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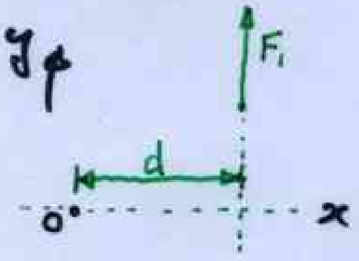
FORCE

- ↳ LINEAR ACCELERATION $\vec{F} = m\vec{a}$
- ↳ ROTATION ABOUT AN AXIS — MOMENT $\vec{M} = \vec{r} \times \vec{F}$

2-D simple: AXIS IS A POINT "o"



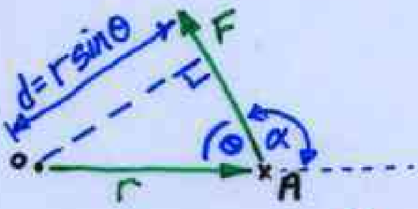
$\vec{M}_o = +F_1 d$

GET SIGN FROM RIGHT HAND RULE

IN 2-D MOMENT EITHER "UP" OR "DOWN"
+ / −

FOR 3-D CASE VECTOR APPROACH HELPS

$\vec{M} = \vec{r} \times \vec{F}$ (Note order!)



if $\vec{r} = 2\hat{i}$ & $\vec{F} = -\hat{i} + 2\hat{j}$ then

$$\vec{M} = \begin{Vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 0 & 0 \\ -1 & 2 & 0 \end{Vmatrix} = \hat{i}(0) - \hat{j}(0) + \hat{k}(2 \cdot 2 + 1 \cdot 0)$$

DETERMINANT

$$= 4\hat{k}$$

RIGHT HAND RULE CONFIRMS SIGN/DIRXN CORRECT.

VARIGNON'S THEOREM

"the MOMENT OF A FORCE ABOUT AN AXIS IS EQUAL TO THE SUM OF THE MOMENTS OF ITS COMPONENTS ABOUT THAT AXIS"