

1. Torque Lab - Procedure Manuals - Page 67 - Experiment 10.2  
Due Today

2. Handout - Torque  
Textbook - Page 501 #31  
Page 529 #27 } *Simpler Torque*

3. Another Example (More Complex)

4. Textbook - Page 501 #33 (a)  
Page 529 #28 (a) }

5. Handout - More Torque Problems

————— Stopped Here P1  
————— Stopped Here P6

\* Friday  $\Rightarrow$  Mock Quiz  
① Simple  
① Complex

$$\% = \left| \frac{| | - | |}{| |} \right| \times 100\% = \underline{\quad}\%$$

$\Rightarrow$

## Torque Problems

Handout - Torque

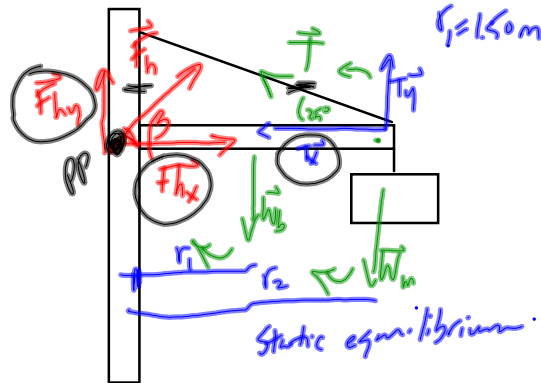
Textbook - Page 501 #31  
Page 529 #27

Textbook - Page 501 #33 (a)  
Page 529 #28 (a)

Handout - More Torque Problems

## Torque - Mass Complex

Example: A uniform beam of mass 50.0 kg and length 3.00 m is attached to a wall with a hinge. The beam supports a sign of mass 300 kg which is suspended from its end. The beam is also supported by a wire that makes an angle of  $25^\circ$  with the beam. Determine the components of the force that the hinge exerts and the tension in the wire. ( $6.8 \times 10^3$  N,  $2.5 \times 10^2$  N,  $7.5 \times 10^3$  N)



$$\begin{aligned} \vec{F}_{\text{net}y} &= 0 & \vec{F}_{\text{net}x} &= 0 \\ & & F_{hx} &= T_x \\ \vec{\tau} &= rF\sin\theta \\ F_{hy} - W_b - W_m + T_y &= 0 & \vec{\tau}_{\text{net}} &= 0 \end{aligned}$$

$$\begin{aligned} -\tau_{W_b} - \tau_{W_m} + \tau_{T_y} &= 0 \\ -r_1 W_b \sin 90.0^\circ - r_2 W_m \sin 90.0^\circ + r_2 T \sin 25^\circ &= 0 \\ -r_1 m_b g - r_2 m_m g + r_2 T \sin 25^\circ &= 0 \end{aligned}$$

$$T = \frac{r_1 m_b g + r_2 m_m g}{r_2 \sin 25^\circ}$$

$$T = 7.5 \times 10^3 \text{ N} \leftarrow$$

$$\vec{T} = 7.5 \times 10^3 \text{ N}, 25^\circ \text{ NW}$$

$F_{hx} = T_x$	$F_{hy} - W_m - W_b +$
$F_{hx} = T \cos 25^\circ$	$F_{hy} = W_m + W_b - T_y$
$F_{hx} = 6.8 \times 10^3 \text{ N}$	$F_{hy} = m_m g + m_b g -$
$F_{hx} = +6.8 \times 10^3 \text{ N}$	$F_{hy} = 2.5 \times 10^2 \text{ N}$
	$F_{hy} = +2.5 \times 10^2 \text{ N}$