



Curiosity Guide #303

Momentum

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

Spinning Stool

Investigation #6

Description

Demonstrate angular momentum with a friend!

Materials

- Office chair with arms that can spin
- 2 plastic milk jugs or 2-liter bottles
- Water
- A friend

Procedure

- 1) Fill the milk jugs with water so that your friend can comfortably hold one jug in each hand, out to his or her sides. You may need to empty the water a bit.
- 2) Ask the friend to sit cross-legged on the office chair.
- 3) Hand your friend the milk jugs so that one jug is held in each hand.
- 4) Your friend should rest his or her arms on the arms of the chair, then hold the jugs out as far to the sides as is comfortable.
- 5) Begin to push your friend so that he or she begins to spin in a circle.
- 6) Stop pushing and let your friend rotate a moment. Then have your friend pull the milk jugs into his or her lap.
- 7) What did you observe?

My Results

Explanation

When objects are rotating, they are said to have **angular momentum**. The objects will continue to rotate with constant angular momentum unless another force acts on the system. Angular momentum is the product of angular velocity and the moment of inertia. Angular velocity is the number of rotations per second. The moment of inertia includes both the mass of the object, as well as how the mass is distributed.

When the mass is further away from the object's center, the object will rotate more slowly. When the mass is more centrally located, the object will spin faster. Angular momentum is conserved as well. So, if the moment of inertia increases and the mass moves away from the center, then the velocity decreases. If the moment of inertia decreases, the velocity increases. This is visible when a spinning ice skater brings the arms in toward the body, and the spin speeds up. The skater slows down when he or she opens the arms up.

Moving the water jugs away from the spinning friend slows down the velocity. When the jugs are brought in, the rotation speeds up.

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