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

Centripetal Coins
Investigation #6

Description
“Coin” you figure out what makes the money spin on edge?

Materials
• Clear Latex balloon
• Coins with different masses

Procedure
1) Drop the coins into the deflated balloon. Blow up and tie off the balloon.
2) Palm the balloon from the top. Bounce the balloon gently, and then begin to rotate your hand quickly in a circle.
3) The goal is to get the coins rotating on edge around the inside of the balloon.
4) Once the coins are rolling in the balloon, hold the balloon still and observe.
5) What did you notice?
6) Which coin was the last one to keep moving?

My Results
Explanation
As the balloon begins to rotate, the coins start rolling inside the surface of the balloon. The balloon applies a centripetal force on the coins, forcing them into a continuous curved path. You may have noticed that the faster the balloon rotates, the greater the centripetal force and the more the coins rise against the curved wall of the balloon. This action seems to defy gravity. Once the balloon stops, the contact friction and the force of gravity begin to slow down the moving coins. You may also notice that the last coin to stop is the coin with the greatest mass. That is because Force = Mass times Acceleration, so the more massive coin experiences a greater centripetal force, and the coin takes longer to stop.

Think and extend. Have you ever seen a toy car, or a marble, go upside down in a loop in a track? You may have even seen a motorcycle drive upside down in a sphere at the circus. In each case, the object must be travelling fast enough to stay against the track when upside down. As the object travels faster and pushes against the track, the round track also has a normal force that pushes back on the object toward the center. All the while, gravity is pulling down on the object, but with enough speed, the object will complete the loop and will never lose contact with the track. Wow!

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