Worksheet #1

Newton's 2nd Law

1. A car is traveling at 22.8 m/s on a horizontal highway.

    a. If the coefficient of friction between road and tires on a rainy day is 0.105, what is the minimum distance in which the car will stop?

    | 254 |
    m

2. Three blocks are in contact with each other on a frictionless, horizontal surface. A horizontal force **F** is applied to m_1. If $m_1 = 2.00$ kg, $m_2 = 3.00$ kg, $m_3 = 6.00$ kg, and F = 16.0 N, draw a separate free-body diagram for each block to the right of the image.
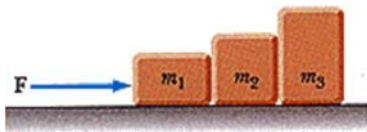
    a. Find the acceleration of the blocks

    | 1.45 |
    m/s^2 (to the right)

    b. Find the magnitude of the contact force between m_1 and m_2.

    | 13.1 |
    N

    c. Find the magnitude of the contact force between m_2 and m_3.

    | 8.73 |
    N

3. A 5.00 kg block is placed on top of a 10.0 kg block. A horizontal force of 45.0 N is applied to the 10.0 kg block, and the 5.00 kg block is tied to the wall. The coefficient of kinetic friction between all surfaces is 0.190.
   a.   Draw a force diagram for each block.

| 5kg Block:	10kg Block:

   b.   Determine the tension in the string and the magnitude of the acceleration of the 10 kg block.

   | 9.31 |
   N

   | 0.776 |
   m/s²

   5.00 kg
   10.0 kg   → F= 45.0 N
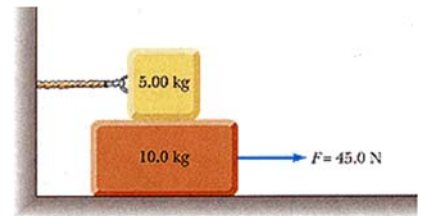
4. Two masses are tied together by a string of negligible mass. The block of mass *m* is set on a table, while the block of mass *3m* is draped over a frictionless pulley. Assuming the coefficient of friction between the table and block *m* is u_k:

   m
   3m
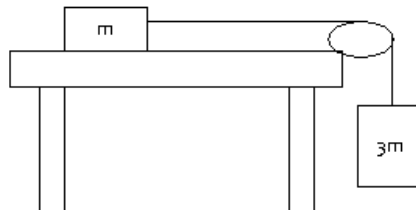
   a.   Write an expression for the coefficient of kinetic friction in terms of a and g.

   b.   Write an expression for the tension force acting on the block of mass *3m* in terms of m, a, and g.