

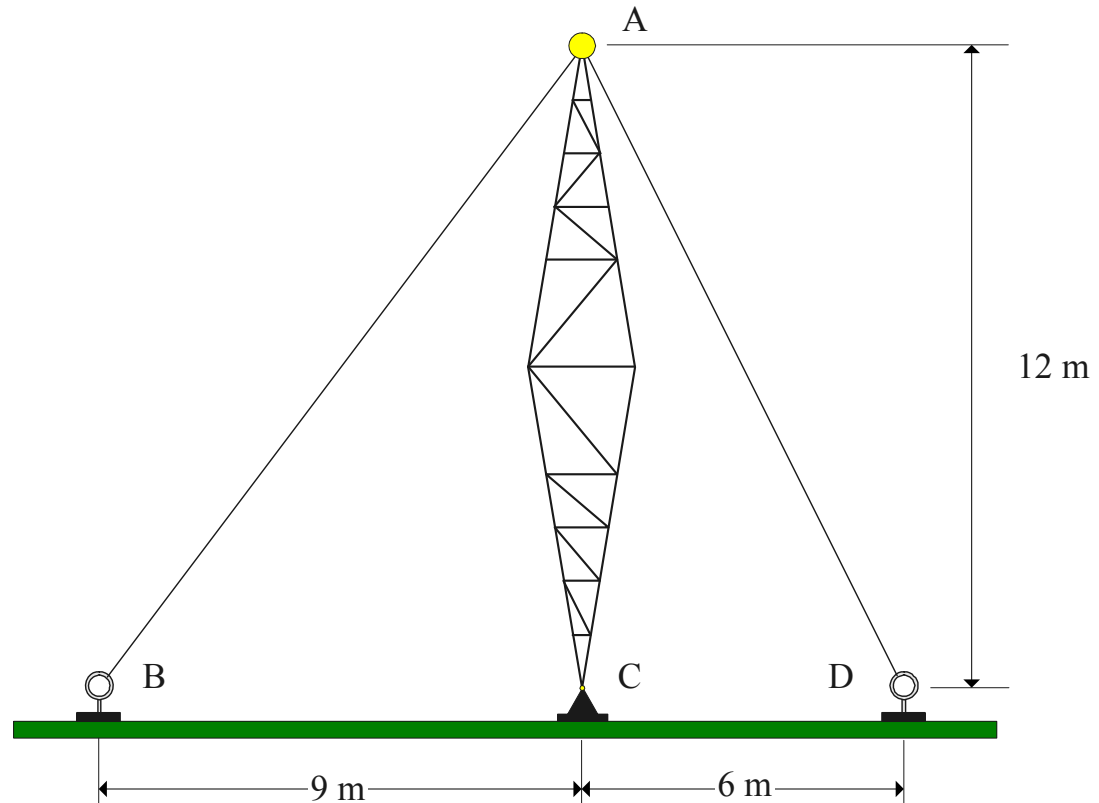
Example 2.2

J. Frye

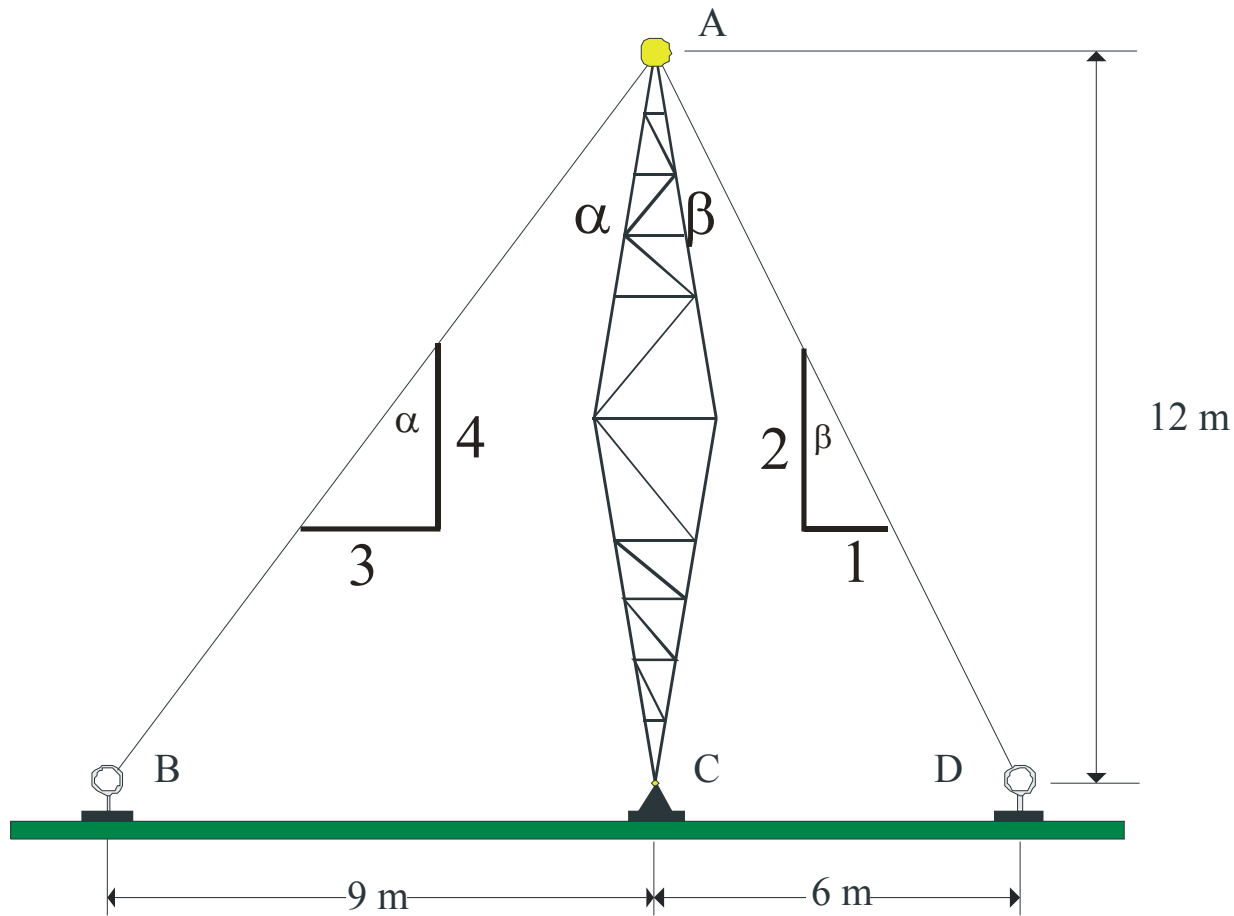
Example 2.2:

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 α and β for Graphical Solution:
From the slopes of the cables:



$$\tan \alpha = \frac{3}{4}$$

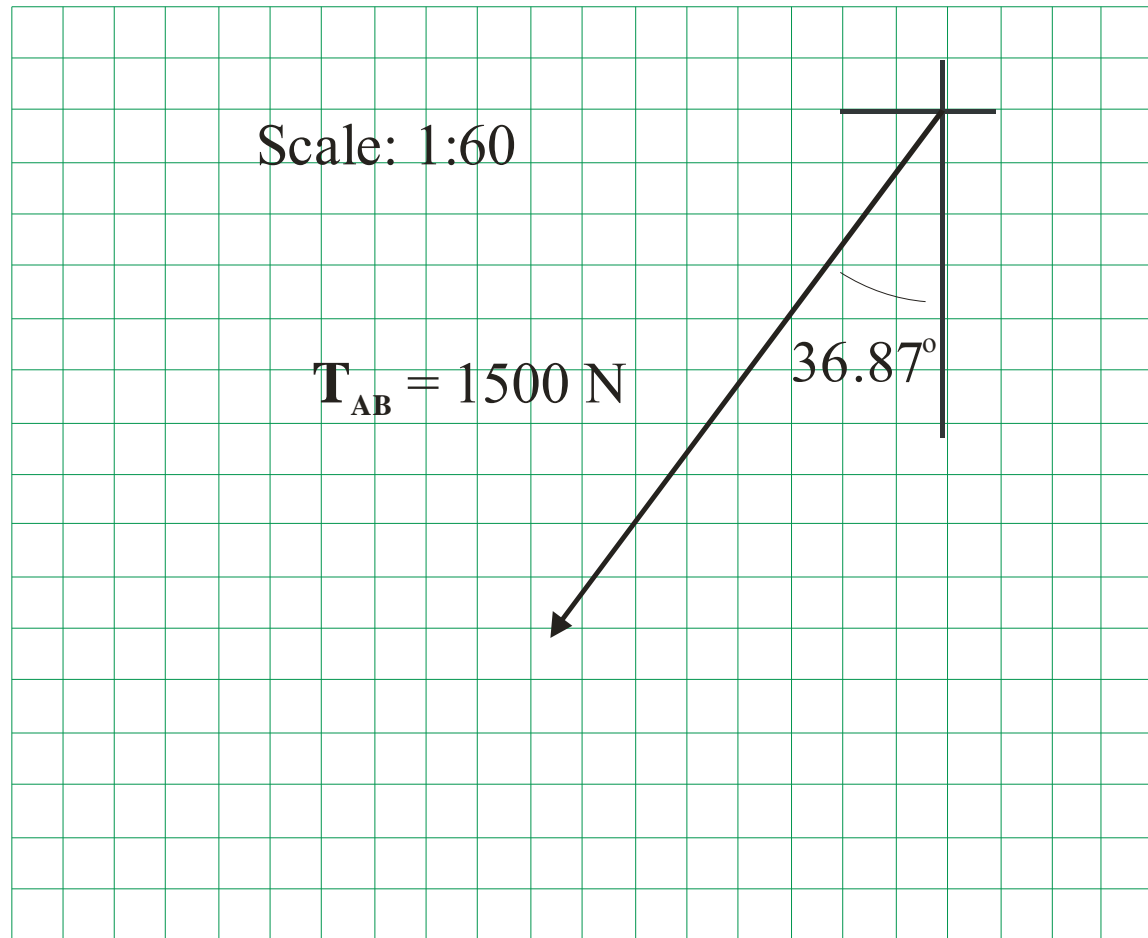
$$\alpha = 36.87^\circ$$

