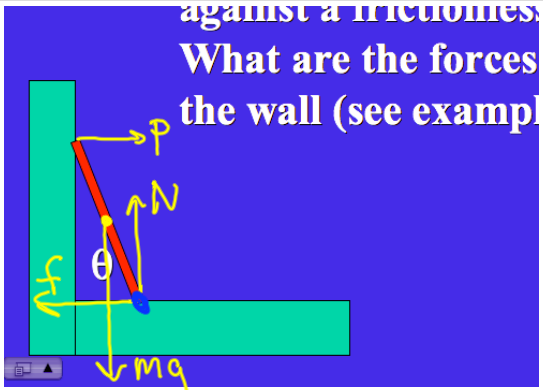
Reminders 04-22-10:

-POW 10 Due Today
-Quiz in Recitation Next Week (Ch 11 and 12)
-Exam 4 Thursday April 29 Chapters 10-12
-Problem number 2 Chapter 11 is asking for the locatio
of the new reference point to that produces a torque th
is minus one-half of that in part (a).

Objectives

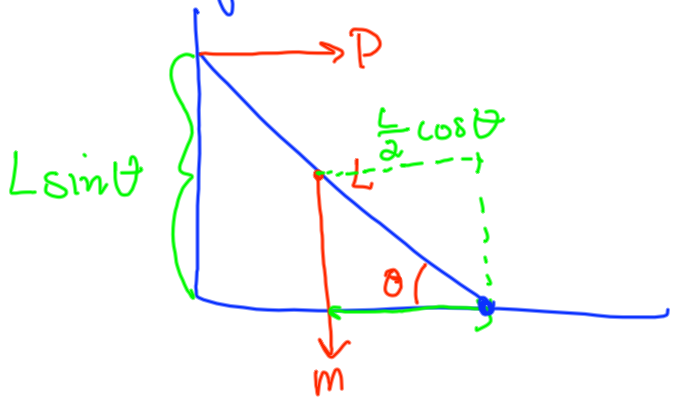
-Conditions for Equilibrium
-Center of Gravity
-Examples, Examples, Examples



