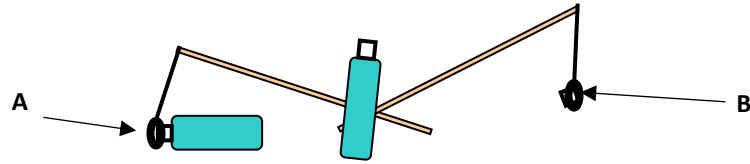


Bottle Stand-Up

Learn Science Using Bottles in this Challenging Carnival Game



This fun carnival game helps students learn how the center of gravity and the force of friction work together to affect the outcome!

Activity Challenge

Loop a plastic ring or string around the bottles to stand them up.

Preparation

1. Help students tie the string to the pull-ring (see **A** above).
2. If plastic rings are unavailable, tie a loop in the end of the string that is big enough to fit over the top of a bottle (more challenging).
3. Attach the string to the stick/dowel (**B**).
4. Add 1-2 inches worth of weight to some of the bottles.
5. Label empty bottles with high point values (e.g., #10-20) and bottles weighted the most with the lowest point values (e.g., #1-10).
6. Set up the playing field by laying the bottles with varying weights on different surface types (e.g., mouse pad, cardboard, floor).

To Do

1. Start with bottles lying on their sides. Use the pull-ring on the string to stand up as many bottles as possible in 1-minute (see above).
2. Play over several 1-minute rounds.
3. When each 1-minute round is up, record the point values of the standing bottles and add them up to calculate a score.

Observations

Looking at the scores, which bottles are the most challenging to stand up? How does this relate to weight, center of gravity, or the playing surface?

Extensions

- Adjust the length of the string or stick and compare results.
- Make a bar chart showing scores for each type of weighted object used and/or the various surfaces used for the playing field.

The Science Behind the Activity

Every object has a center of gravity, which is the object's balance point. Players of this game discover that weighted bottles stand up easier than empty bottles. With a lower center of gravity, weighted bottles are inherently more stable than the non-weighted bottles. The playing field surface also affects the outcome. Slick surfaces might cause the tipped bottle to slip and fall, while surfaces with higher friction, rubber for example, decrease slipping. Players will learn that weighted bottles on high-friction surfaces are easiest to stand upright.

Materials Needed

- o Empty bottles (5-10)
- o Pull-rings from water bottles (1-2)
- o String (~ 3 ft)
- o Stick/wood dowel
- o Small weights (pennies, pebbles, paperclips, etc.)
- o Various types of playing surfaces
- o Timer or equivalent

Grade Range

- K-2
- 3-5
- 6-8

Topics/Skills

Science: Center of Mass, Forces, Observation;
Math: Adding single and/or multiple-digit numbers

Learning Standards

NGSS: [Physical Science](#)
CCSS Math: [Operations & Algebraic Thinking](#)

Duration

15-45 minutes

Prep Time

10-15 minutes