$$\tan \beta = \frac{1}{2}$$

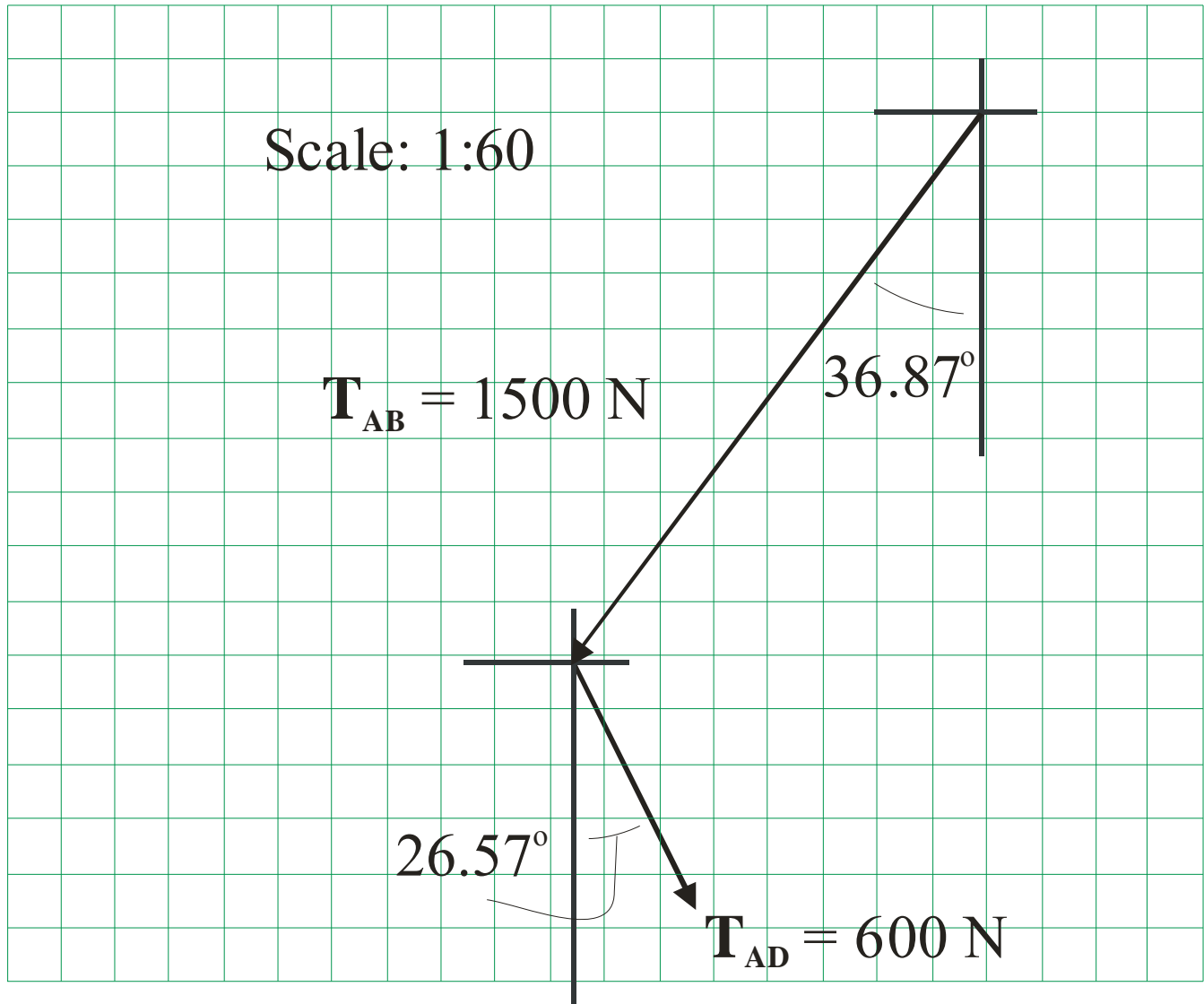
$$\beta = 26.57^\circ$$

GRAPHICAL SOLUTION:

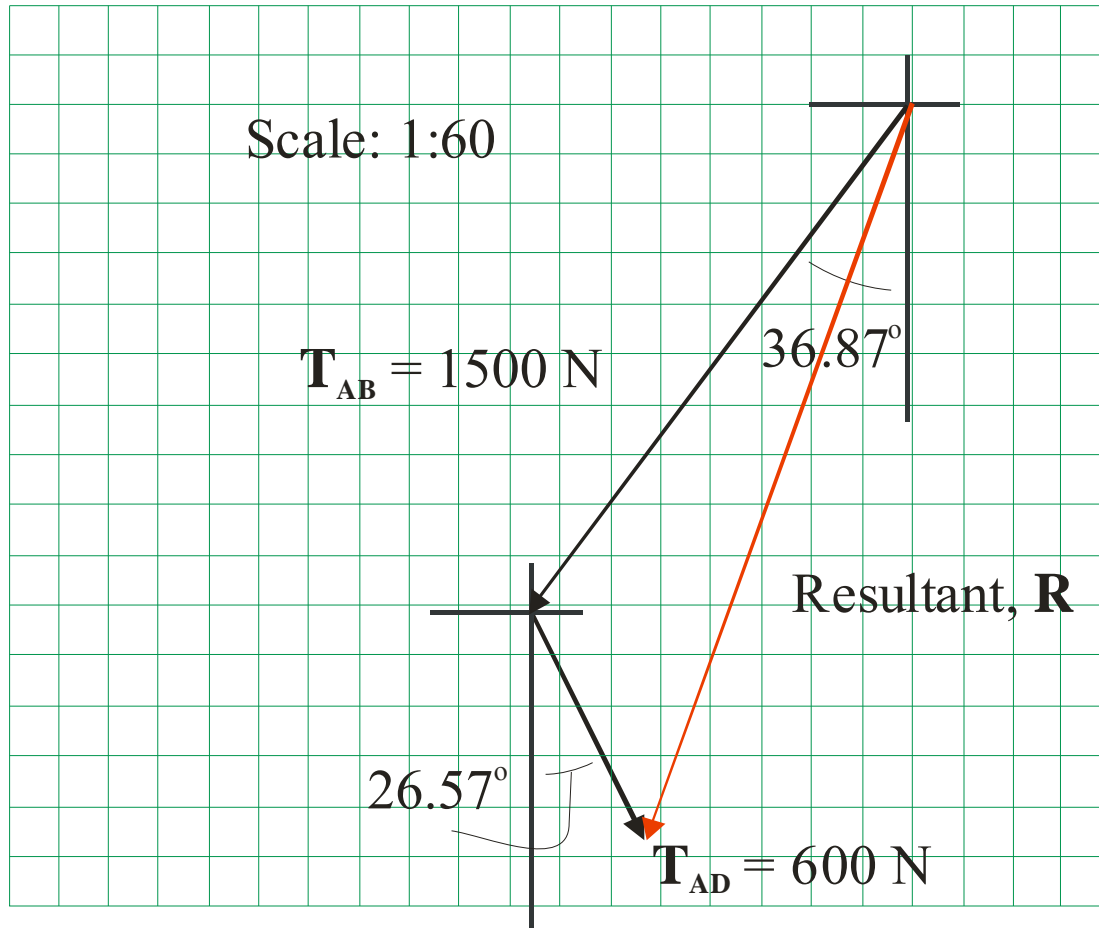
Select a suitable scale and plot $\mathbf{T}_{AB} = 1500 \text{ N}$



