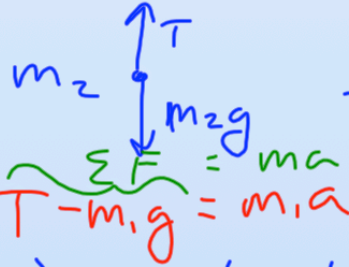


Old Pulley Problems

assumed the pulley had no mass so we could ignore it



T's are the same!

$$\Sigma F_2 = m_2 a$$

$$-T + m_2 g = m_2 a$$

- 1) FBD's
- 2) Define +
- 3) $\Sigma F = ma$

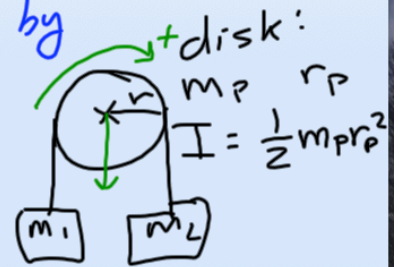
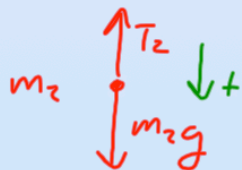
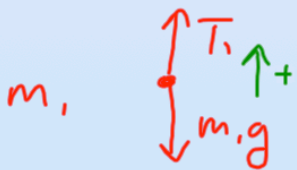
4) acceleration is the same on both blocks

New Pulley Problems

- Pulley's have mass

Some of the energy will be used up by the pulley

1) FBD + Torque diagram:



$$\tau = F \cdot r$$

2) Define + τ if the tensions were the same the pulley wouldn't move

$$\Sigma F = ma \quad \Sigma \tau = I \alpha$$

$$T_1 - m_1 g = m_1 a$$

$$-T_2 + m_2 g = m_2 a$$

$$-T_1 + T_2 = I \alpha$$

$$-T_1 r + T_2 r = \frac{1}{2} m_p r^2 \alpha$$

$$-T_1 r + T_2 r = \frac{1}{2} m_p r^2 \left(\frac{a}{r}\right)$$

$$-T_1 + T_2 = \frac{1}{2} m_p a$$

$$4) a = \alpha \cdot r$$

$$\alpha = \frac{a}{r}$$