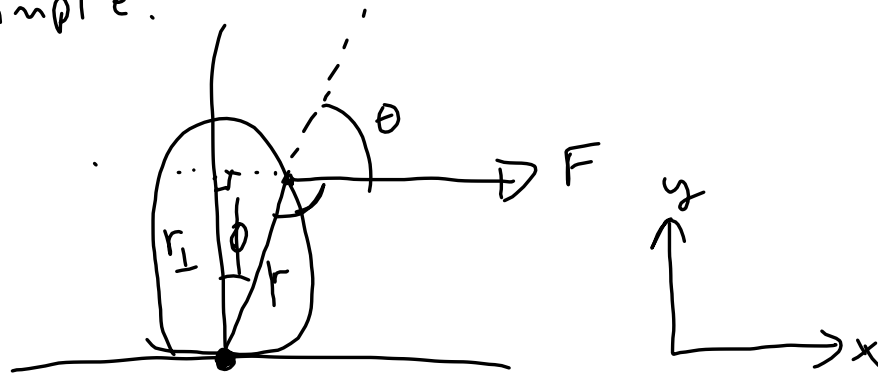


Example:



$$r_{\perp} = r \sin \theta = r \sin \theta$$

$$\vec{\tau} = \vec{r} \times \vec{F} = r F \sin \theta \text{ (negative } z \text{ direction)}$$

~~or~~

Oct 31-9:54 AM

FBD for pulley

Newton's 2nd law for translation

$$\sum F_x = m a_x = 0 \quad \sum F_y = m a_y = 0$$

$$B - T - mg = 0$$

$$B = T + mg$$

$$B = 10\text{N} + 9.8\text{N}$$

$$B = 19.8\text{N}$$

For torque

axis of rotation, so
 τ due to B and mg
 is zero

$$\vec{\tau} = rT \text{ (position)}$$

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Diagram showing a pipe of mass m_p and length l supported at points A and B. A weight m_w is attached to the pipe. Distances are marked as $l/2$ from A to the weight and $l/2$ from the weight to B. Tension forces T_1 and T_2 are shown at A and B respectively. Gravity mg acts downwards at the center of mass.

FBD for pipe:

$$\sum F_y = 0$$

$$T_1 + T_2 = (m_w + m_p)g$$

$$\sum \tau = 0$$

For torque about point A:

$$dT_2 - \frac{l}{2}m_p g + \frac{l}{2}m_w g = 0$$

$$T_2 = \frac{g}{2}(m_p - m_w)$$

For torque about point B:

$$\frac{3l}{2}m_w g - lT_1 + \frac{l}{2}m_p g = 0$$

$$T_1 = \frac{g}{2}(m_p + 3m_w)$$

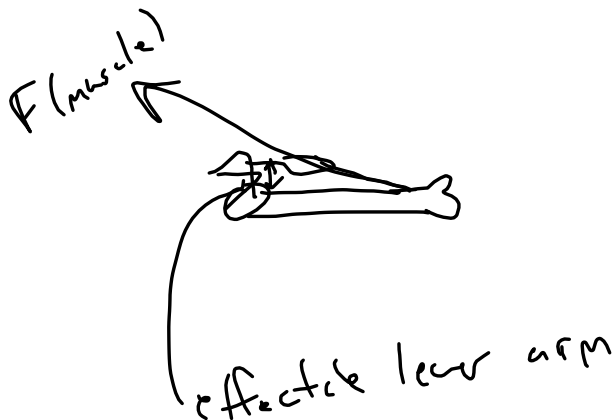
$$T_1 + T_2 = m_p g + m_w g$$

as expected

Oct 31-10:22 AM

For problem # 4 in ETA

An "effective" lever arm for a muscle



Oct 31-10:41 AM