611-1210 (40-072) Inertia Ball

Warranty and Parts:

We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and 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. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

To Use as an Inertia Ball:

Demonstrate the principle of inertia by breaking the top or bottom string at will, just by pulling on the bottom string. (The string attached to the side hook serves as a safety string.)

Additional Materials Needed:

- Thin string
- Method of hanging (i.e. overhead hook, ring stand, etc.)

Description:

This heavy-duty ball can be used as a pendulum bob by attaching a string at one of the eyelets.

You can also do an intriguing lab in inertia by attaching strings to the three eyebolts and following the procedure below.

Introduction:

We know from experience that it takes more effort to push a car than to push a stroller. We also know that it takes more effort to slow down the heavier car, even if it is moving the same speed as the stroller.

This tendency of an object to resist a change in its condition of motion is called inertia. Inertia, like weight, is directly proportional to the mass of a body; the greater its mass, the greater is its inertia.

Newton called this unwillingness of matter to change its motion *inertia* or "laziness." It is an attribute of matter that is constant throughout the universe and can't be tampered with by man. Although a pound of cheese would weigh much less on the moon and nothing at all at the center of the earth, its inertia would be exactly the same at either place as it is here.

Operation:

1. Suspend ball from ceiling or overhead rod by means of a lightweight string attached to the top eye hook.
2. Attach another piece of the same string to the bottom eye hook, and let hang.
3. Attach a third "loose" string from the side hook to the same attachment in #1. This is a safety string so the ball doesn't hit the floor.
4. Pull down **quickly and vigorously** on the lower string and watch what happens. Do both strings break? If not, which string breaks?
   You will see that only the lower string breaks. Why?
5. Replace the broken string with a fresh string.
6. Pull down **gently** on the lower string. Which string breaks this time? You will see the upper string break. Why?

Discussion:

Newton's First Law of Motion (the Law of Inertia) states that every body tends to remain in a state of rest unless acted upon by an external force. In the case of this heavy ball, it prefers to remain where it is.

To break the top string: Pull steadily downward on the lower one. The top string gets the force of your pull plus the weight of the ball.

To break the lower string: just give the lower string a quick jerk. Inertia prevents the full impact of a short, sharp pull from reaching the upper string. When you pull gently and slowly on the lower string, the weight of the ball has time to move with the string, downward, and the upper string breaks as a result.

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