# Recitation Questions

March 11

1. Explain how the conservation of momentum is a consequence of Newton's second and third laws. Call your TA or coach over when you have an argument, and give them your explanation.

2. The driver of a Mini Cooper (mass 1200 kg) is traveling at 10 m/s westward when he runs a stop sign and collides with a Toyota Camry (mass 2000 kg), traveling at 15 m/s northward. The two cars stick together after the collision.

   (a) What is the total momentum before the collision? (Will your answer be one value or two? Why?)

   (b) What is the total momentum after the collision?

   (c) What are the speed and direction of the cars after the collision?

(d) If the coefficient of kinetic friction between the cars' tires and the pavement is 0.6, how far do they skid before coming to rest?

3. A 5 kg box is sitting on a table; the coefficient of kinetic friction between the box and the table is 0.5. Two people throw things at it: a lump of clay and a rubber ball. Both objects have a mass of 500 g and strike the box at a speed of 4 m/s. The lump of clay collides inelastically (sticking to the box), while the ball bounces back at a speed of 2 m/s.

   (a) Without doing any mathematics, which object will knock the box further? How do you know? Hint: In the collision, the impulse delivered to the box is equal and opposite to the impulse delivered to the object thrown at it.

   (b) Calculate how far each object knocks the box.