



Curiosity Guide #802

Centripetal Force

Accompanies Curious Crew, Season 8, Episode 2 (#802)

Tangential Escape

Investigation #4

Description

Don't let that ball get away!

Materials

- Embroidery hoop
- Golf ball, racquetball, or tennis ball
- Table

Procedure

- 1) Place the hoop flat on the table.
- 2) Place the ball inside the hoop.
- 3) Slide the hoop in quick circles on the table, with both hands on the outside of the hoop.
- 4) What happens to the ball?
- 5) Increase the hoop rotation and quickly lift the hoop above the ball.
- 6) What happens?

My Results

Explanation

As the hoop rotates, the ball pushes out on the hoop, but the hoop pushes inward onto the ball. This resistance is a normal force. Because the hoop is curved, the ball experiences centripetal acceleration. Acceleration relates to changes in velocity in either speed, direction, or both. The force pushing in on the ball is a centripetal force. When you lift the hoop, the ball is no longer captive. The ball flies off in a straight line in a direction tangent to that circle due to inertia. Inertia states that an object in motion stays in motion until another force acts on it. Because the ball moves tangentially away, and not opposite to the centripetal force, there really isn't a centrifugal force.

Think about this giant example! According to Sir Isaac Newton's first law of motion, all mass has inertia. That means an object that is holding still will stay that way or an object in motion will travel in a straight line until another force acts on it. Our planet Earth is moving in space and should travel off in a straight path, but the gravity from the sun's mass is so great that gravity pulls the earth toward the sun. The result is that the Earth and the rest of the planets follow a relatively circular path around the sun. That inward force from gravity is referred to as the Centripetal Force. The force changes the direction of motion without even changing its speed. Amazing!

Parents and Educators: use #CuriousCrew

#CuriosityGuide to share what your Curious Crew learned!



Curious Crew is a production of Michigan State University.

Learn more at WKAR.org.

© MSU Board of Trustees. All rights reserved.