

## II Questions:

- A. How do the maximum forces for each collision type compare? Why? Use the concept of impulse to explain the reason for the difference in maximum force.

Max force is higher for the "hard" collision because the impact time is shorter. The change of momentum is fairly even in both cases, so smaller "t" results in a larger "F" ( $\Delta p = F \cdot t$  versus  $\Delta p = F \cdot t$ )

- B. How do the average impulses for the two collision types compare?

Results will vary. This is dependent on efficiency and not "hardness." Springs can be very efficient, and so can hard objects.

- C. Do you think the relationship (from question B) that you observed between impulses in "springy" and "hard" collisions is correct? If so, explain why. If not, explain what the relationship should have been, and explain why.

It should be. If the measurements were precise and accurate, the observed relationship should be correct. If you got consistent data (but not too consistent) they're probably correct.

- D. Explain how and why the concepts of coefficient of restitution and impulse are closely related to one another in this activity.

A collision with a higher  $e$  is going to have a faster separation speed, so its  $p$  will change more, and therefore it will have a higher impulse (since  $Ft = \Delta p$ )

- E. If you decreased the slope of the ramp slightly, what effects would you expect to see on maximum force, impulse and coefficient of restitution?

decrease

About the same, intrinsic since this is an intrinsic property of the colliding bodies (like coefficient of friction)