

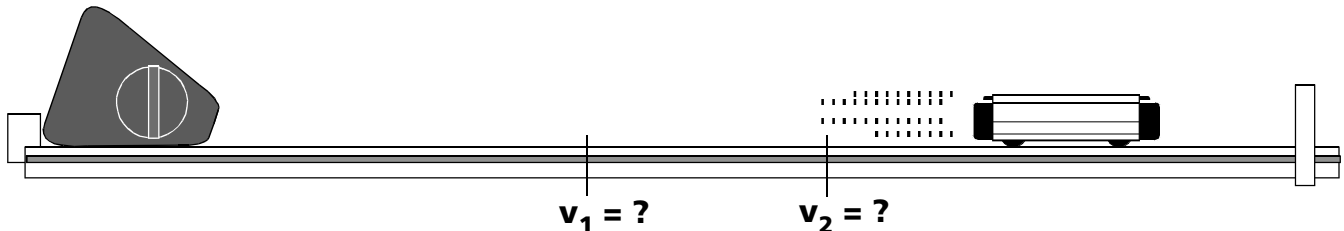
TechLab Techniques:

Motion Sensor / Data Studio Speed

use the motion sensor and Data Studio to determine multiple speeds during an event

• Event •

A dynamics cart is given an abrupt impulse and allowed to coast along a level track.



• Task •

Determine the speed of the cart at two distinct locations on the track.

• Equipment •

___ computer ___ DataStudio and configuration file
___ motion sensor ___ interface device
___ IDS (carts, tracks, accessories)

• Set Up •

1. Turn the computer on. While the computer is starting...
2. Place the motion sensor (on its "belly") on the track as shown in the diagram above. Make sure the gold disc is aimed horizontally along the track (facing the Velcro end stop).
3. Connect the motion sensor to the interface device. Connect the interface device to the computer.
4. When asked what you would like to do with the sensor, locate and open "Inelastic Collisions DS."

• Technique •

1. Ask your instructor for locations of position 1 and position 2 on the track.

Position 1 _____ Position 2 _____

Note: these positions are relative to the motion sensor, not the yellow tape on the surface of the track.

2. Place the cart near the motion sensor.
3. Click the on-screen Start button. Wait until you hear the clicking to go to the next step.
4. Give the cart an abrupt impulse and let it coast toward the Velcro end stop. Let it stick to the end stop.

The configuration file (Inelastic Collisions DS) is designed to start watching the cart when the cart is 30 cm from the motion sensor and stop watching the cart when it is 70 cm from the motion sensor. It generates a graph of velocity vs. position.

• The Reading •

1. Activate the Smart Tool by clicking on its icon near the top of the graph window. "Mousing over" each tool icon will reveal its name.
2. Drag the Smart Tool crosshairs onto the plot of the motion.
3. Use the arrow keys on the keyboard to move the crosshairs as close as possible to position 1. The ordered pair near the crosshairs are (position, velocity). So the first number should be position 1, the second will be the speed at position 1.
You may now return to the PhysLab already in progress.

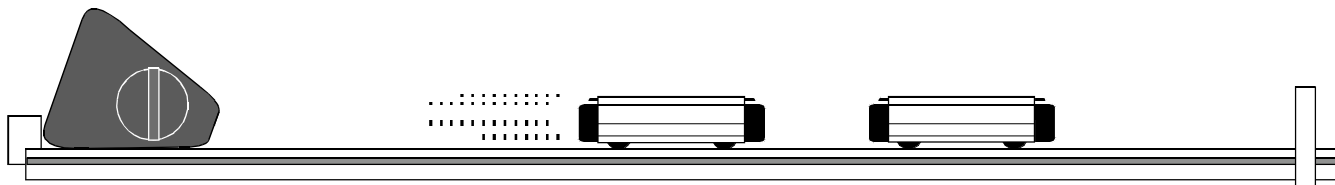
TechLab *Techniques:*

Motion Sensor / Data Studio Inelastic Collision Event Analysis

use the motion sensor and Data Studio to determine watch an inelastic collision

• Event •

A dynamics cart is given an abrupt impulse and allowed to coast along a level track.



• Task •

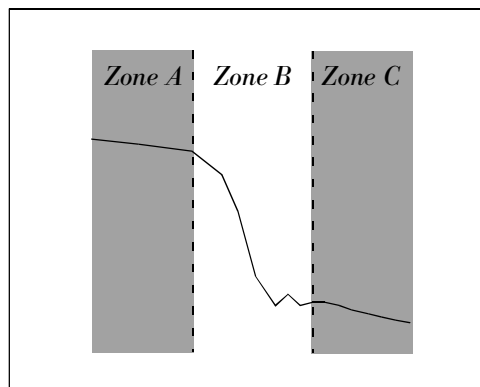
Determine the speed of the cart before and after the collision.

• Set Up •

Make sure the collision will occur when the back end of the cart is about 50 cm from the motion sensor.

• Technique •

1. Activate the motion sensor and run the event.
2. Examine the plot of the event. It will likely look something like the plot shown in the graph below.
3. Make note of the correspondence of the event and the plot.
 - a. Zone A is before the collision.
 - b. Zone B is during the collision.
 - c. Zone C is after the collision.



• The Reading •

1. The speed of the cart before the event should be read at the last reliable point before the event.
2. The speed of the cart after the event should be read at the first reliable point after the event.
3. No reading of any kind should be made from any point during the event.