Physics 113 - Nov 28, 2006

Class Stuff:

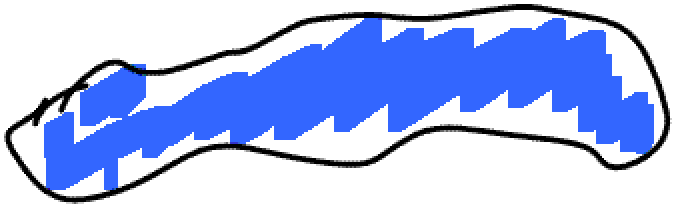
Office hrs today 2-3:30

Sat Dec. 2 - Project Poster Presentations
1-3 pm
Hawkins-Carlson Room in
Rush Rhees Library
If you need anything special — let
me know now!

In-class presentations Dec 5, 7, 12
To be scheduled on a first come, first served
basis - 5 presentations per
class at most

Test out
AV

Static Equilibrium



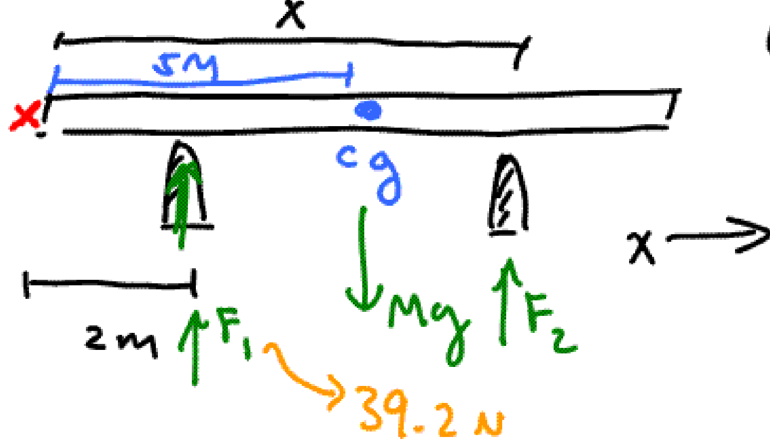
Have static Equil

if

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

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

True for all points
all chosen axes of rotation



uniform beam

$M = 12\ kg$

Length = 10 m

Static equilibrium

where is 2ND support located?

How much weight does it support?

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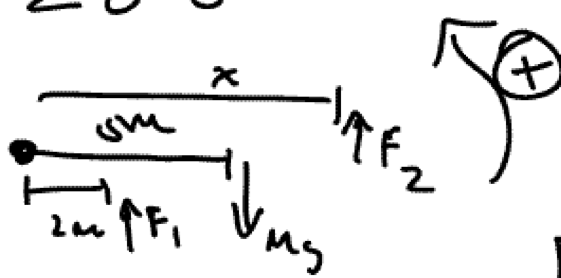
linear equilibrium

$\Sigma F_x = 0$

$\Sigma F_y = 0 = F_1 + F_2 - Mg$

rotational equilibrium

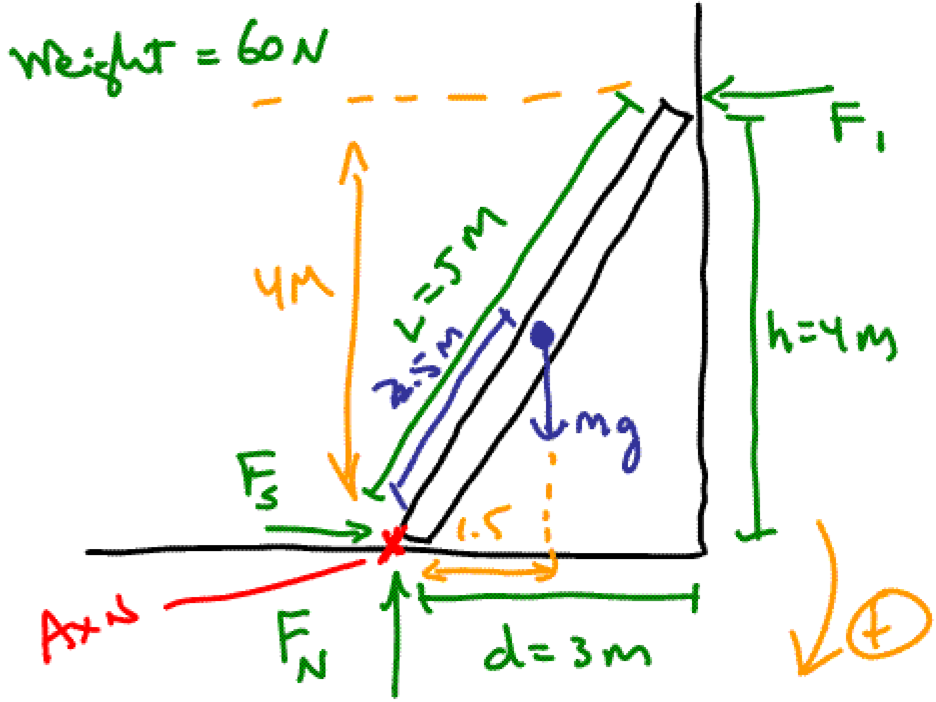
$\Sigma \vec{\tau} = 0$



$0 = (2)F_1 + xF_2 - 5(Mg)$

2 eqns 2 unk

$F_2 = 78\ N \quad x = 6.5\ m$



ladder up against frictionless wall

What is Minimum coeff. of STATIC friction bet. ladder + Floor such that ladder will Not slip

