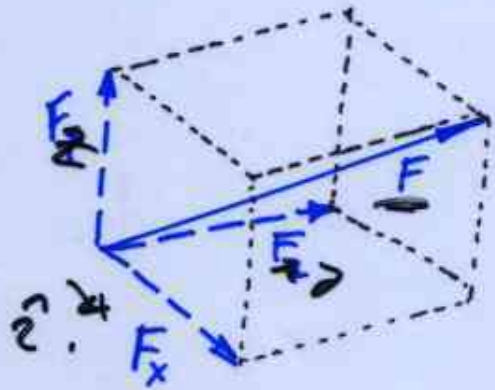


3-Dimensional Cases: FORCE 68

Important to be careful & to use components.
DIFFICULT TO DRAW.

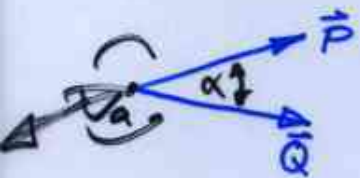
$$\vec{F} = \|F\| (l\hat{i} + m\hat{j} + n\hat{k}) \quad \text{where } l^2 + m^2 + n^2 = 1$$

$$\equiv F_x \hat{i} + F_y \hat{j} + F_z \hat{k}$$



DOT PRODUCT:

$$\vec{P} \cdot \vec{Q} = \|P\| \|Q\| \cos \alpha$$



NOTE VECTORS ORIGINATE at same point for finding α .

Also note: $F_x = \vec{F} \cdot \hat{i}$, $F_y = \vec{F} \cdot \hat{j}$, $F_z = \vec{F} \cdot \hat{k}$ Projection ONTO AXES

ANGLE BETWEEN VECTORS:

$$\alpha = \cos^{-1} \left(\frac{\vec{P} \cdot \vec{Q}}{\|P\| \|Q\|} \right) \dots \text{inverse cosine}$$

if $\vec{P} \cdot \vec{Q} = 0 \Rightarrow \vec{P} \perp \vec{Q}$ (assuming $\|P\| \neq 0$ & $\|Q\| \neq 0$)

$$\vec{F}_1 \cdot \vec{F}_2$$

$$F_{1x} F_{2x} + F_{1y} F_{2y} + F_{1z} F_{2z}$$