INERTIA BEADS

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NEWTON’S INERTIA BEADS

Inertia, force, and motion all come into play as Sir Isaac Newton's favorite beads pull themselves out of a container.
All it takes is a slight tug and the long string of beads literally pull itself out of the container and onto the floor. Best of all, fifty feet of beads empty from the container in under five seconds! How does it work? Inertia and potential energy and gravity and acceleration…quite a package!

Materials
• Long strand of beads
• Large glass container

EXPERIMENT
The key to creating the fountain of beads is to make sure the beads are loaded into the plastic container properly. While the beads were properly loaded into the container during the manufacturing process, they might have gotten tangled during the shipping process. Go ahead and try to pull the end of the string as described below to see if it works, but it’s best to start over and make sure the container is loaded properly as detailed in the directions below.

1. Mark each of the ends of the string of beads with a piece of tape. Hold the container up high with one hand while pulling the end of the string of beads over the edge of the container using a fast-pulling motion. Instantly, the beads will start to climb over the side of the container and land on the floor (or into a second container if you’re really good). The weight of this small section of beads should be enough to pull the rest of the beads out of the container.

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2. Watch as the fountain of beads flows from the container and onto the floor. As the speed picks up, the string will rise above the rim of the container due to the inertia of the moving beads (more about this later). When the spectacle is over, allow a moment for the applause to start and take a bow. Deep down inside your scientific heart of hearts, however, you know that the applause really goes to the master of motion, Sir Isaac Newton. Oh, go on... pretend that it's for you.

3. Here comes the part you'll grow to love... feeding the string of beads back into the container. It's important to note that there's no shortcut to this process. Find one end of the string of beads and thread it into the container. Continue to feed the beads into the container being careful not to tangle the string until the entire strand is in the container. You know that you've mastered this demo when you can get someone else to do this for you!

4. You guessed it... it's time to start the fountain of beads all over again.

**HOW DOES IT WORK?**

The science behind the fountain of beads centers around the principle of inertia. According to Isaac Newton, inertia is a tendency of all objects and matter in the universe to remain still, or, if moving, to continue moving in the same direction unless acted on by some outside force.

Lifting the container high off the ground provided a source of potential energy. The initial “tug” that you gave to start the beads flowing was all that was needed to help turn the potential (stored) energy into kinetic energy (the energy of motion). As the speed of the flowing beads increased, you probably noticed that the string of beads actually lifted above the rim of the container due to the inertia of the fast-moving beads. Newton stated that an object will continue moving in the same direction (initially upward) until a force acts upon it (the arcing motion of the beads is caused by the downward force of gravity.)
TAKE IT FURTHER

• Load the beads into containers made out of different materials like glass or metal to create a
different sound. This demonstration is often used by magicians to start their show because of its
highly visual nature and the cool sound the beads make as they stream from the container.
• Use the Newton’s Beads demonstration to help explain and reinforce the science behind the
Gravi-Goo effect, a chemical-based version of the same principle using a very long chain of
polyethylene oxide molecules. The Gravi-Goo kit (item number WAGG-750 is available online at
www.stevespanglerscience.com).
• The true Newton’s Beads connoisseur will demonstrate his or her powers of concentration by
attempting to catch the falling beads in a second container. Yes, it’s difficult, but with no more than
1,000 hours of practice, you’ll be able to amaze your friends. Seriously, if you can do this, you need
to get a hobby!
HERE IS WHAT YOU NEED

STRAND OF BEADS
LARGE CONTAINER
1. Carefully coil the strand of beads into the container.
2. Pick up the container and quickly pull the end of the bead strand downward.
TRY DIFFERENT KINDS OF STRANDS AND CONTAINERS

WOULD HEAVIER BEADS INCREASE OR DECREASE THE SPEED AT WHICH THE STRAND FALLS?