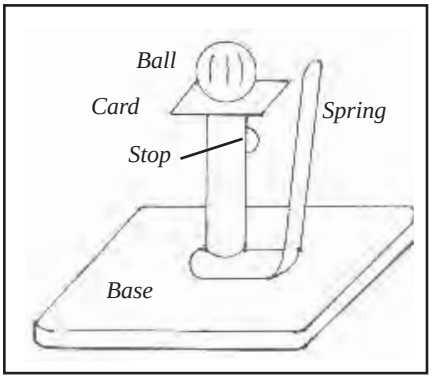
611-1140 (40-300) Inertia Apparatus

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional parts may be ordered toll-free. We accept Mastercard and Visa, School P.O's. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse, or normal wear and tear.

Introduction:

This apparatus is a simple form for the illustration of inertia in a body. It consists of a base and a vertical post with a cup in the upper end. A spring is fastened to the base and curves up alongside the post. A stop fastened to the post serves to prevent the spring from striking too close to the glass ball.



P/N 24-4300

To Assemble (if necessary):

1. Install screw upward through underside of base. Place spring over screw and screw post down firmly against spring. Screw post to position where spring will align with its stop.

To Use:

1. Place base on level surface.
2. Place card on top of post.
3. Turn ball to locate flattened side and place flat edge on the card immediately above the post.
4. Pull back the spring and release. As the spring comes forward, it knocks the card from under the ball. The ball will fall into the cone-shaped depression at the top of the post.

Description:

The purpose of this device is the illustration of an effect of inertia. The performer places the card on the support post, positions the ball on the card and snaps the spring. The card flies off, the ball settles down into the cup and to the audience, it appears not to have moved at all. Actually the ball did move but because it is a ball, it settled into the cup. Try the same experiment with a coin.

The ball has a 5 mm flat spot which permits it to stay in place on the card. Lay the ball on a flat surface, then place the card on the post and pick up the ball - without turning - and place it over the center of the post. The base of the apparatus should be on a level surface; however, it will function properly at any angle (about 5°) at which the ball will not roll off the card.

Consider the speed at which the card moves. At very slow speeds, say 1 cm per second, the ball stays with the card and moves along with it off the post. At high speeds, the ball is subjected to 2 forces: gravity (mg) and friction (mgC) where **m** is the **mass** of the ball, **g** is **gravitational acceleration** and **C** is **Coefficient of friction** between ball and card. Set aside the fact that the ball may roll slightly.

As the card moves, the ball accelerates horizontally. The distance moved is expressed in the same way as a falling body:

$s = 1/2\ mgt^2$

except that **g** is actually Cg and **t** is the **time** it takes for the card to move out from under the ball. Assuming:

980 cm/sec^2 for **g**

.2 for c

1/100 sec for t,

we get $s = \frac{(980)\ (.2)}{(2)\ (10^4)}$ cm

or about .01 cm. For a t of 1/10 sec, s would be 1 cm and the ball would completely miss the post. You can calculate the speed of the card from its movement horizontally and vertically and thus determine the time it was sliding under the ball.

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