MOMENTUM, ENERGY AND COLLISIONS

LAB CALC.19

INTRODUCTION

The collision of two carts on a track can be described in terms of momentum conservation and, in some cases, energy conservation. If there is no net external force experienced by the system of two carts, then we expect the total momentum of the system to be conserved. This is true regardless of the force acting between the carts. In contrast, energy is only conserved when certain types of forces are exerted between the carts.

Collisions are classified as *elastic* (kinetic energy is conserved), *inelastic* (kinetic energy is lost) or *completely inelastic* (the objects stick together after collision). Sometimes collisions are described as *super-elastic*, if kinetic energy is gained. In this experiment you can observe completely inelastic collisions and test for the conservation of momentum and energy.



OBJECTIVES

- Observe completely inelastic collisions between two carts, testing for the conservation of momentum.
- · Measure energy changes during completely inelastic collisions.

MATERIALS

LabPro or CBL 2 interface TI Graphing Calculator DataMate program Vernier Motion Detector dynamics cart track two low-friction dynamics carts with VelcroTM bumpers

PRELIMINARY QUESTIONS

Consider a head-on collision between two cars. One is initially at rest and the other
moves toward it. After the collision they stick together. Sketch a position vs. time
graph for each car, starting with time before the collision and ending a short time
afterward.

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