

# RAFT IDEAS

**Topics:** Games, Physical Challenges, Dexterity, Friction, Center of Gravity

## Materials List

- ✓ Empty bottles
- ✓ Pull-rings from large water-bottle caps
- ✓ String 1 m (3 ft) long
- ✓ Tube, stick, or dowel 1 m (3 ft) long
- ✓ Pellets, lentils, or other weights
- ✓ Varying surfaces: Rubber mouse pads, cardboard sheets
- ✓ Permanent marker
- ✓ Timer

This activity can be used to teach:

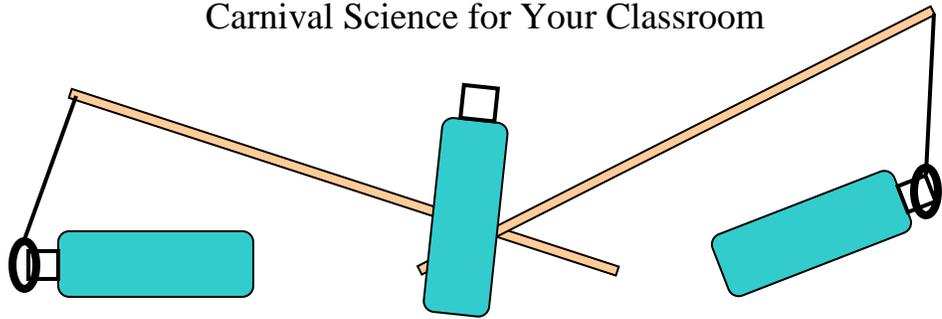
Next Generation Science Standards:

- Forces & Motion (Grade K, Physical Science 2-1, 2-2; Grade 3, Physical Science 2-1; Middle School, Physical Science 2-2)
- Gravity (Grade 5, Physical Science 2-1)
- Science & Engineering Practices (grades K-8)



## Bottle Stand-Up

Carnival Science for Your Classroom



Loop the ring around the bottle and stand it up. How hard could this be? Give it a try! It might surprise you!

## Assembly

1. Attach the pull-ring to the 1 m (3 ft) long tube with the string, creating a “hoop hook fishing pole”.
2. Add 1” or 2” worth of weights, pellets, or lentils to some of the bottles.
3. For the game, use a permanent marker to label each bottle with a point value. Empty bottles should have the highest point value, while bottles weighted the most should have the lowest point value.

## To Do and Notice

1. Start with bottles lying on their sides, each with varying amounts of added weight and/or on varying surfaces (rubber, cardboard, tile).
2. Use the hoop fishing pole to try and stand the bottles upright. Are all the bottles as challenging to stand, or are some bottles easier than others.

## Playing the Game (for any number of players)

1. Set up the playing field by laying several bottles (5-10) with varying weights on varying surface types: tile, rubber, paper.
2. Each student takes 1-minute turns and uses the hoop fishing pole to stand as many bottles as possible in the allotted time. At the end of the minute, the student adds the point value of each standing bottle to get their score.
3. After each player gets a turn, the student with the highest score wins the game.

## The Science Behind the Activity

Every object has a center of mass (or center of gravity), which is the object’s balance point. Students will discover that weighted bottles stand up easier than empty bottles. With a lower center of gravity, the weighted bottle is inherently more stable than the non-weighted bottle. The playing field surface also can contribute to task success or failure. Slick surfaces might cause the tipped bottle to slip and fall, while surfaces with higher friction (i.e. – rubber) decrease slipping. Students should determine that weighted bottles on high-friction surfaces are easiest to stand upright.

**Web Resources** - (Visit [www.raft.net/raft-idea?isid=1](http://www.raft.net/raft-idea?isid=1) for more resources!)