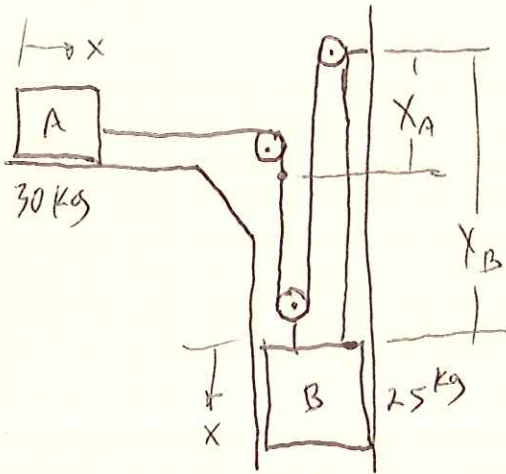


PROB. 12-11



FIND  $a_A$ ,  $a_B$ , TENSION IN CABLE

BLOCK A:  $\Sigma F_x = m_A a_A$

$$T = m_A a_A \Rightarrow a_A = \frac{T}{m_A}$$

BLOCK B:

$$2x_B + (x_B - x_A) = \text{CONSTANT}$$

$$3x_B - x_A = \text{CONSTANT}$$

$$3v_B - v_A = 0, \quad 3a_B - a_A = 0$$

$$a_B = \frac{1}{3} a_A = \frac{T}{3m_A}$$

$$\Sigma F_x = m_B a_B$$

$$-3T + m_B g = m_B a_B$$

$$-3T + m_B g = m_B \left( \frac{T}{3m_A} \right), \quad T \left( \frac{m_B}{3m_A} + 3 \right) = m_B g$$

$$T \left( \frac{m_B + 9m_A}{3m_A} \right) = m_B g$$

$$T = \frac{3m_A m_B g}{(m_B + 9m_A)} = \frac{3(30 \text{ kg})(25 \text{ kg})(9.81 \frac{\text{m}}{\text{s}^2})}{[(25) + 9(30) \text{ kg}]} = 74.82 \text{ N}$$

$$a_A = \frac{T}{m_A} = \frac{(74.82 \text{ N})}{(30 \text{ kg})} = 2.494 \frac{\text{m}}{\text{s}^2} \rightarrow$$

$$a_B = \frac{1}{3} a_A = 0.8313 \frac{\text{m}}{\text{s}^2} \downarrow$$