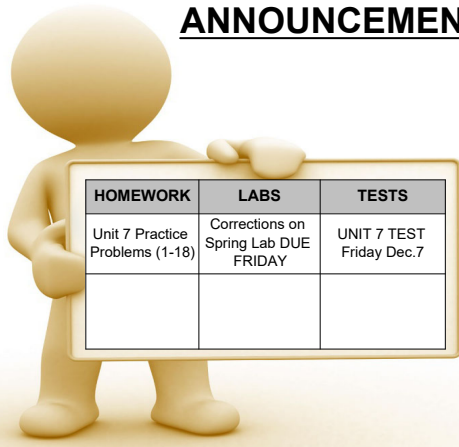


ANNOUNCEMENTS



7.6 Connected Objects

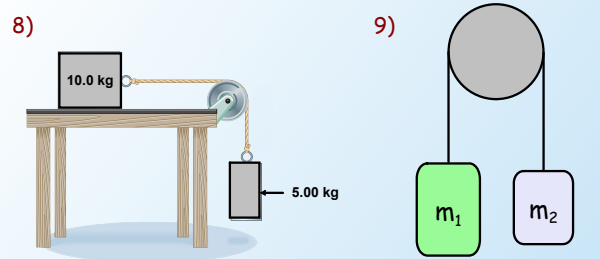
LEARNING TARGETS

7.3 I can define, analyze, and solve dynamic problems involving tension forces and connected objects.

Connected Objects

- 8) A 10.0-kg block slides on a frictionless tabletop. It is connected to a string that passes over a pulley and suspends a 5.00-kg block.
- 9) Two blocks, one of mass 0.270 kg and the other of mass 0.250 kg, are tied together with a massless rope. This rope is strung over a massless, resistance-free pulley.

Connected Objects

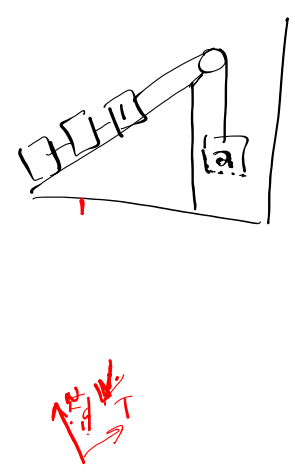


Connected Objects

8) A 10.0-kg block slides on a frictionless tabletop. It is connected to a string that passes over a pulley and suspends a 5.00-kg block. What is the acceleration of the blocks?

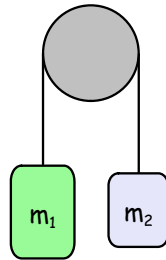
$F_{net,1} = T_{R,1}$
 $m_1 a = T$
 $F_{net,2} = F_{g,2} - T_{R,2}$
 $m_2 a = m_2 g - T$

$a = \frac{m_2 g}{m_1 + m_2}$
 $m_2 a = m_2 g - m_1 a$
 $5 a = 49 - 10 a$
 $15 a = 49$
 $a = 3.27 \text{ m/s}^2$



Connected Objects

- 9) Two blocks, one of mass 0.270 kg and the other of mass 0.250 kg, are tied together with a massless rope. This rope is strung over a massless, resistance-free pulley.

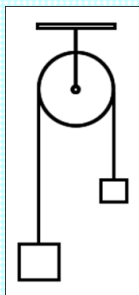


George Atwood

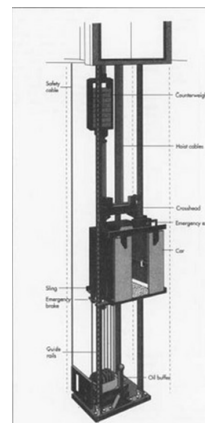


1745 - 1807

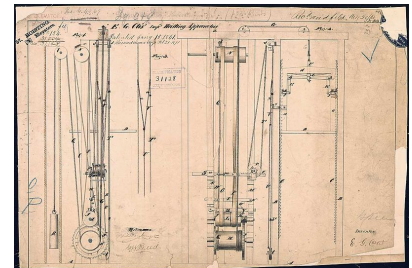
Atwood



An Atwood's Machine is made with two hanging masses connected by a string that passes over a pulley.



Elevators



Atwood's Machine

This Atwood's machine is made with $m_1 = 0.250$ kg, and $m_2 = 0.270$ kg. What is the acceleration of the two masses, and the tension in the rope?

$$F_{net,1} = F_{T,11} - T$$

$$m_1 a = m_1 g - T$$

$$F_{net,2} = T - F_{g,2}$$

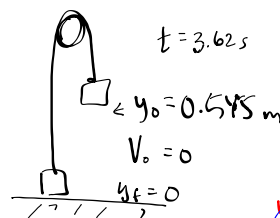
$$m_2 a = T - m_2 g$$

$$T = m_1 g - m_1 a = m_2 a + m_2 g = T$$

$$m_1 g - m_2 g = m_1 a + m_2 a$$

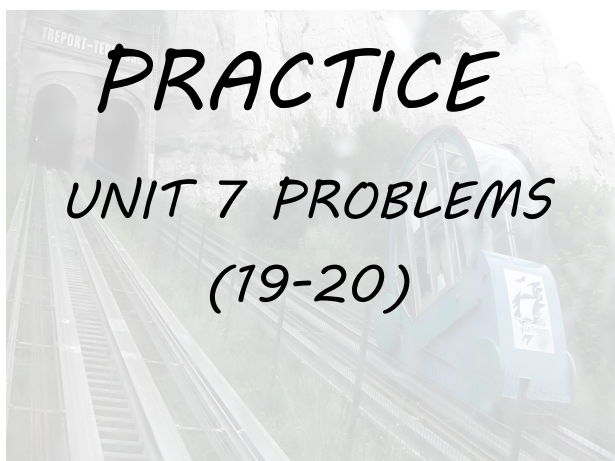
$$m_1 g + m_2 g = a(m_1 + m_2)$$

$$a = \frac{m_1 g - m_2 g}{m_1 + m_2}$$

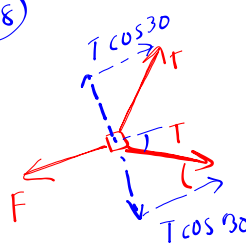
$$a = 0.377 \text{ m/s}^2$$


$$y = y_0 + v_0 t + \frac{1}{2} a t^2$$

$$\frac{2y_0}{t^2} = a = 0.083 \text{ m/s}^2$$



(18)



$$F = 2 T \cos 30$$

$$F = 2(mg) \cos 30$$

