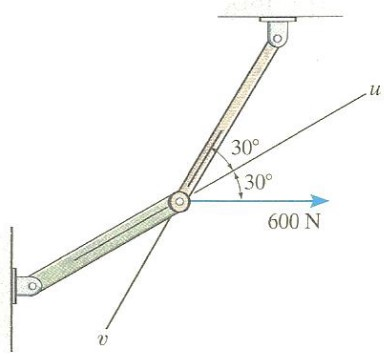
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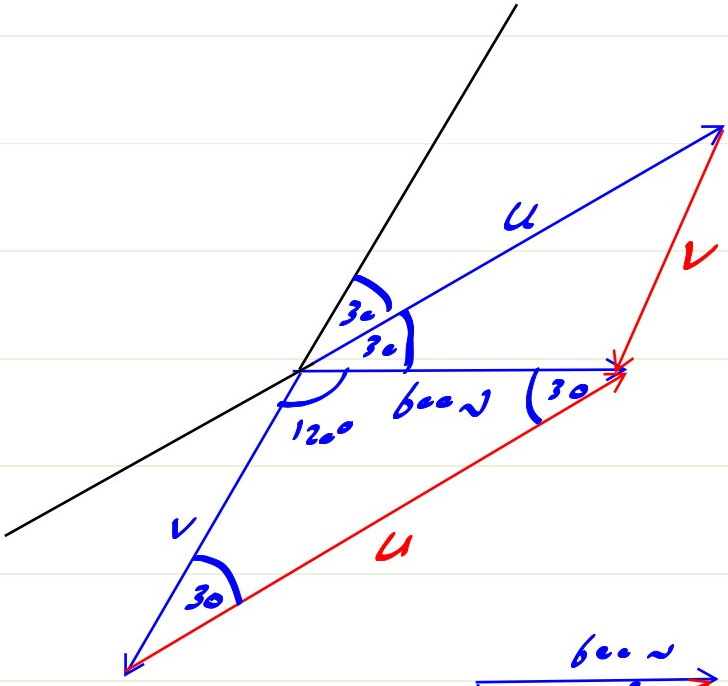
Lec 2-1

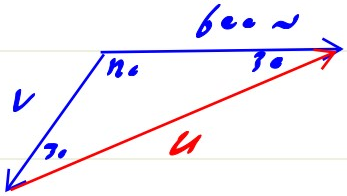
Example (2)

Resolve the horizontal 600-N force in Fig. 2–12*a* into components acting along the *u* and *v* axes and determine the magnitudes of these components.



(a)





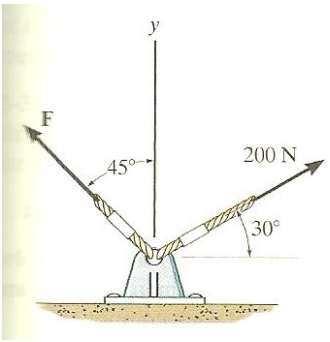
$$R^2 = u^2 + v^2 - 2uv\cos B$$

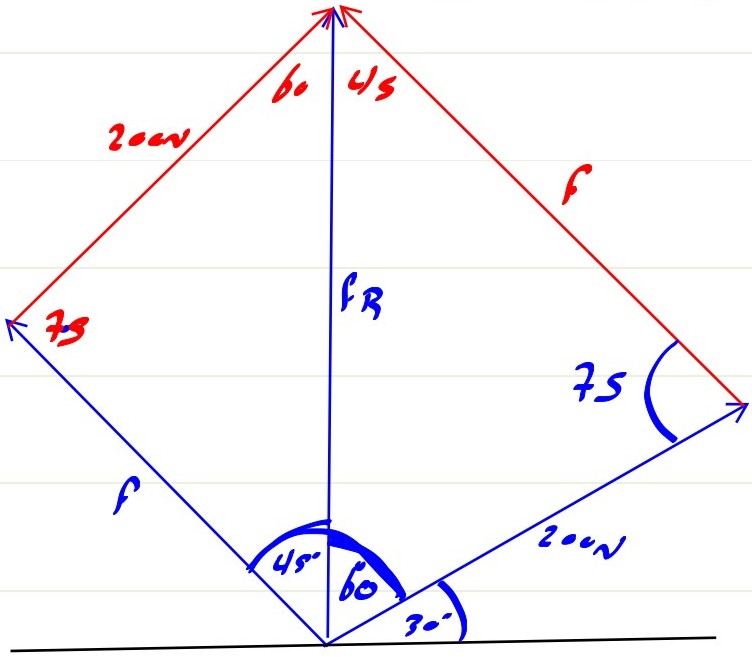
$$\frac{\sin 120}{u} = \frac{\sin 30}{600} = \frac{\sin 30}{v}$$

$$u = 1039.23\ N \quad , \quad v = 600\ N$$

Example (3)

