AP Physics 1
California Crosspoint High School
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Collisions and Momentum Prelab

1. A crash test car collides with a wall.
    a. If you're given a radar gun, how could you determine the impulse that the wall provides to the car during the crash?

    Assuming that we know the mass of the car, we can calculate the impulse of the car with the equation $J = m\Delta v$. Use the radar gun to capture the velocity of the car on impact, and solve for J

    b. A position vs time graph of the car is given to you. How could you determine the impulse that the wall provides to the car during the crash?

    Assuming that we know the mass of the car, we can calculate the change in velocity using the slope of the graph. Plug it into the equation $J = m\Delta v$

    c. If you're given a force sensor, how could you determine the change in momentum of the car during before and after the crash?

    Use the equation $\Delta p = F\Delta t$, assuming we know the change in time.

2. Cart A collides with cart B. How could you determine whether the collision was elastic or inelastic?

    Elastic if kinetic energy is conserved, if not, it's inelastic.

3. Cart A is moving to the right. Cart B has a lesser mass than Cart A and is moving toward Cart A with the same speed.

    a. Describe the motion of the center of mass before the collision.

    The center of mass for the entire system is moving to the right, this is because even though they have the same velocity, Cart A has a higher mass than Cart B, which means the system's momentum is going towards the right. Momentum's direction is the same as velocity's direction.

    b. How does the motion of the center of mass after the collision compare with its motion before the collision?

    Same. The collision is an internal force.