

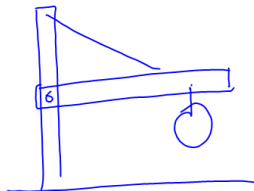
CLASE 4

- $\sum \vec{F}$ no es suficiente para sólidos rígidos
- ESTÁTICA s.r.: $\sum \vec{F} = 0$
 $\sum \vec{\tau} = 0$
- $\vec{\tau}(\vec{F}) = \vec{r} \times \vec{F}$
- $\vec{\tau}(\vec{mg})$
- APLICACIONES.

Control de Lectura, Unidad 03 SN primavera-2008

1. Dibuje el sistema con el que va a trabajar hoy y ponga todas las fuerzas externas que actúan sobre la barra.
2. Cuales son las condiciones (escribas las ecuaciones) para que la barra se mantenga en equilibrio estático?

No olvide poner su nombre

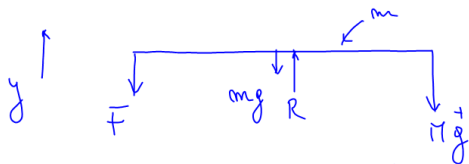


SECCION 4: DINAMICA DEL SOLIDO RIGIDO

4A ESTATICA DEL SR



¿ VALOR DE F PARA QUE EL SISTEMA
ESTE EN EQUIL. ESTÁTICO ?



$$\vec{F} + m\vec{g} + m\vec{g} + \vec{R} = 0$$

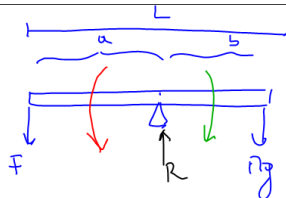
$$\vec{F} - mg - mg + R = 0$$

$$1 \text{ EC } y \quad 2 \text{ INCOG } \left(\vec{F}, R \right) \quad \dot{\quad}$$

LA ECUACION QUE FALTA TIENE QUE

VER CON EL EQUIL. "FUERZAS DE PALANCA"

$$m \approx 0$$



$$a + b = L$$

PARA CUANTIFICAR LA TENDENCIA A ROTAR
QUE PRODUCEN LAS FUERZAS, DEFINIMOS EL
TORQUE

$$\tau(F) = F \cdot a$$

$$\tau(mg) = mg \cdot b$$

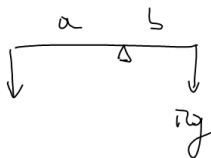
$$\tau(R) = R \cdot 0 \equiv 0$$

Eqvil: $F + Mg - R = 0 \rightarrow a=0 \rightarrow$ No Despl-

$\cdot \quad \tau(F) + \tau(R) + \tau(Mg) = 0 \rightarrow$ No Rotation

$\downarrow (+) \quad \downarrow (-) \quad \downarrow$
 $F \cdot a + 0 - mg \cdot b = 0$

$$F = mg \frac{b}{a}$$



① $\begin{array}{c} a \quad a \\ \downarrow \quad \downarrow \\ F \quad mg \end{array} \rightarrow \bar{F} = 17g$

② $\begin{array}{c} \downarrow \quad \downarrow \\ \bar{F} \quad mg \end{array}$

$$\bar{F} = mg \cdot \frac{0.1L}{0.9L}$$

En forma mas general, equilibrio estatico
de un S.R:

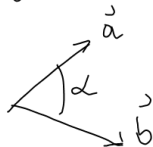
$$\sum \vec{F} = \vec{0}$$

$$\sum \vec{\tau} = \vec{0}$$

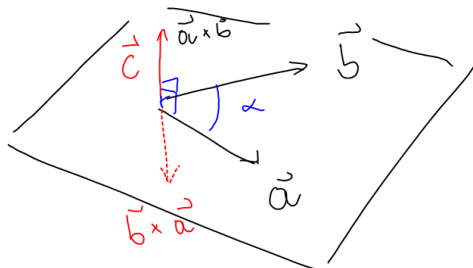
$$\underline{\vec{\tau} = \vec{r} \times \vec{F}}$$

