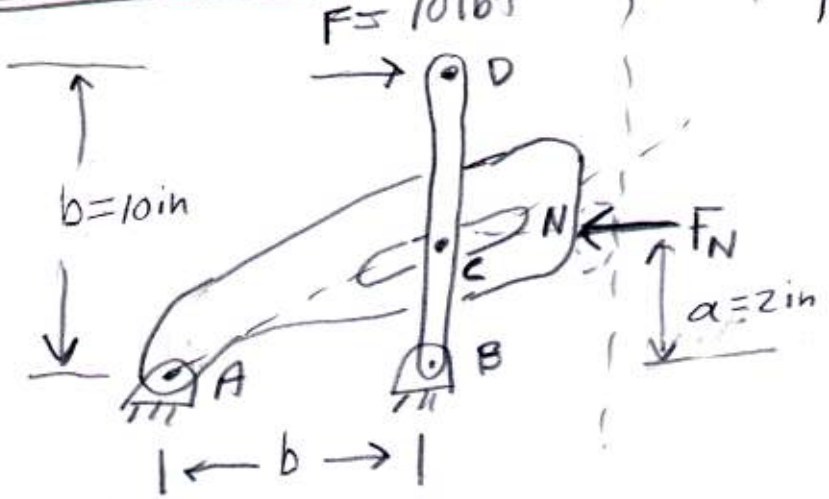
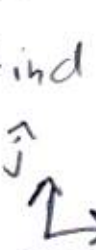
RP 6.3.16

Nutcracker.



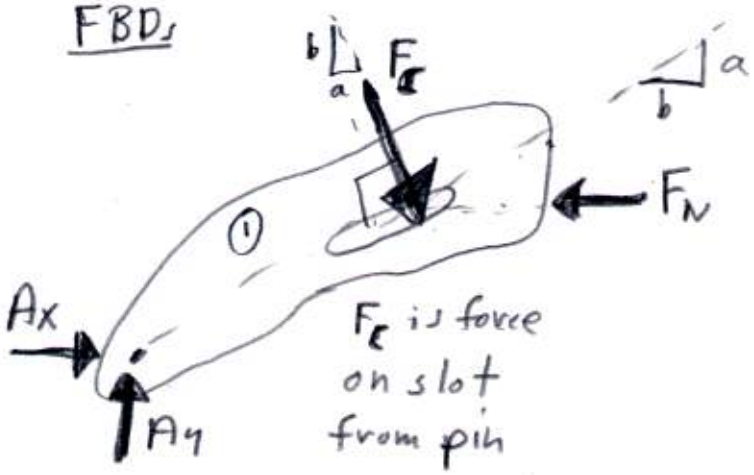
Find F_N!?

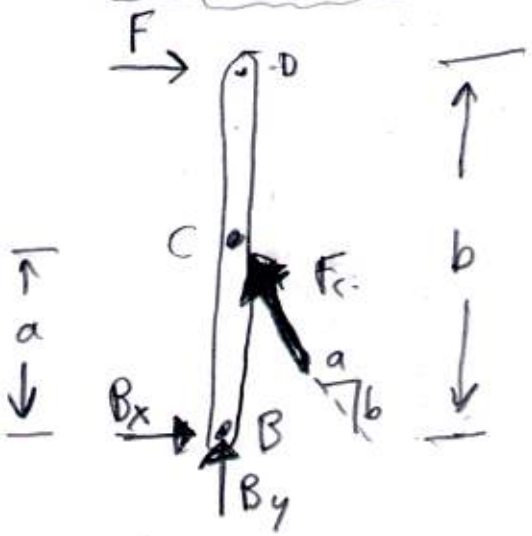
(Nut cracking Force)



"What's your favorite problem?"
"The Nutcracker"
"sweet!"

FBD:





BCD, $\circlearrowleft \sum M_{/B} = 0 \Rightarrow -Fb + \left(F_C \frac{a}{\sqrt{a^2+b^2}}\right) a = 0$

$\Rightarrow F_C = \frac{b}{a} \cdot \frac{\sqrt{a^2+b^2}}{a} F$

ACN, $\overset{+}{\circlearrowleft} \sum M_{/A} = 0 \Rightarrow F_N \cdot a - F_C \sqrt{a^2+b^2} = 0$

$$\Rightarrow \boxed{F_N = \frac{\sqrt{a^2+b^2}}{a} F_C = \frac{b(a^2+b^2)}{a^3} F} = \frac{10 \cdot 104}{8} \text{ lbf}$$

$= 1300 \text{ lbf}$!

(much bigger than F)

b) Lever BCD multiplies force by 5.

Wedge due to sloped slot multiplies by about 5.

Toggle ACN multiplies by about 5.

$5 \times 5 \times 5 = 125 \approx 130$