Curiosity Guide #309
Inertia

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

Cup-Stacking Challenge

Investigation #7

Description

Will the tower topple?

Materials

- Plastic drinking cups
- Notecards
- String
- Measuring tape
- Scissors
- Paper hole punch
- Wooden blocks

Procedure

1) Punch a single hole near the edge of several notecards.
2) Cut a length of string 12 to 18 inches long.
3) Attach a single length of string to each notecard by tying a knot around the hole.
4) Place one cup upside down on the table. Then place a card with knotted string on top of the cup.
5) Continue to stack the cups directly above one another, separating each cup with a notecard that has a string.
6) Try pulling one of the cards out from between the cups by pulling on the string.
7) What happens?

8) Can you and your friends pull some of the cards out at the same time?
9) Repeat this investigation with a stack of wooden blocks.

My Results

Explanation

According to Newton's First Law of Motion, the Law of Inertia, 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.

The stack of cups was at rest because the *normal force* from the tower pushing up balanced the *gravity force* pulling sown. However, when the notecards were quickly pulled out, the forces were no longer balanced. The cups began to fall, stacking as they fell. The tower of blocks remains still because there is still normal force pushing up against the force of gravity, and the mass of the tower increases the total resistance or inertia.

Investigate further: Have you ever tried to get ketchup or mustard out of a bottle and it just wouldn't come out? You may have tried shaking the bottle up and down and then suddenly stopping the bottle in that downward motion. When we shake the bottle the ketchup inside starts moving too, and when we suddenly stop, the ketchup keeps going, right out the cap opening! Thanks goodness, I'm hungry!"

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