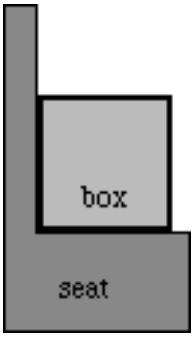
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

1. A 2.00kg box rests on the passneger seat of a car as the car accelerates at 2.00m/s^2. The coefficient of friction between the seat and the box is 0.100. (a)Sketch the forces that act on the box. (b)Find the magnitude of each force.



2. Mimas is a moon of Saturn. Mimas has a mass of 4.00 x 10^{19}kg and orbits at a radius of 1.82 x 10^5m. The period of orbit is 8.17 x 10^4s. The mass of Saturn is 5.68 x 10^{26}kg and it orbits the sun with a period of 9.30 x 10^8s. Find (a)the force of gravity that Saturn exerts on Mimas and (b)the force of gravity that Mimas exerts on Saturn.

3. A 0.150kg baseball is thrown from the outfield with an initial speed of 40.0m/s. When it has traveled 30.0m horizontally, it is 12.0m above the ground. During this flight of the ball, assume no air resistance and find (a)the work done on the ball by gravity, (b)the net work done on the ball, (c)the change in kinetic energy of the ball, and (d)the speed of the ball at this point.

4. The toy shown below consists of a piece of plastic attached to a spring. It has a total mass of 0.100kg. The spring is compressed 2.00cm and release. The designers of the toy want it to rise no more than 60.0cm. Estimate the maximum force constant of the spring that should be used.

5. A 60.0kg skier starts from rest an goes 100m along a 12˚ incline. The velocity of the skier at the bottom is 12.0m/s. Find (a)the change in kinetic energy of the skier, (b)the change in the potential energy, and (c)the average resistive forces that act on the skier during this motion.