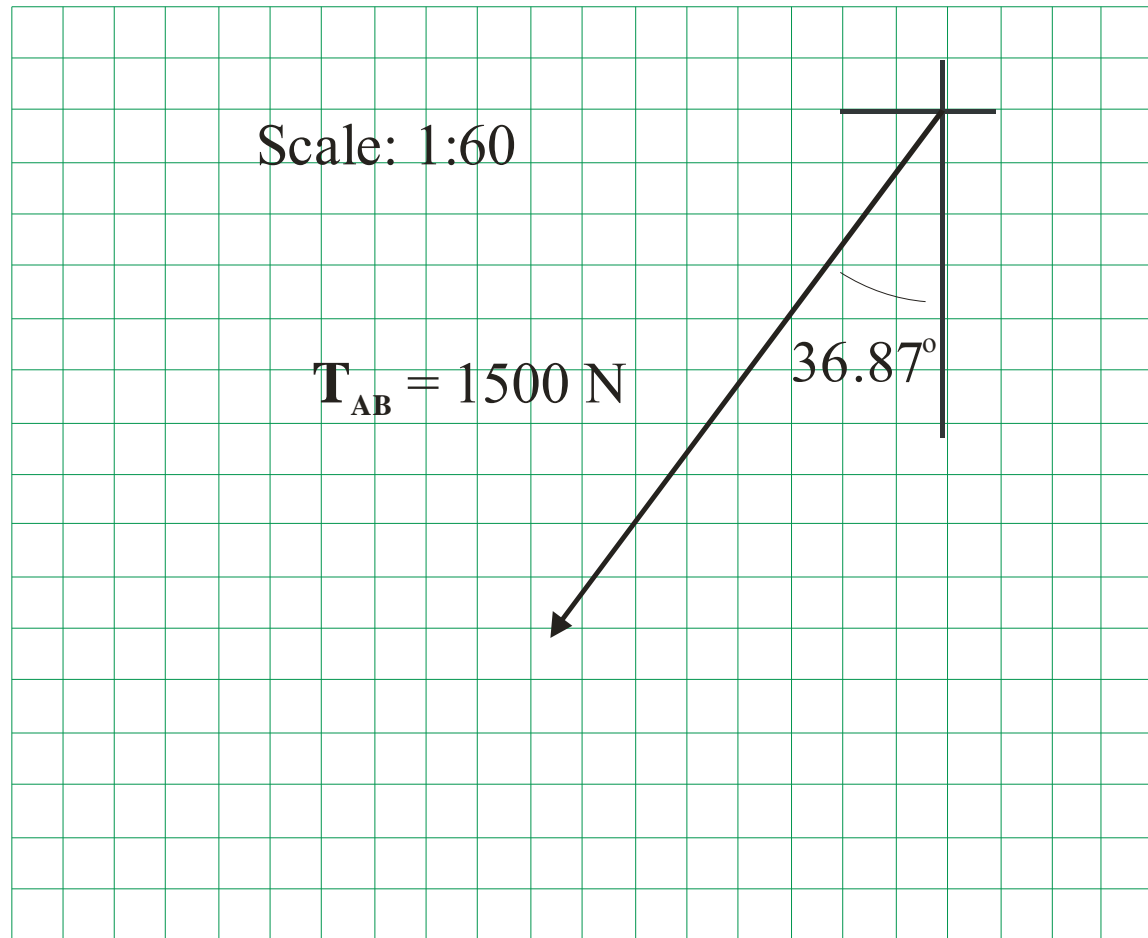
We will need  $\alpha$  and  $\beta$  for Graphical Solution:  
From the slopes of the cables:



