

1. For each of these situations, sketch the object of interest and indicate the forces acting on this object. (a) A pumpkin falling toward the ground. (b) A piñata hanging from a vertical rope. (c) A physics book at rest on a table. (d) A sled sliding at constant speed across an ice covered lake. (e) A baseball player sliding into second base. (f) Jupiter orbiting the sun.
2. A hockey puck slides across the ice at a constant speed until it hits the back wall and bounces off. Explain this motion in terms of Newton's First Law especially the sliding motion and the collision with the wall.
3. A baseball catcher is expected to catch a 100mph (44.7m/s) fastball. Assume all the motion is along one dimension. Find (a) the force his glove exerts on the 150g baseball if it is brought to rest in 0.200s and (b) the force the ball exerts on the catcher's glove.
4. A Smart Car (<http://www.youtube.com/watch?v=ju6t-yyoU8s>) slams into a concrete barrier at high speed. Compare the magnitudes of (a) the mass of the car with the mass of the concrete, (b) the force the concrete exerts on the car with the force that the car exerts on the concrete, and (c) the acceleration of the car during the collision with the acceleration of the concrete during the collision. Cite the laws you use and explain how they apply.