BALLOON POWERED PINWHEEL

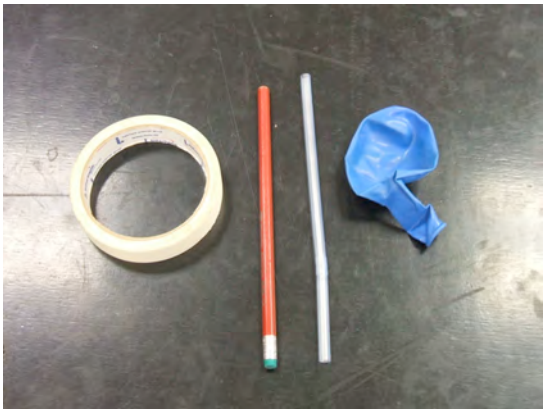
Concepts Illustrated:
(1) Newton's 3rd Law
(2) Torque and rotational dynamics

Time Requirements: 10 minutes

Grade Level of Audience: This qualitative demonstration is best suited for students in grades 6-12.

I. Materials and Equipment Utilized

1. A stick pin
2. Flexible drinking straw
3. A rubber balloon
4. Duct tape
5. Pencil and eraser or a small wooden dowel



II. Description of Set-up and/or Construction of Apparatus

1. Attach the rubber balloon to the non-flexible end of the drinking straw.
2. Push the stick pin through the straw (closer to the balloon end than to the flexible end) and into the eraser or end of the dowel.
3. Bend the flexible end of the straw, such that, it is oriented horizontally, and is perpendicular to the rest of the straw.

III. Details of Student Implementation

1. Inflate the balloon and release.

2. The general idea being demonstrated is balloon forces air out the open end of the straw. According to Newton's 3rd Law, the exiting air must push in the opposite direction on the straw. The resulting twisting force which occurs due to the force being applied at 90^{o} to a line drawn from the axis of rotation to point of application is referred to as a torque. Torques are considered to be either clockwise or counter clockwise.