$$\Sigma\vec{F}=0 \rightarrow \Sigma F_x = 0 = F_1 - F_s$$

$$F_1 = \mu_s F_N \;?$$

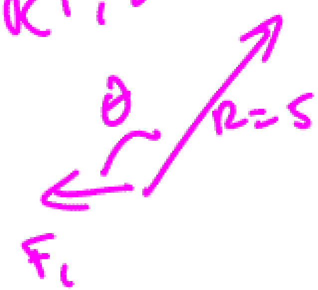
$$\Sigma F_y = 0 = F_N - Mg$$

$$F_N = 60\,N$$

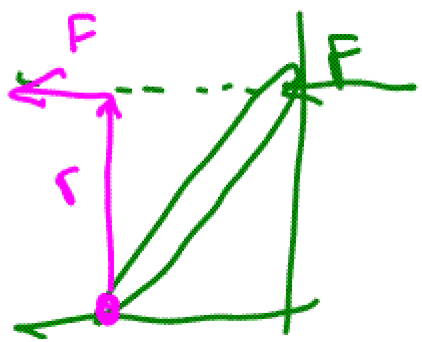
$$\Sigma\vec{\tau}=0 \rightarrow 0 = (1.5)\,mg - (4)\,F_1$$

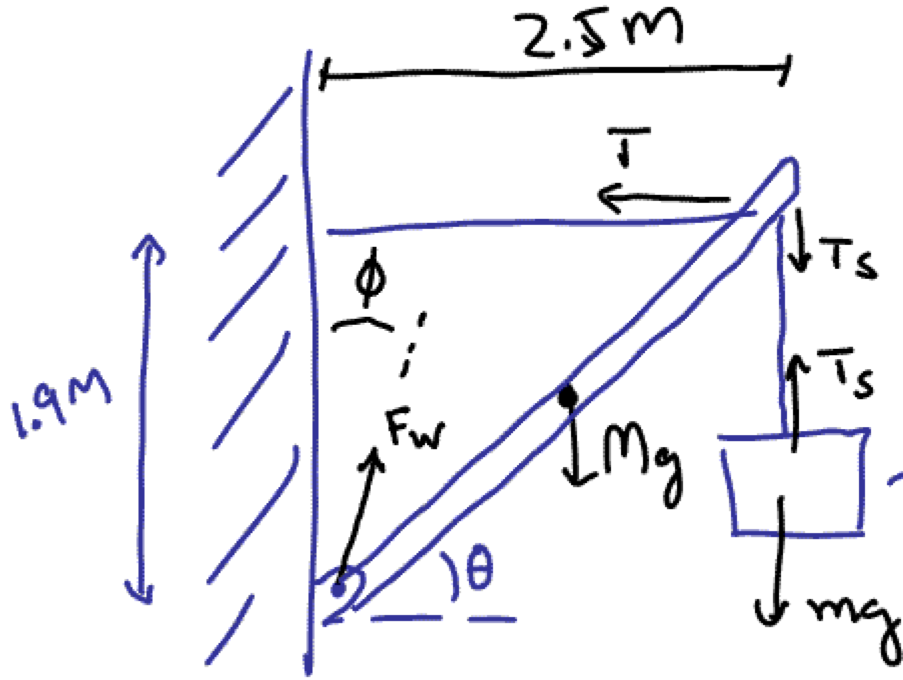
$$\mu_s = 3/8$$

$\tau = R F_1 \sin\theta$



$\tau = rF$





$M_{beam} = 85$ kg

sign = 430 kg = m

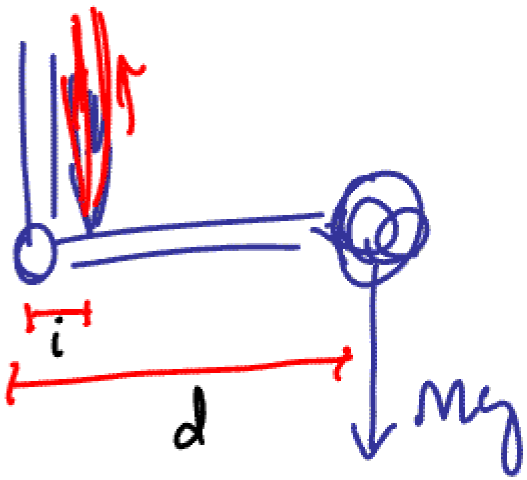
Find T in upper cable

Sign → $T_s = mg$

$\Sigma F_x = 0 = F_w \sin\phi - T$

$\Sigma F_y = F_w \cos\phi - Mg - T_s$ (mg)

