

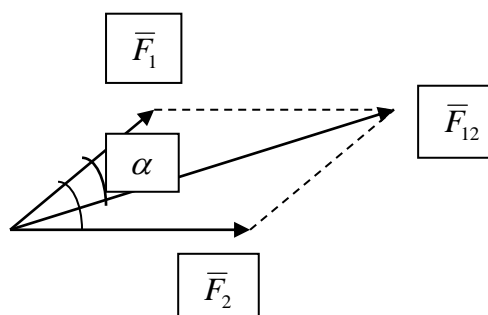
### Answer on Question #51335 – Math – Vector Calculus

**Given:**

$$\angle(F_1, F_2) = 45^\circ$$

$$\bar{F}_1 = 10N$$

$$\bar{F}_2 = 15N$$



**Find:**

$$\bar{F}_{12}, \alpha$$

**Solution:**

$$1) \bar{F}_{12} = \bar{F}_1 + \bar{F}_2$$

Using the law of cosines, we obtain

$$F_{12}^2 = F_1^2 + F_2^2 - 2F_1F_2 \cos(135^\circ) = 100 + 225 - 300\cos(90^\circ + 45^\circ) = \\ = 325 + 300\sin(45^\circ) = 325 + 300 \cdot \frac{\sqrt{2}}{2} \approx 537$$

$$F_{12} = \sqrt{537} \approx 23.18N$$

$$2) \cos\alpha = \frac{F_1^2 + F_{12}^2 - F_2^2}{2F_1F_{12}} = \frac{100 + 537 - 225}{2 \cdot 10 \cdot 23.18} = \frac{412}{463.6} \approx 0.889$$

$$\alpha = \arccos\left(\frac{412}{463.6}\right) \approx \arccos(0.889) \approx 27^\circ,$$

where  $\arccos(t)$  is the inverse of cosine function  $\cos(t)$ .

$$\text{Answer: } F_{12} = 23.18N$$

$$\alpha = 27^\circ$$