611-1135 (40-175) Acceleration Paradox

Warranty and Parts:
We replace all defective or missing parts free of charge. Additional replacement parts may be ordered toll-free. We accept MasterCard, Visa, checks and School P.O.s. All products warranted to be free from defect for 90 days. Does not apply to accident, misuse or normal wear and tear. Intended for children 13 years of age and up. This item is not a toy. It may contain small parts that can be choking hazards. Adult supervision is required.

Curriculum Fit: Acceleration, Gravity, Center of Mass.

Description:
Here is an exciting way to show acceleration. It all happens in a flash, but the point it underscores will remain with your class for a long time. When a board and ball are released together, the end of the board outstrips its center of mass, leaving the ball behind. The ball is caught in the included cup, an acrobatic feat.

Caution! Never use just your hand to pull out the stick!

Procedure:

1) Tie a string to the bottom of the rubberized stick.
2) Set the acceleration paradox up as pictured. First raise one side of the apparatus and place the rubberized stick so that the top and bottom rest in the circles which are printed on the top of the bottom board and underneath the top board of the apparatus.
3) Place the rubberized ball onto the golf tee which is permanently affixed to the apparatus.
4) Using the string, quickly pull out the rubberized stick, being careful to move your hand far away from the hinged board and falling ball.
5) Students should write down their thoughts as to why the ball fell into the cup.

Discussion:

1) If you drop 2 objects at the same time, from the same place, their centers of mass will fall at the same rate. In the case of a sphere, the center of mass is at the center of the sphere.
2) The center of mass of the board falls at the same rate as the ball. However, the board is rigid and hinged at the middle. This means that the parts of the board that extend past the hinge fall faster than the ball.
3) Because the center of mass of the board occurs at a lower point than the center of mass of the ball, the board (with its attached cup) is in effect falling away from the ball during its descent. The board hits the table before the ball and the ball falls directly into the cup.

Additional Ideas: Try this experiment with objects of different shapes and sizes on the golf tee. Try different materials in the base of the catching container. Try different angles of the apparatus to see if that changes the experiment.

Science First® *is a designer and manufacturer of hands-on science labs. Our products are available from most science education distributors. For more information contact us.*

More Science First® Products:

611-1810 Bobber Centripetal Force Paradox: Similar to the rotating candle experiment, this illustrates centripetal force in an way that "goes against the grain". Ask your students what they expect the floats to do when the platform on which they sit is spun. Our two floats serve as buoyant pendulums inside transparent jars filled with water. Since they are buoyant, they move in the same direction as the accelerating force - which is toward the axis of rotation, or toward the center. Includes tripod base with rod; two sturdy plastic jars with caps; bobber with cord; instructions.

614-0701 Cylindrical Spectroscope This device is made of optical glass. The optical glass has been carefully machined into a compound prism and convergent lens. Spectrums of many different kinds can be seen through this spectroscope.