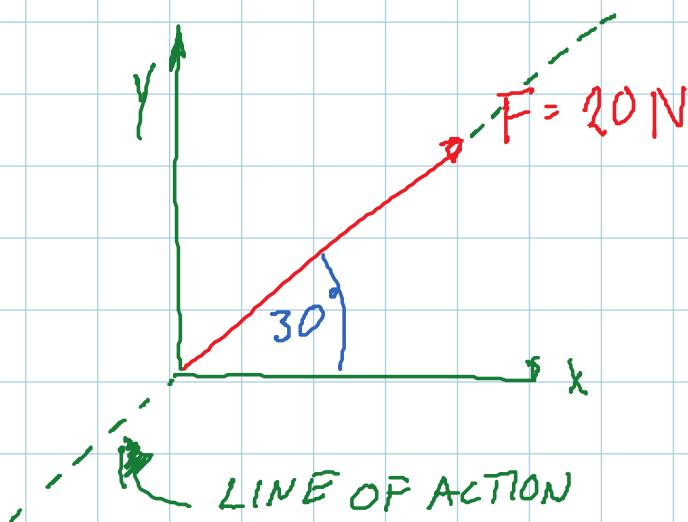


2D CONCURRENT FORCES

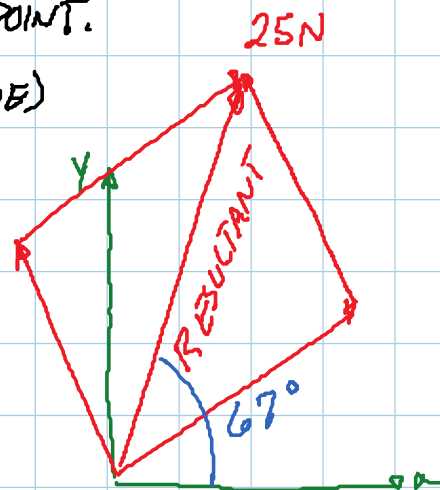
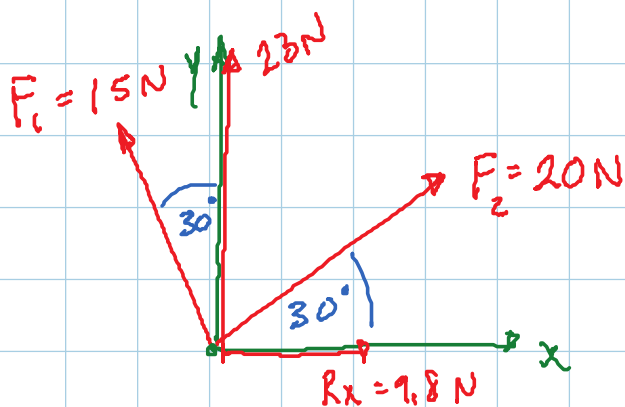
Wednesday, November 28, 2012
1:23 PM



FORCES!

- 1) MAGNITUDE
- 2) DIRECTION
- 3) POINT OF APPLICATION

CONCURRENT FORCE SYSTEM: ALL LINES OF ACTION IN THE SYSTEM INTERSECT AT ONE POINT.
DOESN'T SUPPORT A MOMENT (TORQUE)



RECTANGULAR COMPONENTS

$$\sin(\theta) = \frac{\text{OPP}}{\text{HYP}} \quad \cos(\theta) = \frac{\text{ADJ}}{\text{HYP}}$$

$$\sin(30^\circ) = \frac{F_{2y}}{F_2} = \sin(30^\circ) \cdot F_2 = F_{2y}$$

20N
↓
y-COMPONENT OF F_2

therefore $\therefore F_{2y} = 10\text{ N}$

$$\cos(30^\circ) = \frac{F_{2x}}{F_2} = \cos(30^\circ) \cdot 20\text{ N} = F_{2x} = 17.3\text{ N}$$

FOR F_1 :

$$\sin(30^\circ) = \frac{F_{1x}}{F_1} = \sin(30^\circ) \cdot 15\text{ N} = F_{1x} = 7.5\text{ N}$$

$$\cos(30^\circ) = \frac{F_{1y}}{F_1} = \cos(30^\circ) \cdot 15\text{ N} = F_{1y} = 13\text{ N}$$

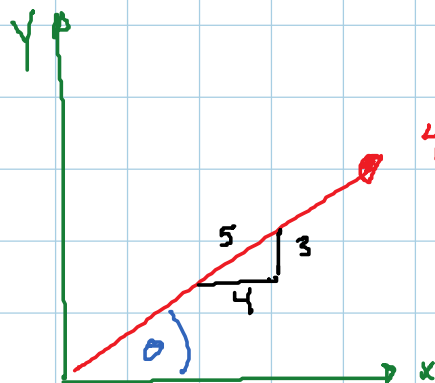
RESULTANT:

$$R_x = F_{1x} + F_{2x} = 7.5\text{ N} + 17.3\text{ N} = 24.8\text{ N}$$

$$R_y = F_{1y} + F_{2y} = 13\text{ N} + 10\text{ N} = 23\text{ N}$$

$$R = \sqrt{R_x^2 + R_y^2} = \sqrt{24.8^2 + 23^2} = 34\text{ N}$$

$$\theta = \tan^{-1} \frac{R_y}{R_x} = \tan^{-1} \frac{23}{24.8} = 43^\circ$$



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$$\theta = \tan^{-1} \frac{3}{4} = 36.9^\circ$$

$$\cos(\theta) = \cos(36.9^\circ)$$



$$F_x = 40\text{ lb} \cdot \cos \theta = 40\text{ lb} \cdot \left(\frac{4}{5}\right)$$