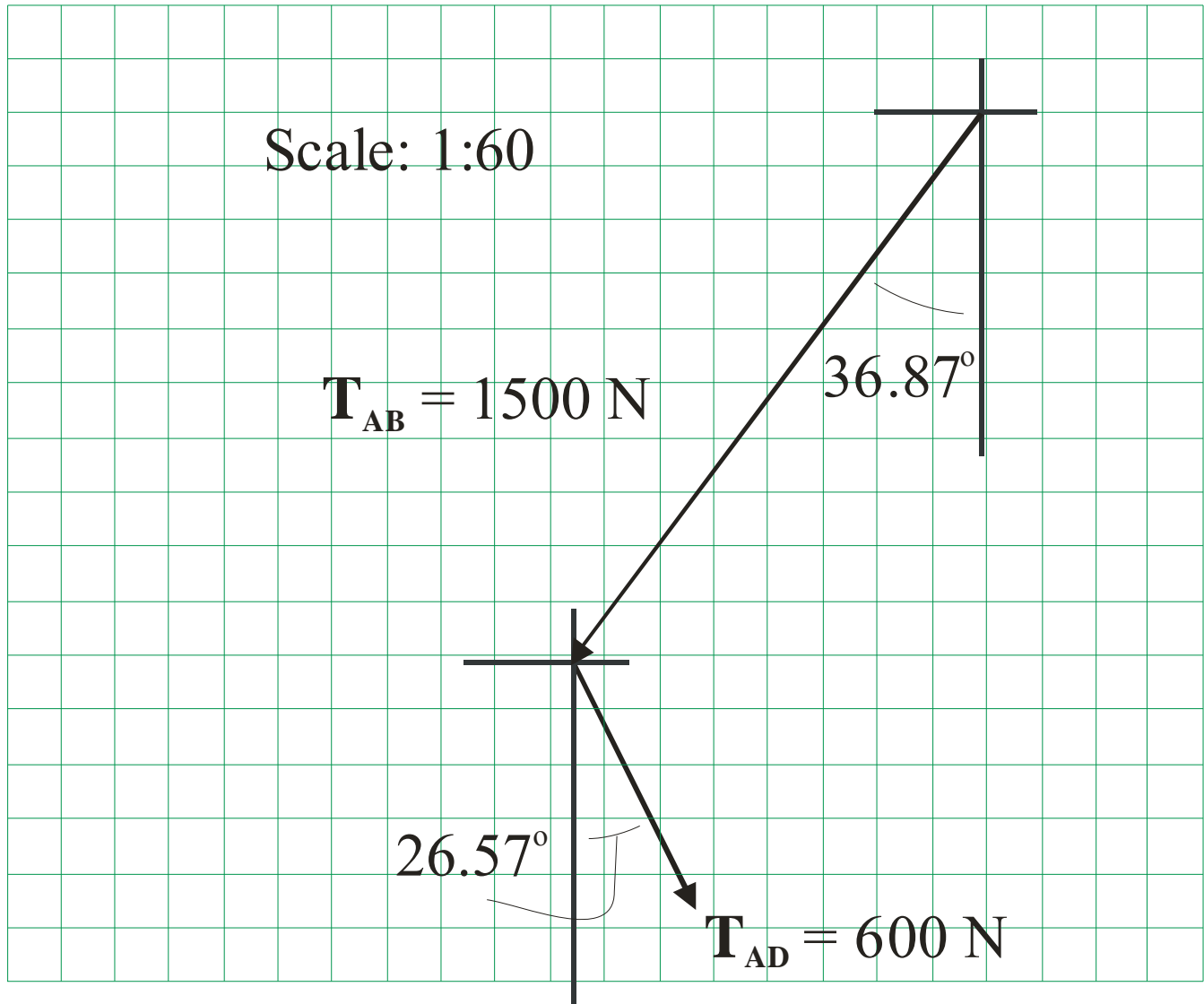
$$\tan \alpha = \frac{3}{4}$$
$$\alpha = 36.87^\circ$$
$$\tan \beta = \frac{1}{2}$$
$$\beta = 26.57^\circ$$

