

Physics: 1D Collisions

Objective: To explore conservation of momentum in 1-Dimensional elastic and inelastic collisions (Refer to Ch. 7.3, p. 310 for information and equations).

Materials: Wiimote, sensor bar, PASCO track, two PASCO carts, silver masses, magnetic end stop.

Procedure Part I: Elastic Collisions (magnets face each other)

1. Connect the Wii remote to the PC (click on the CPU Devices shortcut on the desktop then click add a device)
2. Start *Wii Physics* and change the collection mode to measure the 1D motion, distance and y-acceleration only.
3. Right click on the blank Wii Physics screen and select *Show Point Values*.
4. Measure the mass of all objects.
5. Make sure the track is as level as possible. Attach the wiimote to a cart.
6. Attach the sensor bar somewhere behind the magnetic bumper such that it is level with the IR camera on the wiimote.
7. Start collecting data then send the cart gently toward the bumper.
8. When the cart is moving in the opposite direction stop collecting data.
9. Use your results (velocities of the cart before and after) to check if the momentum before the collision equals the momentum after (the velocity of the cart is the slope of the line on the graph).
10. Place a second cart (it will be initially static) on the track so the magnetic ends face each other.
11. Begin recording data and send the wiimote cart towards the other, non-moving cart. Using the data calculate the velocity of the wiimote cart before and after the collision. Calculate the velocity of the second cart assuming momentum was conserved.

Procedure Part II: Inelastic Collisions (Velcro sides face each other)

1. Place the two carts on the track, one with the wiimote.
2. Start collecting data and send the wiimote cart towards the other (the carts should stick together).
3. Stop collecting data a couple of seconds after the collision.
4. Determine the momentum before and after the collision.
5. Repeat with two silver masses on the second cart.

Summarize your data and calculations in a table.