

Chapter 3: Newton's First Law of Motion—Inertia**Inertia****7****Buckle Up!****Purpose**

To investigate how Newton's law of inertia is involved in collisions

Required Equipment/Supplies

4 m of string
2 dynamics carts
4 100-g slot masses
rubber band
2 small dolls
2 pulleys
2 wood blocks
masking tape

Discussion

Newton's first law of motion states that an object in motion keeps moving with constant velocity until a force is applied to that object. Seat belts in automobiles and other vehicles are a practical response to Newton's first law of motion. This activity demonstrates in miniature what happens when that important law is ignored.

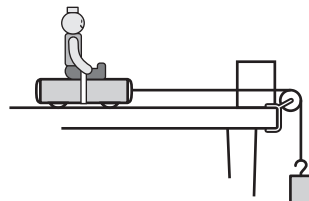
Procedure

Step 1: Attach 2 m of string to each of two small dynamics carts. Attach a 200-g mass to the other end of each of the strings. Attach the pulleys to the table edge and hang the masses over them with the masses on the floor and the carts on the table. Place a wood block on the table in front of each pulley.

Step 2: Place one doll on each cart. Use a rubber band to serve as a seat belt for one of them.

Step 3: Pull the carts back side by side and release them so they accelerate toward the table's edge.

Crash doll on cart with and without "seat belts."



Analysis

1. What stopped the motion of the doll without a seat belt when the cart crashed to a stop?

2. Was there any difference for the doll with a seat belt?

Going Further

Step 4: Tape a 100-g mass to the doll.

3. Before repeating the experiment, predict the results with increased mass. Does the increased mass affect the movement of the doll after it crashes?
