CENTRAL SCIENTIFIC COMPANY

OPERATING INSTRUCTIONS

Acceleration Experiment Stand
No. 32159

1. Purpose

The Acceleration Experiment Stand is a “super” highway for your dynamics carts experiments. Because it can be inclined, you will be able to increase the number of experiments you can do with dynamics carts.

2. Description

One side of the stand’s track has six rails for supporting a cart’s wheels or for rolling steel balls straight through the rail wells. The other side of the track is flat. The track has four walled sides to protect carts from falling and a 110-centimeter scale to measure the distance the carts travel.

You can incline the track from a horizontal position to about ten degrees using the adjusting bracket.

There are two small stages on either end of the track that serve as walls and for placing a spark recorder. Two magnetized rubber bumpers may be attached to the stages.

3. Setup

The track comes already assembled. To incline the track, simply loosen the wing nut on the adjustment frame, set the track to the inclined angle that you want, and tighten the wing nut. If you are setting the angle of inclination at less than five degrees, please place a piece of wood or a book under the apparatus. (The stand might slip at these angles without a little shoring). Use a C-clamp to attach one end of the track to a sturdy table.

4. Operation

Dust the track off with a clean, soft cloth before using it in any kinematics experiments. Take care not to damage the surface of the track.

A. Constant acceleration in linear motion: Set up the stand as shown below in Fig. 1. Compare the acceleration at different inclines. Set the launching force of the carts at different velocities for the same incline.

Fig.1 Linear Motion

B. Conservation of momentum (qualitative): One way of studying the conservation of momentum qualitatively is to use 12mm diameter metal balls (not included). (See Fig. 2.) Be certain that the stand is level. Use paper shims if necessary to level the stand. Set one ball near the middle of the track within two rails and start the other ball rolling from the end of the track within the same rails. Observe the collision. Try to start the ball rolling using more or less force. How does more force seem to affect the collision?

Fig. 2 Conservation of Momentum (Qualitative)

C. Conservation of momentum (quantitative): Use two carts with the Velcro tapes adjacent. Position one cart near the center of the track and launch the other from the end of the track. Compare different launch velocities by resetting the force load on the cart when launching. (See Fig. 3.)

Fig. 3 Conservation of Momentum (Quantitative)

Caution! Do not pull the carts apart after they have docked because this action will eventually loosen the Velcro tapes. Instead, tilt the carts at the docking point and they will pull apart without stressing the Velcro tapes.

D. Second Law of Motion: Set up a spark-tape timer with the stand as shown in Fig 4. Pull a cart at a constant force with a rubber string attached to a spring scale. More conveniently, you can hook a string to our Cenco No. 32158 Cart Acceleration Apparatus. It will measure the force and supply a more constantly applied force.

Fig. 4 The Second Law of Motion

E. Friction Experiment: Set up the cart without the spark timer as shown in Fig. 5 and level the track. Pull the cart with a spring balance or the Cart Acceleration Apparatus (Catalog No. 32158). Now pull a block of wood in a similar manner. Notice the difference needed in the force applied to move the two objects.

Fig. 5 Friction Experiment

5. Maintenance

Take care not to damage the track's surface, and wipe it with a soft, clean cloth every time before using. Otherwise, the Acceleration Experiment Stand needs no special maintenance. If you should experience any difficulty with a stand, please contact Central Scientific Company, giving details of the problem. To ensure better service, please do not return any apparatus to Central Scientific Company until we have sent you authorization.

6. Accessories

Description	Catalog No.
C-Clamp, 10cm opening x 7cm depth	88056-02
Compact Spark Timer	32210
Twelve Steel Balls	75205-01
Dynamics Carts with Masses	32157
Cart Acceleration Apparatus	32158

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