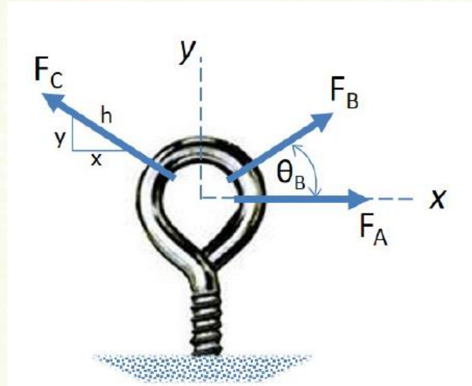
1. Given:

$F_A = 425$ N
$F_B = 450$ N
$F_C = 325$ N
$\Theta_B = 40°$
x,y,h (respectively): 4,3,5



Find:

F_R, Θ_R

Solution:

$$F_{Rx} = 425 + 450\cos 40 - 325\left(\tfrac{4}{5}\right) = 509.72 \text{ N}$$

$$F_{Ry} = 450\sin 40 + 325(3/5) = 484.25 \text{ N}$$

$$F_R = \sqrt{488.12^2 + 500.46^2} = \underline{703.08 \text{ N}} \leftarrow F_R$$

$$\Theta_R = \tan^{-1}(484.25/509.72) = \underline{43.53^0} \leftarrow \Theta_R$$

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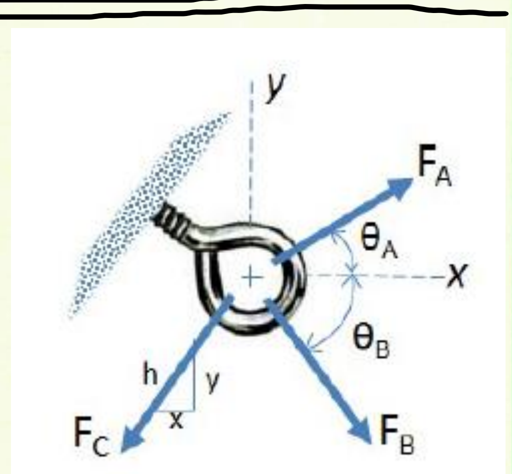
2. Given:

$F_R = 800$ N
$\Theta_R = 35°$
$F_B = 650$ N
$\Theta_B = 60°$
$F_C = 400$ N
x,y,h (respectively): 3,4,5



Find:

F_A, Θ_A

Solution:

$$F_A \cos\theta_A + 650\cos 60 - 400\left(\tfrac{3}{5}\right) = 800\cos 35$$

$$F_A \sin\theta_A - 650\sin 60 - 400\left(\tfrac{4}{5}\right) = -800\sin 35$$

$$F_A \cos\theta_A = 570.32$$

$$F_A = \frac{570.32}{\cos\theta_A}$$

$$570.32\tan\theta_A = 424.05$$

$$\tan^{-1}(424.05/570.32) = \underline{36.6^\circ = \theta_A} \leftarrow \theta_A$$

$$F_A = \frac{570.32}{\cos(36.6)} = \underline{710.7\ N} \leftarrow F_A$$

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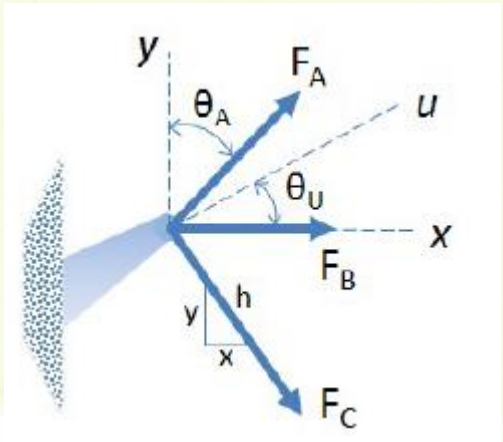
3. Given:

F_R = 450 N
Θ_U = 35°
F_B = 220 N
F_C = 280 N
x,y,h (respectively): 5,12,13

Find:

F_A, Θ_A



Solution:

$$f_A \sin\theta_A + 220 + 280(5/13) = 450\cos 35$$

$$f_A \cos\theta_A - 280(12/13) = 450\sin 35$$

$$f_A \sin\theta_A = 40.93$$

$$f_A = \frac{40.93}{\sin\theta_A} \qquad \frac{40.93}{\tan\theta_A} = 516.57$$

$$\tan^{-1}(40.93/516.57) = 4.53^0 = \theta_A \leftarrow \theta_A$$

$$f_A = \frac{40.93}{\sin(4.53)} = 518.19\,N \leftarrow f_A$$