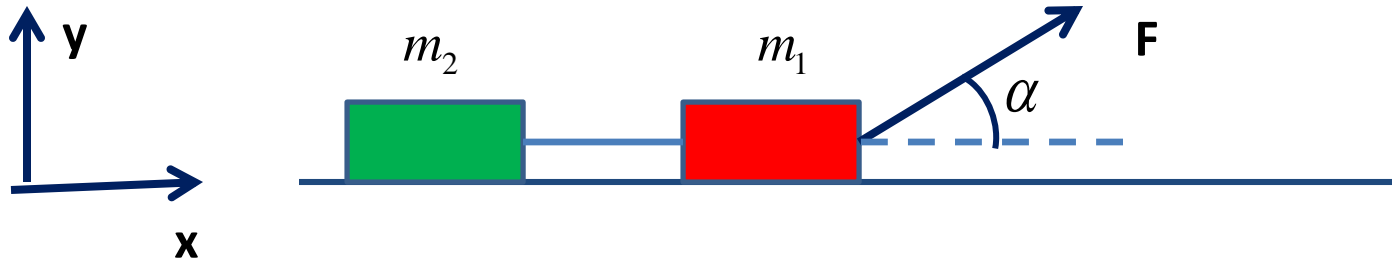
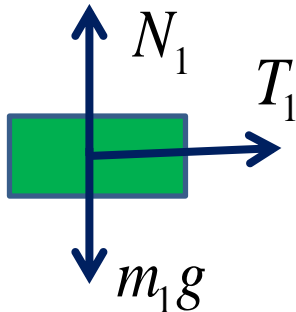


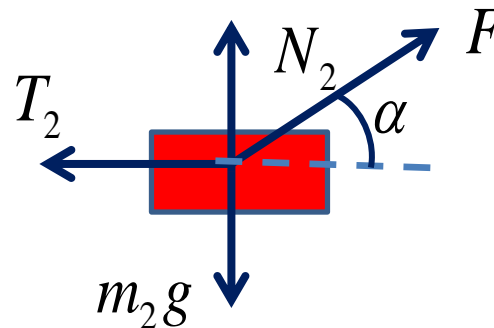
Free Body Diagram



1. Choose the coordinate system.
2. Show all forces applied to each object.
3. Write 2nd Newton's Law for each object, and each axis.
4. Solve equations to find acceleration.



$$T_1 = T_2 = T$$



$$\begin{array}{ll}
 x\text{-axis:} & T = m_1 a & F \cos \alpha - T = m_2 a \\
 y\text{-axis:} & N_1 - m_1 g = 0 & N_2 + F \sin \alpha - m_2 g = 0
 \end{array}$$