$\Sigma \tau = 0$ abt pin at wall $(2.5)T_s - (1.9)T + (1.25)Mg = 0$



$\Sigma \tau = 0 = d\,Mg - F(i)$

Fluid Mechanics

Statics — hydrostatics

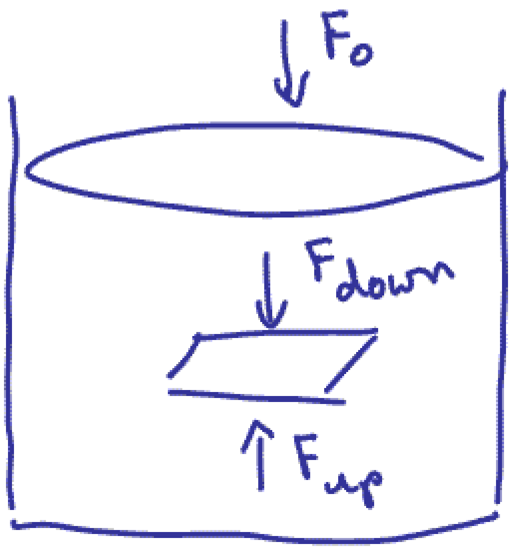
Ave Vol. density $\frac{M}{Vol} = \rho \quad kg/m^3$

$$\text{Specific gravity} = \frac{\rho_{material}}{\rho_{H_2O \text{ at } 4^\circ C}}$$

$$1000\ kg/m^3 = 1\ g/cm^3$$

Sg > 1 object sinks in water

< 1 float

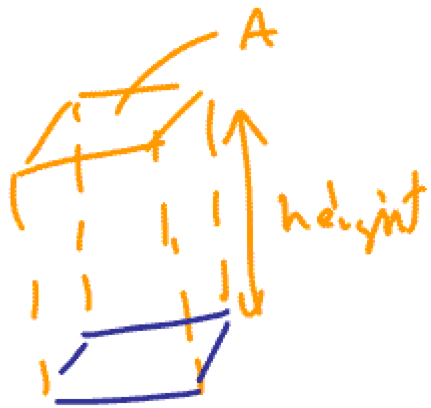


Area height = vol

$$\frac{F_{down}}{Area} = \frac{F_0}{Area} + \frac{\rho v g}{Area}$$

Pressure ≡ Force/Area

N/m^2 ≡ Pascal (MKS)



$V = hA$

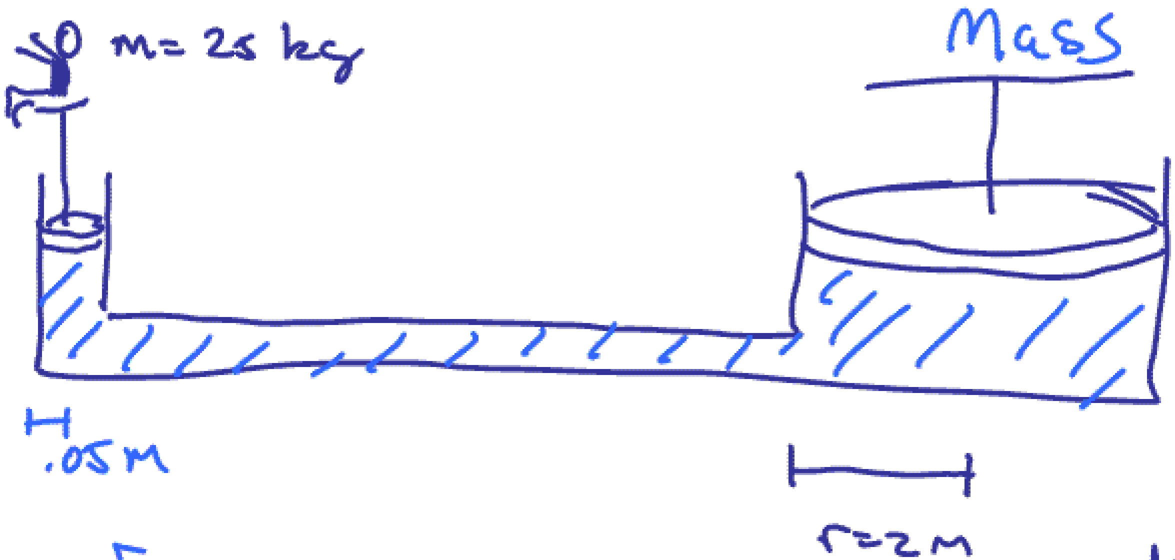
$$P_{\text{top paper}} = P_{\text{top water}} + \rho g h$$

$1 \text{ atm} = 1.013 \times 10^5 \text{ Pa}$

$= 1013 \text{ millibar}$

$= 14.70 \text{ lb/in}^2$

Pascal's law: Pressure applied to an enclosed fluid is transmitted undiminished to every point in fluid and the container walls.



Hydraulics

$$P_{kid} = \frac{F}{A}$$

$$= \frac{(25)(9.8)}{(\pi)(.05)^2} = \frac{(Mass)\,g}{\pi\,(2)^2}$$

↑ Pascal

$MASS = 40,000$ kg

80 000 lbs