Determine the magnitude of the component force **F** in Fig. 2–13*a* and the magnitude of the resultant force $\mathbf{F}_R$ if $\mathbf{F}_R$ is directed along the positive *y* axis.





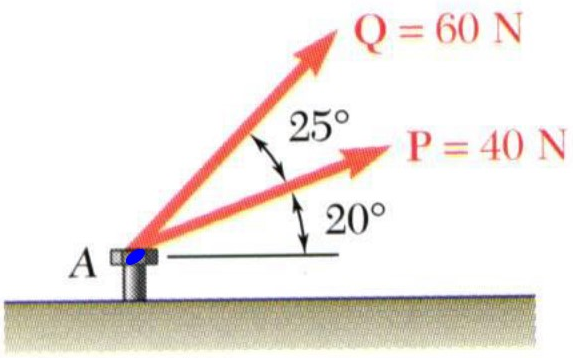
$$F_R^2 = 200^2 + F^2 + 2 \times 200 \times F \cos 75 \quad *$$

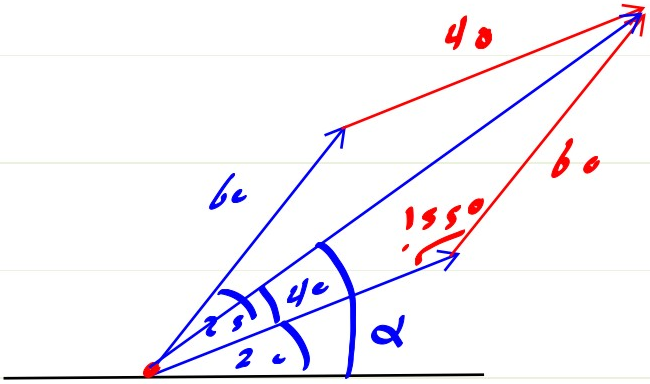
$$\frac{\sin 60}{F} = \frac{\sin 45}{200} = \frac{\sin 75}{F_R}$$

$$F = \frac{\sin 45}{\sin 60} = \frac{200 \sin 60}{\sin 75} = 245\,N$$

$$F_R = \frac{200 \sin 75}{\sin 45} = 273.2\,N$$

The two forces act on a bolt at A. Determine their resultant?