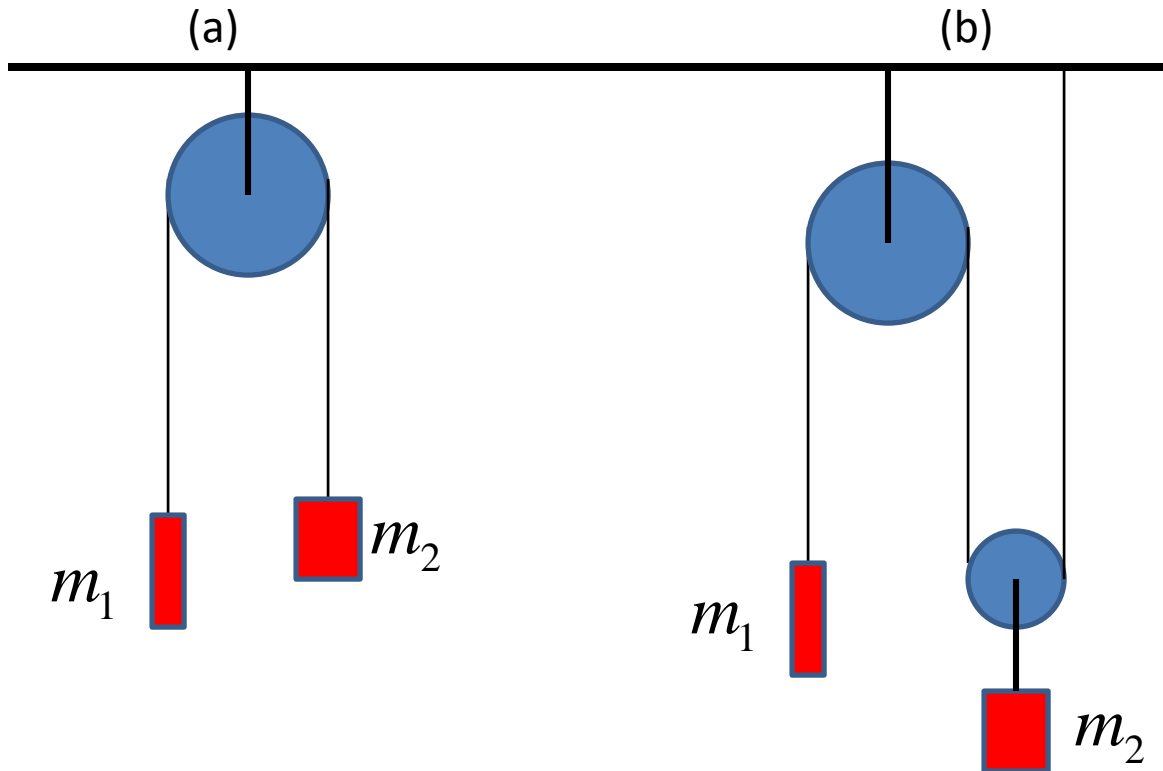
$$a = \frac{F \cos \alpha}{m_1 + m_2}$$

Homework

Problem 1.

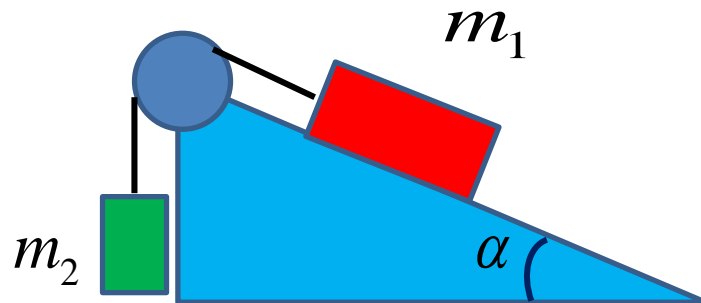
Find acceleration of block “1” in both cases in the Figure. All pulleys are weightless and rotate without friction.

Important hint: the accelerations of two blocks in the case (b) are not the same! Imagine that you move block “2” by distance x upward. How much did the block “1” moved? This consideration will allow you to find the relationship between the two accelerations.



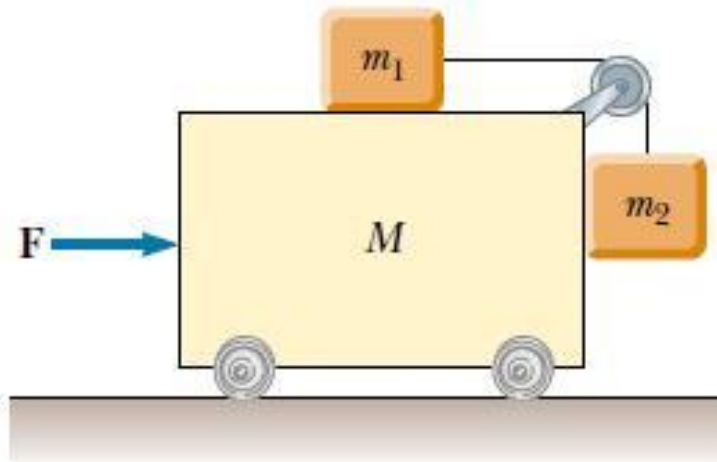
Problem 2

Construct Free Body Diagrams, and find the accelerations of all the blocks (no friction):



Problem 3.

What horizontal force must be applied to the cart shown in Figure so that the blocks remain stationary relative to the cart? Assume all surfaces, wheels, and pulley are frictionless.



Hint: If the blocks are stationary, accelerations of all three bodies is the same, and directed horizontally.