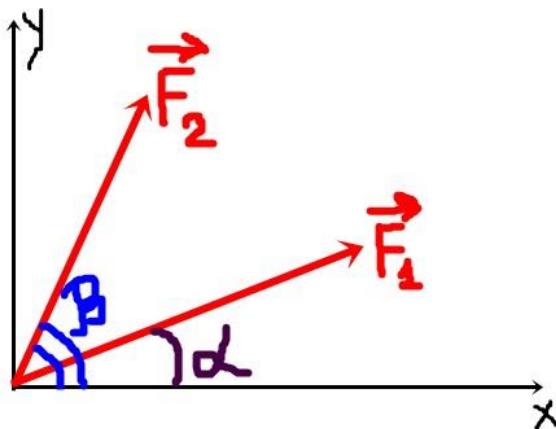


### Answer on Question #53351, Physics / Other

**Task:** What is the resultant force (magnitude and direction) of two force vectors  $F_1=6.0$  and  $x$  and  $F_2=7.0$ ? Explain why.

**Solution:**



We want the **resultant**  $R$ ,  $\vec{R} = \vec{F}_1 + \vec{F}_2$ . Find the **components** of the vectors.

$$\vec{F}_{1x} = F_1 \cos \alpha = 6 \cos \alpha$$

$$\vec{F}_{1y} = F_1 \sin \alpha = 6 \sin \alpha$$

$$\vec{F}_1 = 6\vec{i} \cos \alpha + 6\vec{j} \sin \alpha$$

$$\vec{F}_{2x} = F_2 \cos \beta = 7 \cos \beta$$

$$\vec{F}_{2y} = F_2 \sin \beta = 7 \sin \beta$$

$$\vec{F}_2 = 7\vec{i} \cos \beta + 7\vec{j} \sin \beta$$

$$\vec{R} = \vec{F}_1 + \vec{F}_2$$

$$\vec{R} = 6\vec{i} \cos \alpha + 6\vec{j} \sin \alpha + 7\vec{i} \cos \beta + 7\vec{j} \sin \beta = \vec{i}(6 \cos \alpha + 7 \cos \beta) + \vec{j}(6 \sin \alpha + 7 \sin \beta)$$

As before, we now need to find the magnitude of the resultant and its direction,

$$R = \sqrt{\vec{R}_x^2 + \vec{R}_y^2} = \sqrt{(6 \cos \alpha + 7 \cos \beta)^2 + (6 \sin \alpha + 7 \sin \beta)^2} = \sqrt{85 + 84 \cos(\alpha - \beta)}$$

**Answer:**  $R = \sqrt{\vec{R}_x^2 + \vec{R}_y^2} = \sqrt{(6 \cos \alpha + 7 \cos \beta)^2 + (6 \sin \alpha + 7 \sin \beta)^2} = \sqrt{85 + 84 \cos(\alpha - \beta)}$