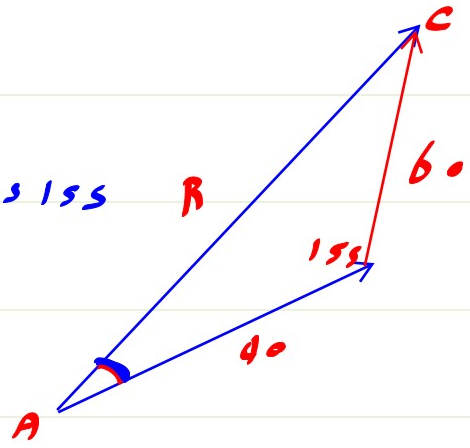




$R^2 = P^2 + Q^2 - 2PQ\cos\theta$

$R^2 = 40^2 + 60^2 - 2 \times 40 \times 60 \cos 155$

$R = 97.73\,N$



$\frac{\sin A}{60} = \frac{\sin 155}{97.73}$

$A = 15.04°$

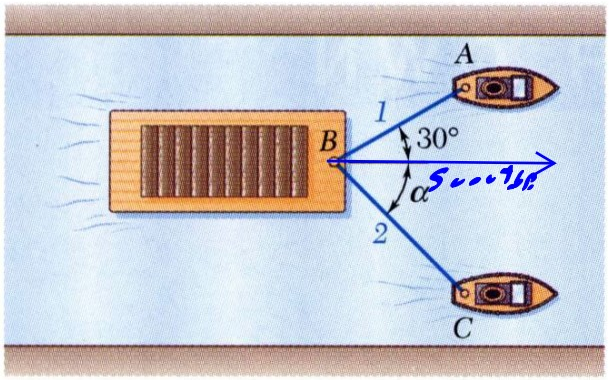
$\alpha = 15.04 + 20 = 35.04°$

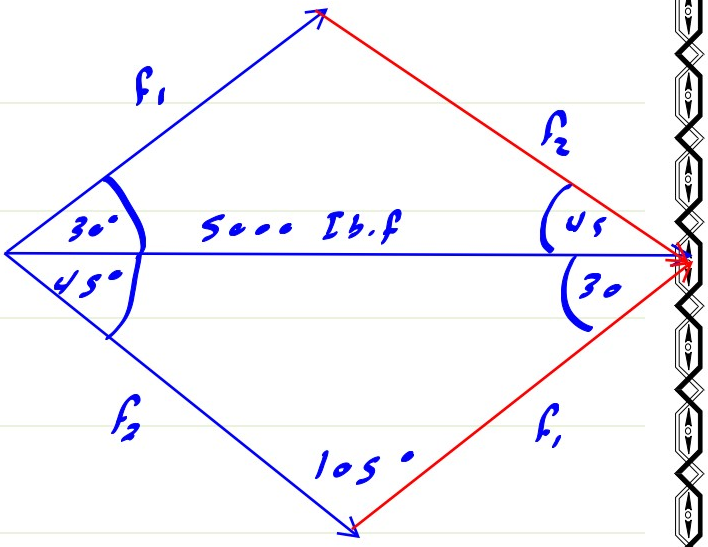
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A barge is pulled by two tugboats. If the resultant of the forces exerted by the tugboats is 5000 lbf directed along the axis of the barge, determine

a) the tension in each of the ropes for $\alpha = 45°$,

b) the value of α for which the tension in rope 2 is a minimum.



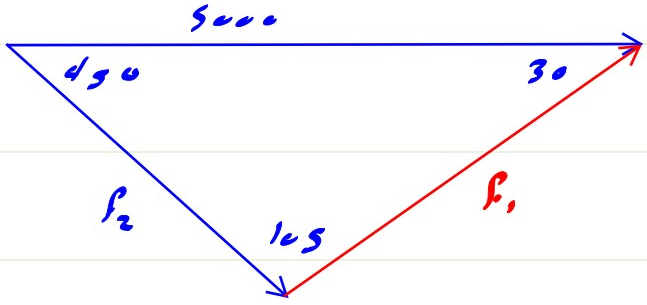


(a)

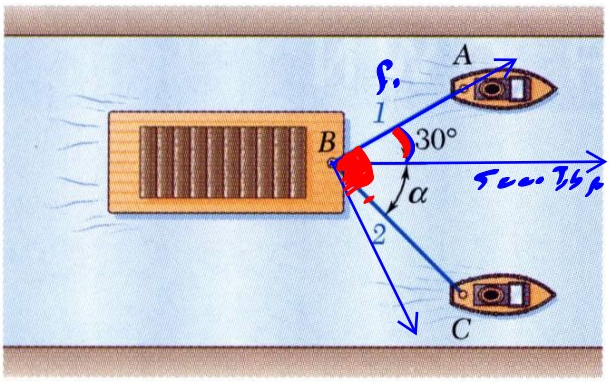
$$\frac{\sin 105}{5000} = \frac{\sin 45}{F_1} = \frac{\sin 30}{F_2}$$

$F_1 = 3660.25$ lb.f

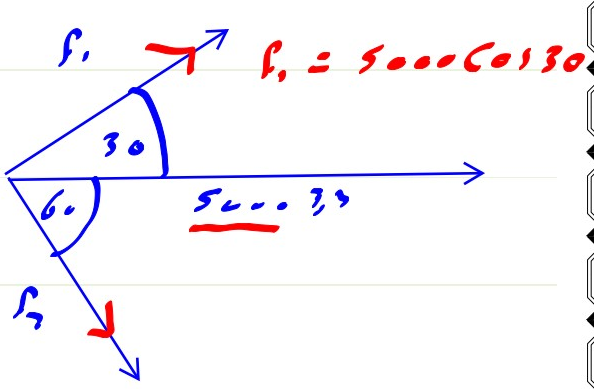
$F_2 = 2588$ lb.f



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$\alpha = 90 - 30 = 60°$



$f_1 = 5000 \cos 30 = 4330$ lb

$f_2 = 5000 \cos 60 = 2500$ lb