

MOMENTS - Right Hand Rule

This is A CONVENTION to tell you the direction of moment vector. HARD TO DRAW

Leads ON TO USE OF CROSS-PRODUCT

$$\vec{M} = \vec{r} \times \vec{F}$$



\vec{r} is VECTOR from Axis O to point of application A



FOR 2D case $\|\vec{M}\| = \|\vec{r} \times \vec{F}\| = \|\vec{r}\| \|\vec{F}\| \sin\theta$
 $= d \|\vec{F}\|$ (since $d = \|\vec{r}\| \sin\theta$)

which is WHAT WE HAD BEFORE

HOWEVER, this also APPLIES TO GENERAL 3D case



VARIGNON'S THEOREM

"moment of a force about a point is equal to sum of moments of components about that point"

Basically ... if $\vec{F} = \vec{A} + \vec{B}$

$$\Rightarrow \vec{M}_O = \vec{r} \times \vec{F} = \vec{r} \times (\vec{A} + \vec{B})$$

$$= \vec{r} \times \vec{A} + \vec{r} \times \vec{B}$$

