



Curiosity Guide #802

Centripetal Force

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

Poised Penny

Investigation #2

Description

Give that penny a whirl!

Materials

- Wire hanger
- Plastic hanger
- Coin
- Safety glasses

Procedure

- 1) Bend the hook of the wire hanger so the pointed tip is angled back, and the tip edge is a level surface when the hanger is upside down.
- 2) Grab the horizontal center of the hanger and stretch the hanger open, making a rhombus or diamond.
- 3) Hold the bent center of the hanger and carefully balance the coin on the tip of the hanger.
- 4) Gently begin to swing the hanger back and forth on your finger and eventually rotate the hanger in an entire circle.
- 5) Could you keep the penny balanced?
- 6) Try a variation with a plastic hanger! Place the penny on the inside horizontal arm of the hanger and try spinning the hanger from the hook end.

My Results

Explanation

The swinging hanger gets the system moving in a circular path. If unsupported on the tip of the hanger, the penny would fly off in a straight line tangential to the circular motion. However, the hanger applies a centripetal or center-seeking force on the penny, which keeps the penny in place. The faster the hanger is rotated, the stronger the centripetal force. The combination of both gravity and the centripetal force acts on the objects in the same way, so the objects keep their relative positions. If the hanger bumps something, a new force would be introduced, and the penny would fly off in a straight line due to inertia. The higher acceleration of the hanger ensures that the circular motion is greater than the force of gravity. $\text{Force} = \text{Mass} \times \text{Acceleration}$.

Think and extend. Centripetal means center-seeking so a centripetal force is a force that acts on something traveling in a circular path. A tether ball is a great example. When you hit a tether ball, the rope has tension toward the pole that prevents the ball from going off in a straight line, and gravity pulls down on the ball. When the ball is struck, it travels in a horizontal circle around the pole. Centripetal force that causes the ball to travel in that circle. A good hit will increase the speed and cause the ball to rotate a little higher, that is until the ball winds up around the pole! Great hit!

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