GSC International
Phone: 417.374.7431
Fax: 417.374.7442
Toll Free: 888.756.4592
service@gosciencecrazy.com
2076 James River Court
Nixa, Missouri 65714

Second Law of Motion
#1476

Warning:

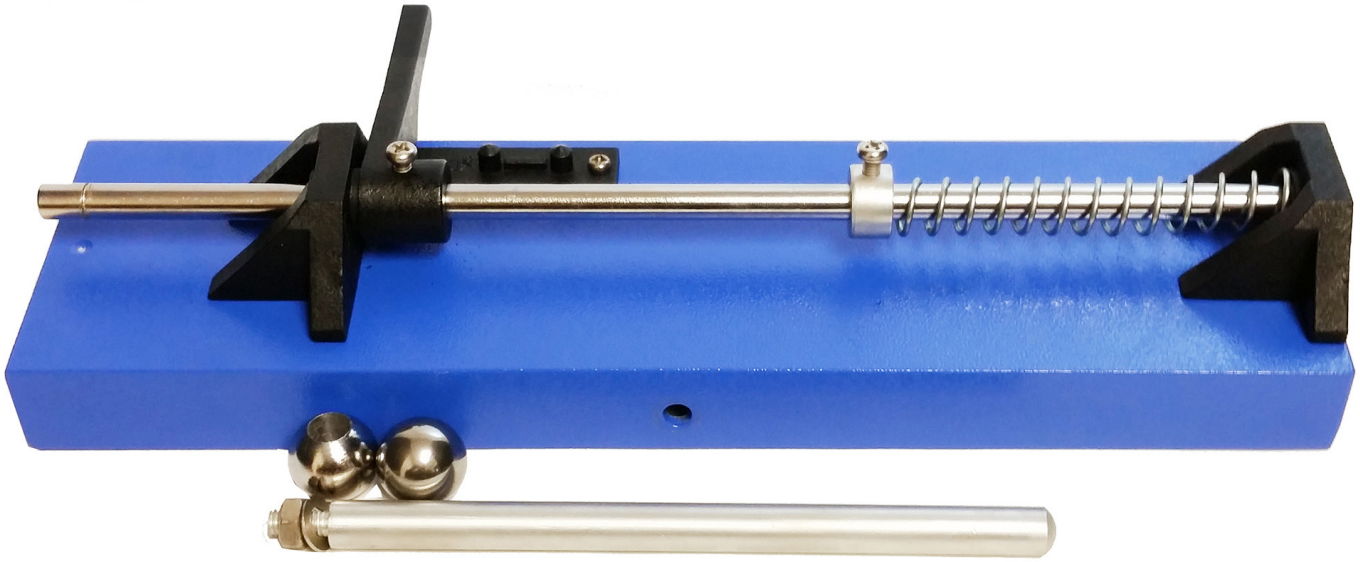
- **Not a toy; use only in a laboratory or educational setting.**
- **Contains small parts**
- **California Proposition 65 Warning: This product can expose you to chemicals including nickel and lead, which are known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information go to www.P65Warnings.ca.gov.**

Introduction

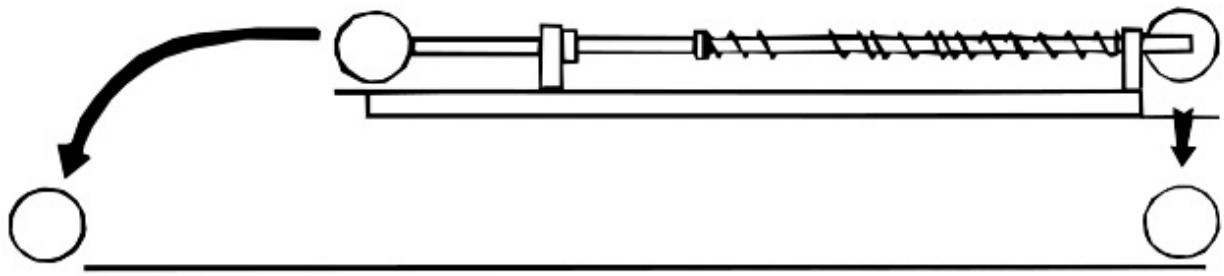
This apparatus provides students with an entertaining and educational way of better understanding Newton's law and the forces that act upon objects at rest and in motion.

Newton's Second Law of Motion operates on the following principle: The acceleration produced by a particular force, acting on a body, is directly proportional to the magnitude of the force and inversely proportional to the mass of the body.

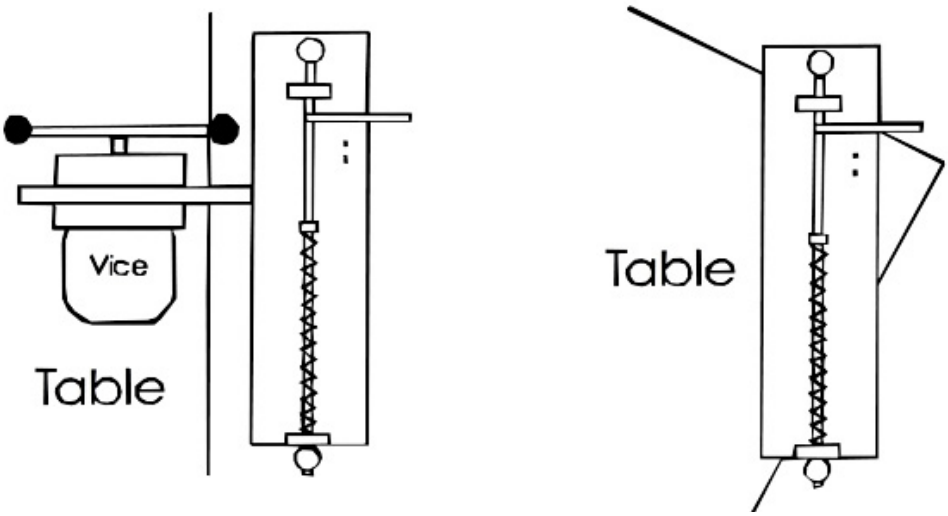
The equation used to express this concept is **a=kf/m** where **"a"** equals acceleration in cm/sec.^{2}, **"f"** equals force in dynes, and **"m"** equals mass in grams.



The trajectory of a solid ball projected horizontally from the front of this apparatus differs from the free falling ball drop from the rear of the unit. The difference being is the initial horizontal force imparted to the front ball. The entire concept of this piece of equipment is to prove that the two forces, horizontal and vertical, are independent of one another.



The apparatus can be used as a mobile unit or more securely mounted to a table. The latter is the preferred method. If you chose to secure the unit, thread in the horizontal rod into the side of the base. This rod is then fastened to a vice or clamped to a table. The whole unit should rest thirty inches or more above the floor. Clamp the rod into the vice or hold the unit on the edge of the table (use a level if necessary to make sure the unit is perfectly horizontal) and cock the release lever back (see illustration) behind the first pin. Place the solid ball into the depression at the front of the apparatus and the ball with the hole slides onto the steel rod at the back of the apparatus. Ask the students to close their eyes and listen for the balls to hit the floor when you release the lever. There should be only one distinct sound as the two balls are released, proving that the two balls hit the floor at the same time.



Repeat the experiment, only this time cock the release lever back behind the second pin and allow the students to watch the procedure this time. Similar results should be noticed except the propelled ball will travel farther horizontally. This proves that regardless of the amount of force applied in the horizontal direction the gravity force will still pull the balls down at the same rate.