



## Curiosity Guide #309

### Inertia

Accompanies Curious Crew, Season 3, Episode 9 (#309)

#### Knock a Block

Investigation #4

#### Description

Learn how a common magic trick works, using the power of Newton's Law of Inertia.

#### Materials

- 6 one-inch wood cubes
- 2-foot length of thin PVC pipe, or a meter stick
- Stack of washers or quarters
- Notecard or playing card

#### Procedure

- 1) Make a stack of the 6 wood blocks.
- 2) Quickly slide the PVC pipe or meter stick so that the pipe or meter stick bumps the bottom block out of the way.
- 3) Then slide back the opposite way to knock the bottom block out in that direction.
- 4) What happens to the remaining stacked blocks?
- 5) Try the investigation again with a stack of quarters or washers and the notecard or playing card.
- 6) Quickly slide the card through so that the card strikes the bottom washer. Slide the card back the opposite way.
- 7) What happens?
- 8) What will happen if you do the motion slowly?

## My Results

### Explanation

This is a good example of Newton's First Law of Motion, the Law of Inertia. Newton's First Law of Motion says that an object that is still or at rest will stay at rest. An object in motion will keep moving unless another force acts on it.

At the beginning of the investigation, the stack of blocks or washers are at rest. Gravity is pulling down on each object. An opposite force, called the *normal force*, is pushing up. Nothing is moving. When you quickly strike the bottom object out of the way, the force of gravity is still acting on the blocks and washers so they stay stacked up, but fall straight down.

If you try the experiment too slowly, the tower will fall because the sideways friction between the objects becomes too great. You will see that the horizontal movement increases as the stack gets shorter because there is less overall mass and less inertia. The more mass an object has, the more resistant the object is to changing motion.

**Try some magic:** Have you ever seen a magician pull a table cloth out from under a table with dishes on it? It's a cool trick! That magician is using the power of *inertia*. If the objects on the table are heavy, and the cloth is smooth, then the objects will stay there when the cloth is quickly pulled out. The objects on the table resist that change in motion and stay there.

Now don't try this with your parents' dishes! Instead, fill up a plastic jar with pennies. Place the jar on a scrap of fabric, and you can perform your own inertia magic!

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