## GRAPHICAL SOLUTION:

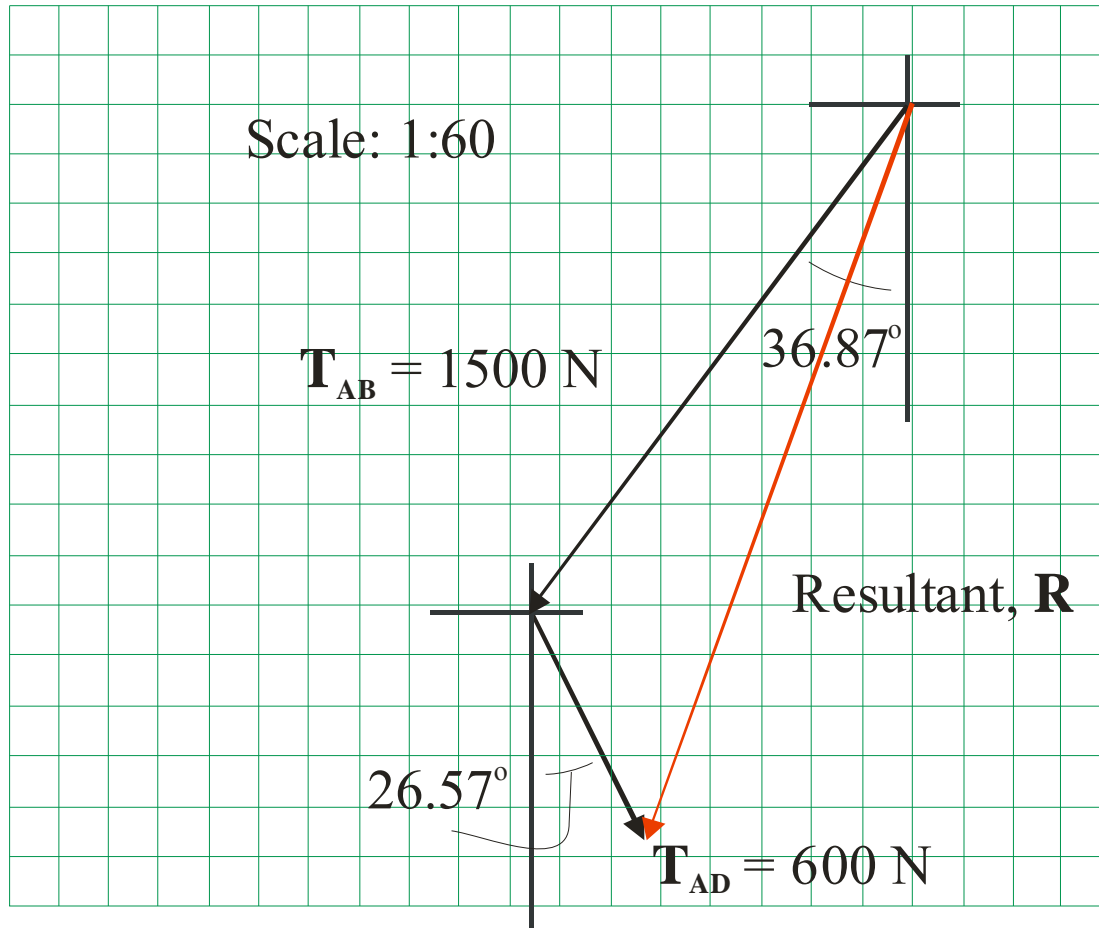
Select a suitable scale and plot  $\mathbf{T}_{AB} = 1500 \text{ N}$