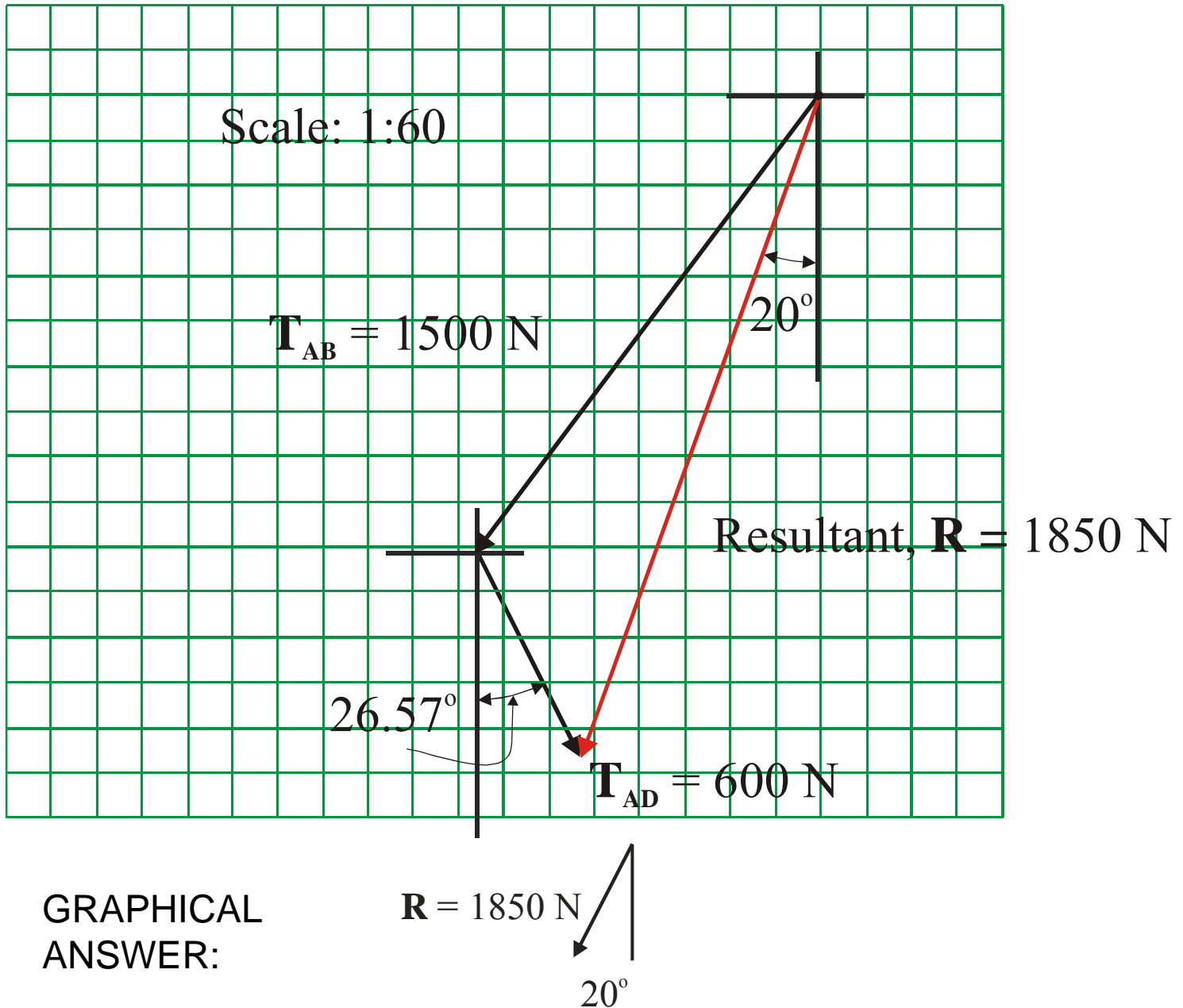
At the “Tip” of \mathbf{T}_{AB} Plot $\mathbf{T}_{AD} = 600 \text{ N}$



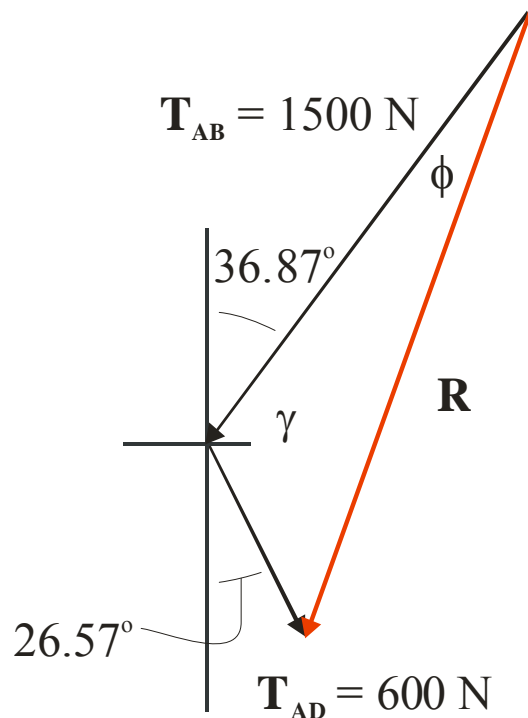
The Resultant, \mathbf{R} of \mathbf{T}_{AB} and \mathbf{T}_{AD} is drawn from the “Tail” of \mathbf{T}_{AB} to the “Tip” of \mathbf{T}_{AD}



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:

