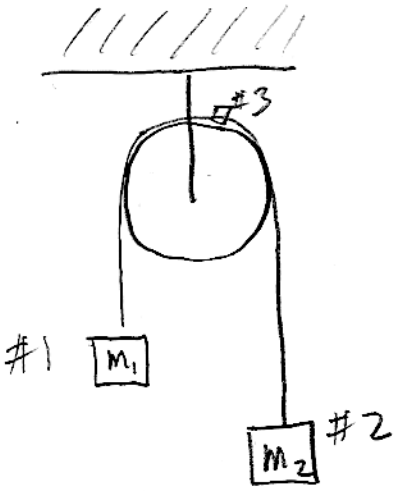


"Constraint"

Magnitude of #1's acceleration is same as #2's

$\Rightarrow$ rope does not stretch

$$a_1 = a_2 \quad (1)$$

Given: m_1, m_2, g

Find: T_1, T_2, a_1, a_2 (4)

#1: T_1 (+), a_1; W_1

$$T_1 - W_1 = m_1 a_1 \quad (2)$$

#2: T_2 (+); W_2, a_2

$$T_2 - W_2 = -m_2 a_2 \quad (3)$$

#3: T_1, T_2

$$T_1 - T_2 = 0$$

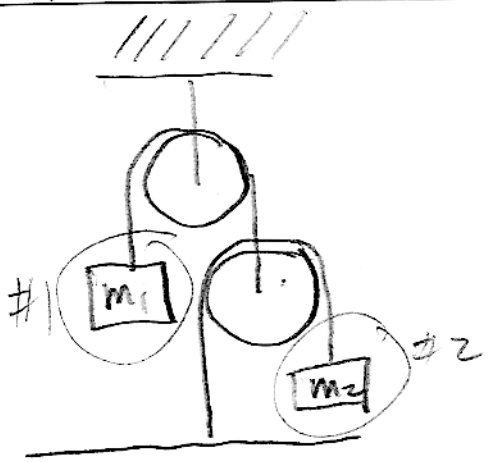
$$T_1 = T_2 \quad (4)$$

$$a_1 = a_2 = \frac{(m_2 - m_1)}{m_1 + m_2} g$$ check sign

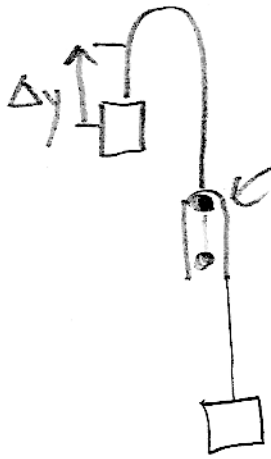
$$T_1 = T_2 = 2\frac{m_1 m_2}{m_1 + m_2} g = 2\mu g$$

Remove["Global`*"]

```
Solve[{a2 == a1, T1 - m1*g == m1*a1,
  T2 - m2*g == -m2*a2, T1 == 2*T2},
 {a1, a2, T1, T2}]
```



a_1 & a_2 related



$2\cdot\Delta y$ of string available.

$\therefore \underline{a_2 = 2a_1}$ #1

#1: T_1 ↑, a_1 ↑; W_1 ↓

$T_1 - W_1 = m_1 a_1$

$T_1 - m_1 g = m_1 a_1$

#2 T_1 ↑; W_1 ↓, a_2

$T_1 - m_2 g = m_2 a_2$

#3 massless pulley: $T_1 - 2T_2 = 0$

$T_1 = 2T_2$

T_1 ↑; T_2 ↓, T_2 ↓

$$a_1 = -\frac{(m_1 - 2m_2)}{m_1 + 4m_2} g = \frac{2m_2 - m_1}{m_1 + 4m_2} g$$

$$a_2 = -2a_1 = -2\frac{(2m_2 - m_1)}{m_1 + 4m_2} g$$

$$T_1 = \frac{6 m_1 m_2}{m_1 + 4m_2} g \qquad T_2 = \frac{1}{2} T_1 = \frac{3 m_1 m_2}{m_1 + 4m_2}$$