

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
Physics Department

Physics 8.01T

Fall Term 2004

**Experiment 07: Momentum**

**Section:** \_\_\_\_\_ **Table and Group:** \_\_\_\_\_

**Participants:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Each group need turn in only one report. Make sure that you each have a copy of your data, as you will need it for a problem on Problem Set 9. (You can find a copy of the problem at the end of the notes for the experiment.)

**Part One: Inelastic Collisions**

Enter your data for the three inelastic collisions into the table below.

$m_A$	$m_B$	$v_{A,1}$ (m/s)	$v_2$ (m/s)
0.25 kg	0.25 kg		
0.25 kg	0.50 kg		
0.50 kg	0.25 kg		

Question 1: Is the kinetic energy constant in these collisions? If not, where did this energy go? Is it a reversible process?

### Part Two: Elastic Collisions

Enter the results measured by your group for elastic collisions into the table below.

If you assume that cart B collides elastically with the force sensor, then during the collision the momentum of cart B changes by  $\Delta\vec{p}_B = -2m_B\vec{v}_{B,2}$ . This change in momentum is the impulse that the force sensor exerts on the target cart B. Cart B therefore exerts an equal and opposite impulse on the force sensor; both have magnitude  $J = 2m_Bv_{B,2}$ . Measuring this impulse allows you to calculate the velocity of the target cart after the collision,  $v_{B,2} = J/2m_B$ .

$m_A$	$m_B$	$v_{A,1}$	$v_{A,2}$	$J$
0.25 kg	0.25 kg			
0.25 kg	0.75 kg			
0.75 kg	0.25 kg			

Question 2: What is the average impulse of cart A on cart B during each of the three collisions? While the carts were colliding, did the total kinetic energy change? If so, where did this energy go?