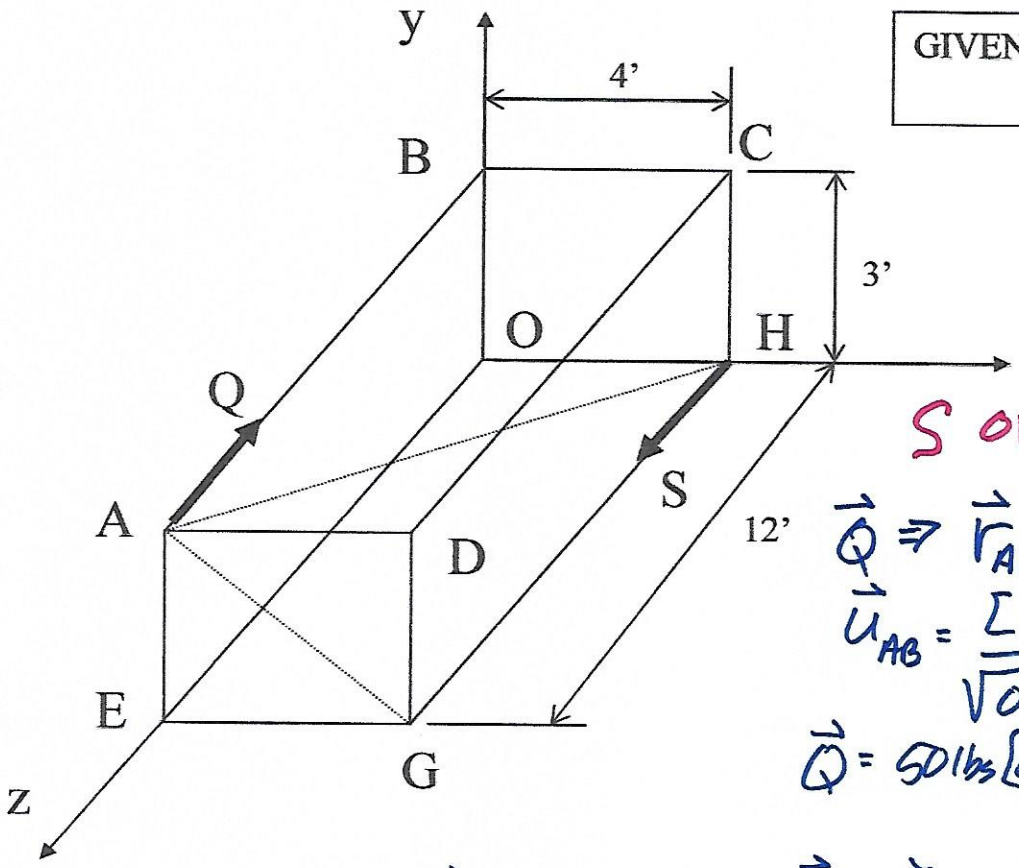
3-D Couples 1

Determine couple moment caused by forces S and Q.



GIVEN: Q = 50 lbs
S = 50 lbs

S OR Q AS UNIT VECTOR

$\vec{Q} \Rightarrow \vec{r}_{AB} = [0\ 0\ -12]$

$\vec{u}_{AB} = \dfrac{[0\ 0\ -12]}{\sqrt{0^2+0^2+(12)^2}} = [0\ 0\ -1]$

$\vec{Q} = 50\,\text{lbs}[0\ 0\ -1] = [0\ 0\ -50]$ lbs

$\vec{C}_{Q+S} = \vec{r}_{BH} \times \vec{S} = \vec{r}_{HB} \times \vec{Q} = \vec{r}_{AH} \times \vec{S} = \vec{r}_{HA} \times \vec{Q}$
$= \vec{r}_{BG} \times \vec{S} = \vec{r}_{GB} \times \vec{Q} = \vec{r}_{AG} \times S = \vec{r}_{GA} \times \vec{Q}$

ANY ONE OF THE Q WILL WORK

$\vec{r}_{HB} = [-4\ 3\ 0]$ Ft $\quad \vec{Q} = [0\ 0\ -50]$ lbs

$\vec{C} = [4\ 3\ 0] \times [0\ 0\ -50] = \underline{[-150\ -200\ 0]\ \text{Ft·lbs}}$