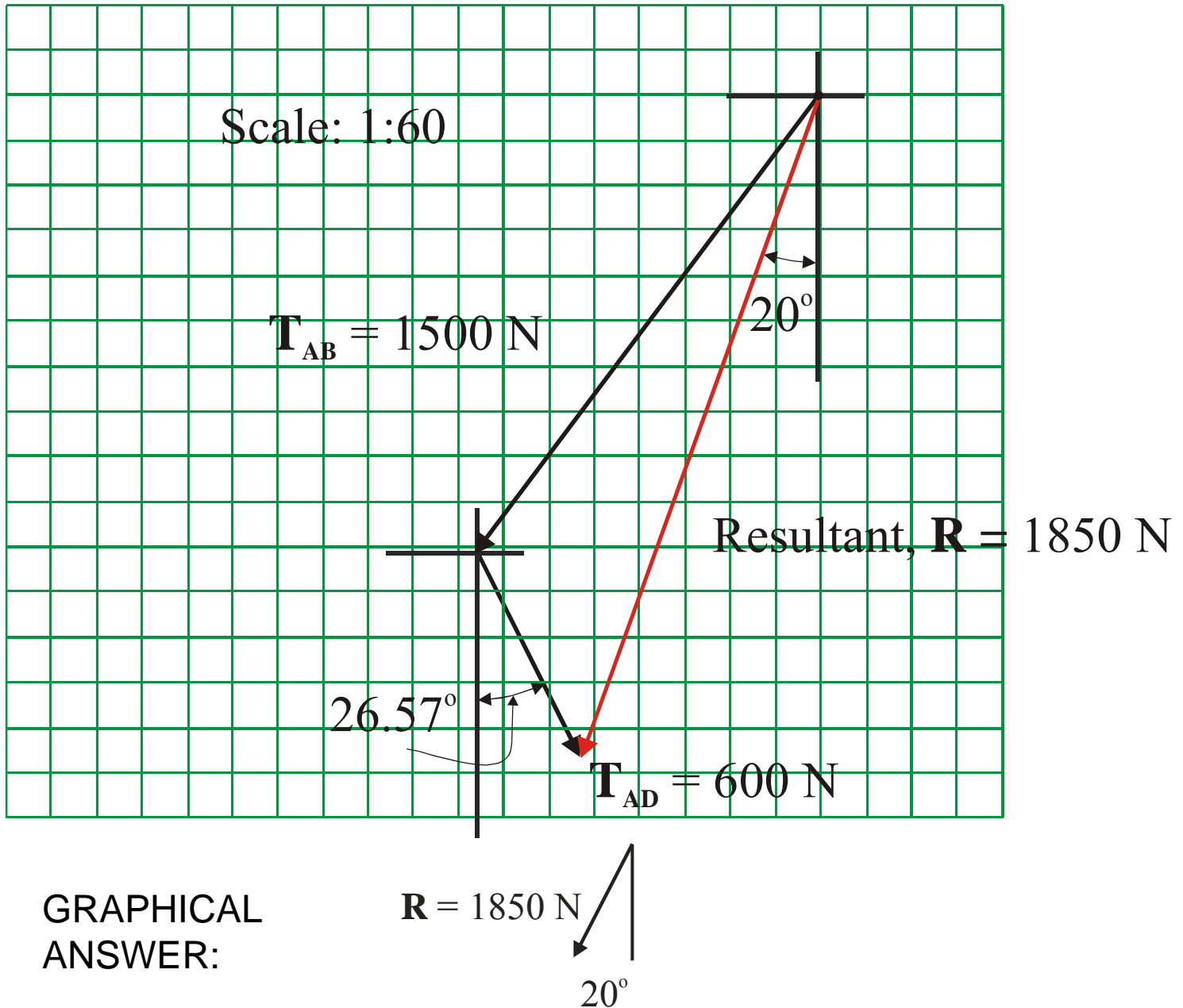
At the “Tip” of  $\mathbf{T}_{AB}$  Plot  $\mathbf{T}_{AD} = 600 \text{ N}$



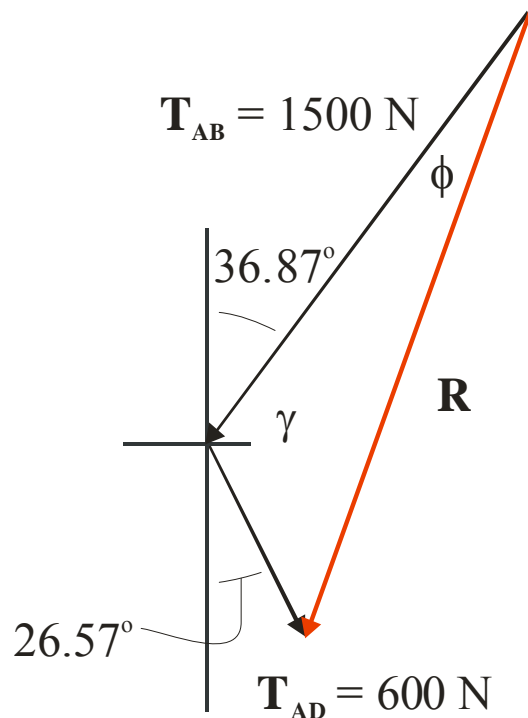
The Resultant,  $\mathbf{R}$  of  $\mathbf{T}_{AB}$  and  $\mathbf{T}_{AD}$  is drawn from the “Tail” of  $\mathbf{T}_{AB}$  to the “Tip” of  $\mathbf{T}_{AD}$



## GRAPHICAL SOLUTION:



## TRIG SOLUTION:



$$\gamma = 180^\circ - 36.87^\circ - 26.57^\circ = 116.56^\circ$$

Cosine Rule :

$$R^2 = 1500^2 + 600^2 - 2(1500)(600)\cos 116.56^\circ$$

$$R^2 = 3414842.53$$

$$R = 1847.9\text{ N}$$

Sine Rule :

$$\frac{600}{\sin \phi} = \frac{1847.9}{\sin 116.56^\circ}$$

$$\phi = 16.9^\circ$$



## TRIG SOLUTION:

