

The Mysteriously Moving Ball

The Action

Two cups are attached close to the end of a meter stick and when the stick is elevated and then dropped, the ball placed in the end cup will hop to the other cup.

Grade Level

Units involving Forces and Gravity.

Materials

- A meter stick
- Tacks
- Tape
- 2 small cups
- 2 cm diameter ball

Instructions

- Attach the cups to the meter stick: one at one end and the other 5 cm from the first. Attach the end of the stick that does not have the cups on it to the floor with the cups facing up. Place the ball in the cup closest to the end.
- Elevate the free end of the meter stick to a 45 degree angle from the floor. Allow the stick to fall to the floor. The ball will "hop" from the end cup to the next cup.

Safety

No safety concerns

Hints

- Practice this experiment until you are comfortable doing it before you attempt it in front of a class as it takes a couple of trials to get used to. A coin (e.g. a toonie) could be substituted.
- If the ball wants to bounce out of the second cup and disrupt the results, spread some plastercine in the bottom of the second cup to reduce the bounce.

Science Principle

The ball hops from the end cup to the next one because the end and the center of gravity of the stick fall at the same time. Since the cup on the end moves faster than the center of gravity of the stick because of the greater angle, it also falls faster than the ball. As a result, as the stick falls, the ball comes out of the cup and then falls straight down, landing in the cup that is second from the end. The end of the stick falls faster than a regular free fall.