The system shown is released from rest. The pulley is frictionless and massless.

(a) Determine which direction the system moves. The arrow shows the positive direction.

(b) Calculate the acceleration of the system.

(c) What is the speed after block 1 has fallen 1.50 m?

(d) How much time does it take for the system to move 2.25 m?

\[ m_1 = 6.25 \text{ kg} \]
\[ m_2 = 4.25 \text{ kg} \]
\[ \mu_k = 0.50 \]
\[ \mu_s = 0.60 \]

\[ m_1 g - T = \frac{m_1 g - T}{m_1} \]
\[ m_2 g \sin \theta = \frac{T}{m_2} \]

And \( a_1 = a_2 \text{ [Same direction]} \)

Only one \( T \) in problem, not two. (or \( T_1 = T_2 \))

From (1) \[ T = m_1 g - m_2 g \sin \theta \]

Plug into (2) \[ a_2 = \frac{m_1 g - m_2 g \sin \theta - f}{m_2} \]

\[ f = \mu_k m_2 g \cos \theta \]

From (3) \[ f = m_2 g \cos \theta \]

\[ m_1 a + m_2 a = m_1 g - m_2 g \sin \theta - \mu_k m_2 g \cos \theta \]

\[ a = \frac{m_1 g - m_2 g \sin \theta - \mu_k m_2 g \cos \theta}{m_1 + m_2} \]

\[ a = 1.93 \text{ m/s}^2 \]
The system shown is released from rest. The pulley is frictionless and massless.

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\[ m_1 = 6.25 \text{ kg} \]
\[ m_2 = 4.25 \text{ kg} \]
\[ \mu_k = 0.50 \]
\[ \mu_s = 0.60 \]

\[ V^2 = \frac{V_0^2}{2} + 2a(x - x_0) \]
\[ V^2 = 2 \times (1.93)(1.50) \]
\[ V^2 = 5.79 \]
\[ V = 2.41 \text{ m/s} \]

Some people used "g" instead of \( g \).

\[ a = 1.93 \text{ m/s}^2 \]

Some people used \( a = 1.93 \text{ m/s}^2 \) also.

Some people used \( V = 2.41 \text{ m/s} \)

And \( V = at \), BUT \( 2.41 \text{ m/s} \) is not in "free fall".

\[ x - x_0 = V_0 t + \frac{1}{2}at^2 \]
\[ 2.25 = \frac{1}{2} (1.93)t^2 \]
\[ t^2 = 2.3325 \]
\[ t = 1.53 \text{ s} \]

Some people used many methods in (c), but left out friction.

Some people used every method in (c), but left out friction.

If you said \( T = m_1g \) or \( T = m_2g \cos \theta + m_3g \sin \theta \), then the block would not move. Bad Error.