$$\vec{a} \times \vec{b} = \vec{c} \quad ; \quad \text{PRODUCTO CRUZ}$$

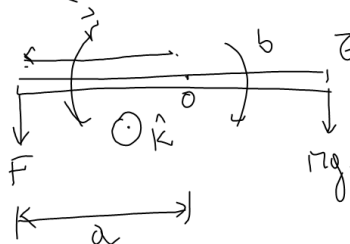
$$|\vec{c}| = |\vec{a}| |\vec{b}| \sin \alpha$$



$$\vec{c} = \vec{a} \times \vec{b}$$



Example

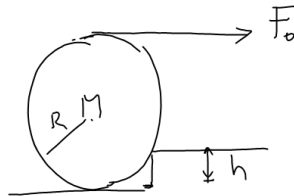


$$\vec{\tau}_O(F) = \vec{r} \times \vec{F} \\ = \underline{a \cdot F} \cdot \hat{k}$$

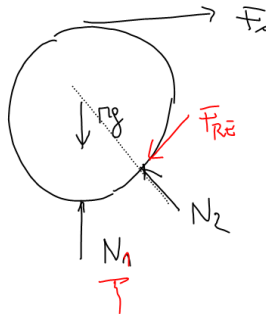
$$\vec{\tau}_O(F) = a \cdot F \cdot \hat{k}$$

$$\vec{\tau}_O(mg) = -b \cdot mg \cdot \hat{k}$$

Ejemplo



F_0 para mover
el tambor?



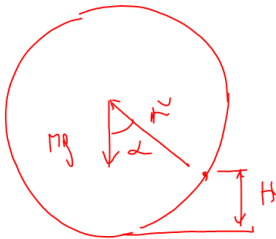
Part Equil:

$$\vec{F}_2 + \vec{mg} + \vec{N}_1 + \vec{N}_2 + \vec{F}_2 = 0$$

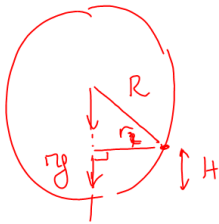


$$\sum \vec{\tau}_p = 0 \quad \left(\begin{array}{l} \text{p.p.o. Resolver} \\ \text{con } \sum \tau_{\text{on}} = 0 \end{array} \right)$$

$$\vec{\tau}(\vec{F}_2) + \vec{\tau}(\vec{mg}) + \vec{\tau}(\vec{N}_2) = 0$$



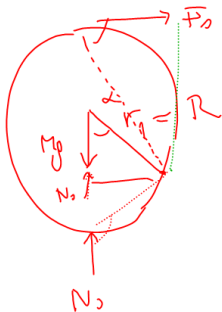
$$\tau(\vec{mg}) = |\vec{r}| \cdot mg \cdot \sin \alpha$$



$$|\vec{G}(mg)| = r_1 \cdot mg \sin \alpha = R mg \sin \alpha$$

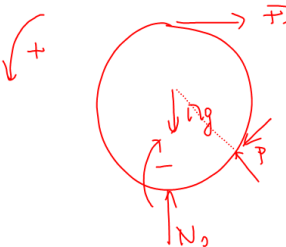
$$= r_2 mg \quad \checkmark$$

$$r_2^2 + (R-H)^2 = R^2 \quad \checkmark$$



$$|\vec{G}(F_0)| = F_0 \cdot (2R-H)$$

$$|\vec{G}(N_0)| = N_0 r_2$$



A diagram of a circular object of radius R . A horizontal force F_o is applied at the top center, pointing to the right. A vertical force N_o is applied at the bottom center, pointing upwards. A weight force Mg acts downwards from the center. A point P is located on the right side of the circle. A curved arrow at the top left indicates a counter-clockwise moment, labeled with a '+' sign. A curved arrow at the bottom left indicates a clockwise moment, labeled with a '-' sign.

$$\sum \vec{C}_p = 0$$

$$+ C(Mg) - C(F_o) - C(N_o) = 0$$

$$+ Mg \cdot r_2 - F_o(2R - H) - N_o \cdot r_2 = 0$$

$$\rightarrow N_o = N_o(F_o) \quad \checkmark$$

Per ultimo, per levare il corpo

$$N_o = 0 \rightarrow F_o^*$$