Force Homework (due Wed, 2/27/19)
Name:

Newton's Laws		
1	Inertia	$\Sigma \vec{F} = 0$
2	F = ma	$\Sigma \vec{F} = m\vec{a}$
3	Karma	$\vec{F}_{12} = -\vec{F}_{21}$

Forces		
Gravity	$m \cdot g$	$g = 10 \text{ m/s}^2$
Normal Force	F_N	Comes from Surfaces
Tension	T	Always pulls
Static Friction	$f_s = \mu_s \cdot F_N$	Not Moving
Kinetic Friction	$f_k = \mu_k \cdot F_N$	Moving

1. Solve (Don't forget units):

   1.1. If m = 7 kg, and a = 3 m/s^2, find F.

F =

   1.2. If F = 48 N, and a = 12 m/s^2, find m.

m =

   1.3. If F = 40 N, and m = 5 kg, find a.

a =

2. Is it possible to have motion in the absence of a force? Explain

3. A baseball (mass m) is thrown upward with some initial speed. What is the force on the ball when a) it reaches half its maximum height and b) when it reaches its maximum height?

4. If it's true that when you push on a small book, it pushes back at you with an equal and opposite force (Newton 3), why does it move?

5. A block of mass m_1 = 2 kg hangs by a string from the ceiling. Another block of mass m_2 = 5 kg hangs from the bottom of m_1, and a third block of mass m_3 = 3 kg hangs from the bottom of m_2. Find the tension in each string: T_1, T_2, and T_3. Do this by drawing Free Body Diagrams (FBD) for EACH mass and then solving Newton's first law for each block.
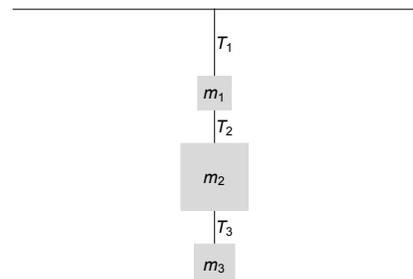
6. A block of mass m = 4 kg sits on a rough (μ_s = .7) horizontal surface. Draw the FBD of the block. How big does a force F have to be so that it will just start moving?
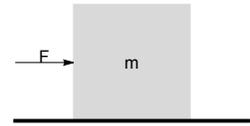
7. A block (m = 9 kg) slides on a rough surface (μ_k = .4) with an initial velocity of 5 m/s to the left. Draw the FBD of the block, find the friction force, the acceleration of the block, and the time it takes to come to a stop.

8. 2 blocks pushed are pushed to the right on a rough surface (μ_k = .3) with a force of F = 12 N. m_1 = 8 kg, m_2 = 5 kg. Draw the FBD for each mass, find the forces between the blocks, F_{12} and F_{21}, and the acceleration of the system.