



Curiosity Guide #303

Momentum

Accompanies Curious Crew, Season 3, Episode 3 (#303)

Ball Drop

Investigation #5

Description

Hold a bounce contest! Which balls bounce the highest?

Materials

- Basketball
- Soccer ball
- Racquetball
- Baseball
- Golf ball
- Ping pong ball
- Ball of clay
- Tennis ball
- Meter stick

Procedure

- 1) Drop a variety of balls, one at a time, from the height of a meter stick, and compare how high they bounce.
- 2) Which ball bounced the highest?
- 3) Try the experiment again on a different floor surface?
- 4) Does the floor surface make a difference?

My Results

Explanation

Two kinds of collisions occur between objects, **elastic** and **inelastic** collisions. In an **inelastic** collision, two objects collide and stick together, and the kinetic energy in the system transfers into another form of energy. This might be heat or a change in internal energy, like the crushing of a car in an accident. Depending on the material tested, some balls do not bounce. Clay, for example, would flatten, and is an example of an inelastic collision.

Collisions are usually both elastic and inelastic. In an **elastic** collision, the initial momentum of the first object plus the initial momentum of the second object is equal to the final momentum of the first object plus the final momentum of the second object. In other words, the total combined kinetic energy is the same before and after the collision, so both momentum and kinetic energy are conserved. In an

elastic collision, the objects bounce away from one another after impact, but the degree to which they move depends on the materials. When the ball hits the ground, the momentum is transferred back into the same ball.

Think about it: When objects collide, there can be some combination of elastic or inelastic results. Elastic collisions happen when objects bounce away from one another and transfer the momentum. Inelastic collisions happen when the objects stick together when they hit. If you look at a tennis ball in slow motion when it gets hit with a racket, the ball gets temporarily squished against the racket, like the inelastic example of the car hitting the tree, but then the ball bounces back in an elastic way and goes over the net. The types materials that collide will determine how elastic the collision is.

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