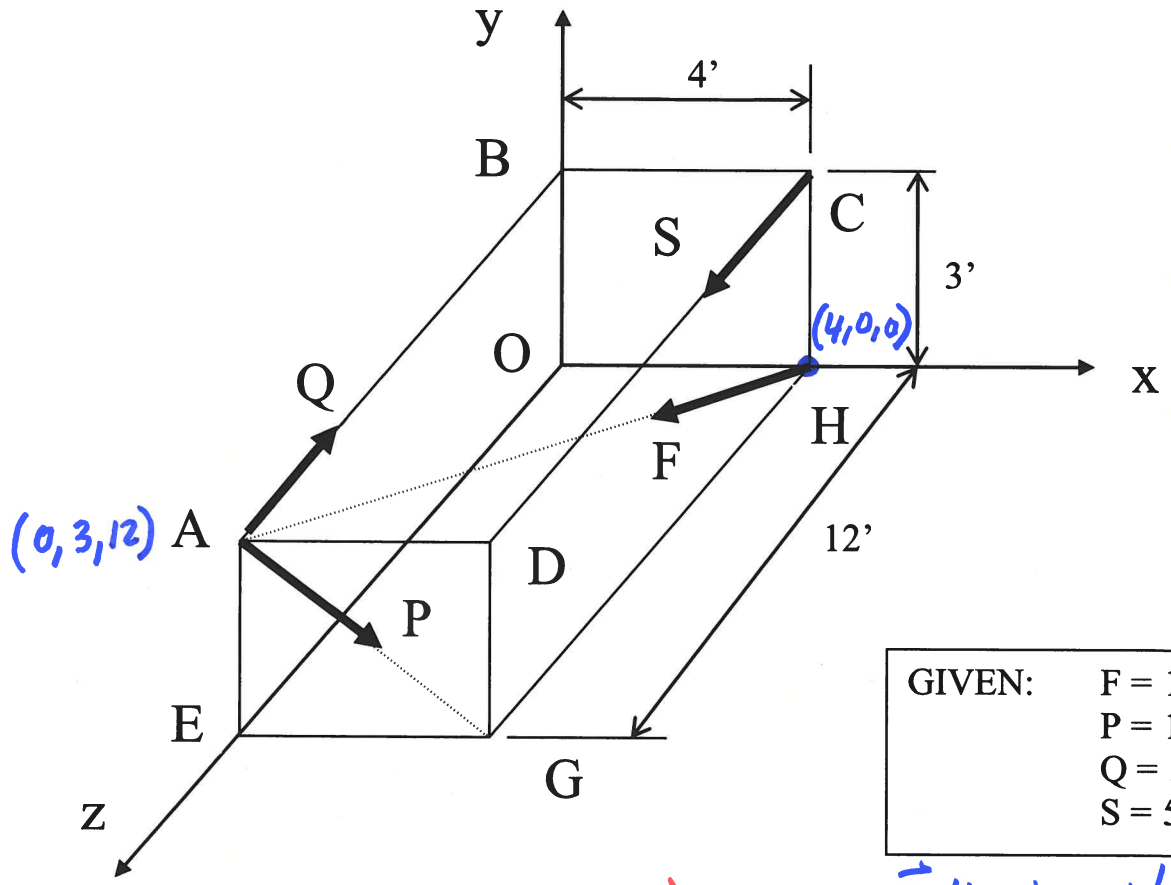
3D Force Resultant

Determine resultant, **R**, of **F**, **P**, **and Q**.



GIVEN:	F = 130 lbs
	P = 100 lbs
	Q = 50 lbs
	S = 50 lbs

$\vec{F} = ?$

$\vec{r}_{HA} = (-4\hat{i} + 3\hat{j} + 12\hat{k})\ ft$

$|\vec{r}_{HA}| = \sqrt{(-4)^2 + (3)^2 + (12)^2}\ ft = 13\ ft$

$\hat{u}_{HA} = \dfrac{(-4\hat{i} + 3\hat{j} + 12\hat{k})\ ft}{13\ ft}$

$= \left(-\frac{4}{13}\hat{i} + \frac{3}{13}\hat{j} + \frac{12}{13}\hat{k}\right)$

$\vec{F} = |F|\,\hat{u}_{HA}$

$= 130\ lb\left(-\frac{4}{13}\hat{i} + \frac{3}{13}\hat{j} + \frac{12}{13}\hat{k}\right)$

$\vec{F} = [-40 \quad 30 \quad 120]\ lb$

$\vec{P} = ?$ Note $\vec{P}$ lies in a plane // plane xy

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$\vec{P} = \left[100 \times \frac{4}{5} \quad -100 \times \frac{3}{5} \quad 0\right] lb$

$\vec{P} = [80 \quad -60 \quad 0]\ lb$

$\vec{Q} = ?$ Note $\vec{Q}$ is // to axis z (opposite direction)

$\vec{Q} = [0 \quad 0 \quad -50]\ lb$

$\vec{R} = \vec{F} + \vec{P} + \vec{Q} \Rightarrow$ add all components

$\vec{R} = [40.0 \quad -30.0 \quad 70.0]$ lbs through A