Curiosity Guide #802
Centripetal Force
Accompanies Curious Crew, Season 8, Episode 2 (#802)

Wild Ball
Investigation #3

Description
Keep that ball under control!

Materials
• Ping-pong, Styrofoam, or a wiffle ball
• String or rope, 3 to 4 feet
• A friend

Procedure
1) Tie a long string securely to a ball.
2) Take the ball and rope outside to a large open space.
3) Throw the ball and string together and notice that the system goes in a straight line.
4) This time hold the string and throw the ball as before.
5) What did you notice?
6) Now swing the ball in a circle.
4) Can you feel a force pulling on your hand?
5) Ask your friend to predict what will happen if you let the ball go while swinging it.
6) Get the ball swinging in a circle and let go. What did you notice?
My Results

Explanation
When the ball was thrown the first time, the ball began to travel in a straight line due to inertia. The second time, the ball quickly changed direction and began to travel in a curved path. This change was due to the tension in the string that was pulling the ball back toward your hand. You could even feel that force on your hand. Adding the swinging movement kept the ball traveling in a curved path.

When you swing the ball in a circular motion, the string is applying a centripetal force on the ball, with the force directed back toward the center where your hand is. When you release the string, the ball no longer travels in a circle, but flies off in a straight line in a direction tangent to that circle. Because the ball moves tangentially away and not opposite to the centripetal force, there really isn't a centrifugal force, which is often referred to as a virtual or apparent force.

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