

Galilean Canon

What happens when you stack a big ball and a small ball, drop them together, and watch the smaller one launch sky-high? You're recreating a surprising physics demo inspired by Galileo himself!

This activity—sometimes called the "Galilean Cannon"—shows how energy and momentum transfer between objects of different masses. It's a simple, eye-popping way to explore motion, collisions, and the strange but beautiful rules that govern our universe.

Let's drop in and see what happens!

Materials Needed:

2+ different sized balls

Exercise (yoga) balls, basketballs, soccer balls, tennis balls, ping pong balls, etc. all work well.

Avoid hard balls if possible (golf balls, baseballs) as they can cause damage.

Lots of space!

If done correctly this can bounce a ball far and fast, so be careful! This activity is most safely done outside.

Instructions

1. To begin, drop the largest ball on its own and see how high it bounces.
2. Next, drop a smaller ball on its own and see how high it bounces.
3. Finally, hold the smaller ball on top of the larger ball and drop them both at the same time. The balls should be in contact when the first ball hits the ground, so it's important to drop them at the same time and not to throw them downwards.

Level up: Try this activity with more than two balls stacked, with different sized balls, etc.



(Source: Rhett Alain)

In the above example the much more massive basketball transfers a lot of its momentum to the smaller tennis ball, causing it to bounce much higher than it would on its own.

Keep Exploring

The photos and instructions were adapted from the following resources.

City of Science Activity Guide

http://cdn.worldsciencefestival.com/wp-content/uploads/2016/04/CoS-Activity-Guide_updated-120616.pdf

WIRED: Why A Tennis Ball Goes Flying When Bounced on a Basketball

<https://www.wired.com/story/why-a-tennis-ball-goes-flying-when-bounced-on-a-basketball/>

The Late Show with Stephen Colbert: Brian Greene Explains the Most Powerful Explosion in the Universe

<https://youtu.be/75szwX09pg8>