Name(s)

**Impulse and Momentum**

PreLab Questions

1. In a car collision, the driver’s body must change speed from a high value to zero. This is true whether or not an airbag is used, so why use an airbag? How does it reduce injuries?
2. You want to close an open door by throwing either a 400-g lump of clay or a 400-g rubber ball toward it. You can throw either object with the same speed, but they are different in that the rubber ball bounces off the door while the clay just sticks to the door. Which projectile will apply the larger impulse to the door and be more likely to close it?

PostLab Questions

1. If the impulse-momentum theorem is correct, the change in momentum will equal the impulse for each trial. Experimental measurement errors, along with friction and shifting of the track or Force Sensor, will keep the two from being exactly the same. One way to compare the two is to find their percentage difference. Divide the difference between the two values by the average of the two, then multiply by 100%. How close are your values, percentage-wise? Do your data support the impulse-momentum theorem?
2. Look at the shape of the last force *vs*. time graph. Is the peak value of the force significantly different from the average force? Is there a way you could deliver the same impulse with a much smaller force?
3. Revisit your answers to the Preliminary Questions in light of your work with the impulse-momentum theorem.
4. When you use different elastic materials, what changes occurred in the shapes of the graphs? Is there a correlation between the type of material and the shape?
5. When you used a stiffer or tighter elastic material, what effect did this have on the duration of the impulse? What affect did this have on the maximum size of the force? Can you develop a general rule from these observations?