

## INSTRUCTIONAL GUIDE

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- Inertia Apparatus
- Ball
- Plastic Plate with String Attached
- Instructional Guide



## Background

**Demonstrate inertia and Newton's First Law in a memorable way!**

This classic apparatus is standard for a reason – it works and it's impressive! Rest the ball on top of the square that is set on the vertical post. Release the spring and the square is projected out. The ball falls into place on the post, remaining at rest as if nothing happened.

## Newton's First Law

Newton's first law in everyday terms: An object at rest will stay at rest, forever, as long as nothing pushes or pulls on it. An object in motion will stay in motion, traveling in a straight line, forever, until something pushes or pulls on it.

Scientists use the term inertia to describe this tendency of an object to resist a change in its motion. The Latin root for inertia means "lacking the ability to move." You can see how scientists came up with the word. What's more amazing is that they came up with the concept. Inertia isn't an immediately apparent physical property, such as length or volume. It is, however, directly related to an object's mass. Newton wasn't the first scientist to come up with the Law of Inertia; it was Galileo and René Descartes, but we give Newton the credit.

When demonstrating Newton's 1<sup>st</sup> Law with this device, place the plastic square on the post, centering the post in the middle of the square. Now place the red ball so that the flattened area rests over the post center. Pull back the metal spring and release. The plastic square will be projected away and the red ball will remain on the post. Why? The faster the plastic square is moved from beneath the ball, the less tendency for friction to act on the ball, altering its position in any way. You might experiment by placing less tension on the spring and have the plastic square released at a slower speed. Notice what happens to the ball.

This demonstration is a great analogy to the classic "pull the tablecloth from beneath the dishes" trick only safer! The ball's inertia allowed it to remain at rest while the plastic square moved beneath the ball. Remember, object's at rest will remain at rest unless affected by an external force... Newton's 1st Law!

## Related Products

**Exploring Newton's First Law: Inertia Kit (P6-7900)** Students investigate inertia by observing a marble's motion around a specially designed circular track.

**Ballistics Car (P3-3527)** A classic demonstration that still amazes students. Compare the speed of the cart to the horizontal speed of the ball. Show the independence of the vertical and horizontal motion of the ball.

**Variable Inertia Set (96-1060)** The Variable Inertia Set is simple to set up and a fun activity to study rotational inertia. Students investigate how varying the distribution of mass (steel balls) inside a compartmentalized plastic disc affects how the disc rolls down an inclined plane.