$\Sigma F_y = N - mg = 0 \quad N = mg = 400N$

$\Sigma F_x = P - f = 0 \quad P = f$

Sum torques

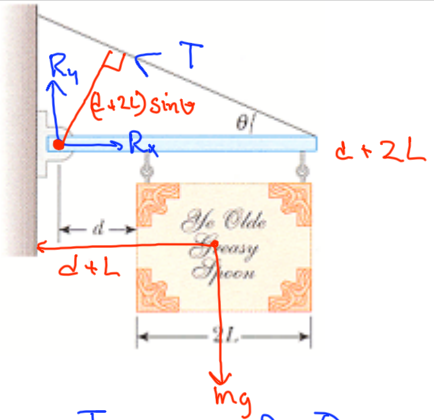


$\Sigma \tau = -PL\sin\theta + mg\frac{L}{2}\cos\theta = 0$

$P\sin\theta = \frac{mg}{2}\cos\theta$

$P = \frac{mg}{2}\cot\theta = 200\cot 53°$

$P = 151N = f$



$$\Sigma F_x = -T\cos\theta + R_x = 0 \leftarrow$$

$$\Sigma F_y = R_y - mg + T\sin\theta = 0 \leftarrow$$

$$\Sigma \tau = -mg(d+L) + T(d+2L)\sin\theta = 0$$

$$T(d+2L)\sin\theta = mg(d+L)$$

$$T = \frac{mg(d+L)}{(d+2L)\sin\theta}$$

$$R_x = T\cos\theta = \frac{mg(d+L)}{(d+2L)\sin\theta}\cos\theta$$

$$R_x = \frac{mg(d+L)}{(d+2L)}\cot\theta$$

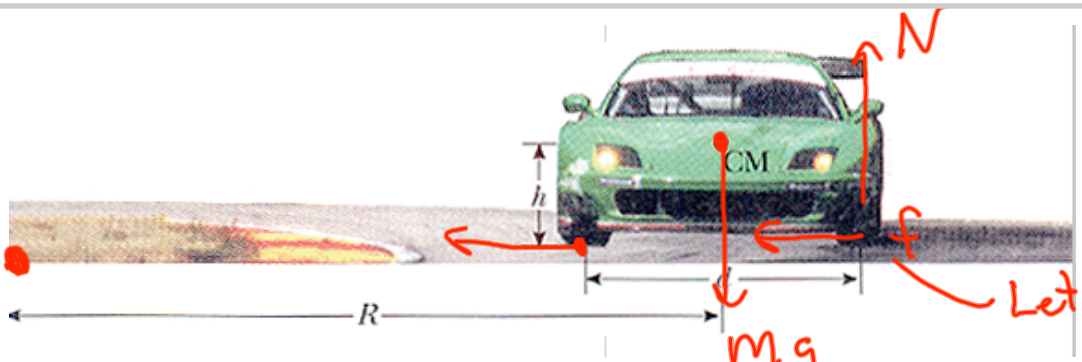
$$R_y = mg - T\sin\theta$$

$$mg - \frac{mg(d+L)}{d+2L}$$

$$= \frac{mg(d+2L) - mg(d+L)}{d+2L}$$

$$R_y = \frac{mgL}{d+2L}$$

$$R = \sqrt{R_x^2 + R_y^2}$$



Sum torques about center of mass

$N = mg \qquad f = \frac{mv^2}{R}$

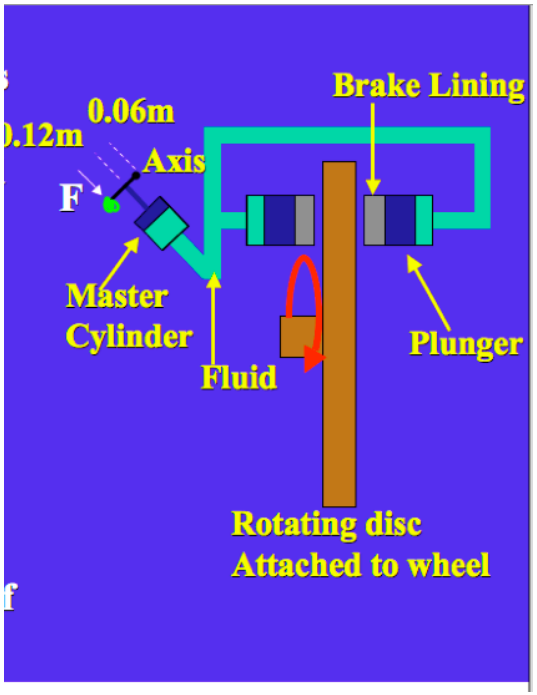
$N\left(\frac{d}{2}\right) - f(h) = 0$

$N\frac{d}{2} = f(h)$

$mg\frac{d}{2} = \frac{mv^2}{R}(h)$

$\frac{gRd}{2h} = v^2 \qquad v = \sqrt{\frac{gRd}{2h}}$

higher the c.m. of the vehicle the lower the max. speed.



$F_{app}(.18m) = f_m(.06)$

$f_m = F_{app}\left(\frac{.18}{.06}\right)$

$= 3F_{app}$

$= \boxed{27N}$

Apply Pascal's Principle

$\frac{f_M}{A_1} = \frac{f_2}{A_2}$ $\qquad f_2 = f_p$

$f_2 = f_p = \frac{A_2}{A_1} f_M = \frac{\pi r_2^2}{\pi r_1^2} f_M$

$= \left(\frac{.018}{.009}\right)^2 f_m = 4f_m = 4(27N)$

$= \underline{108N}$

Title: Apr 22-10:29 AM (5 of 5)