

RAFT IDEAS

Topics: Physical Science,
Center of Mass, Inertia

Materials List

- ✓ Plastic or wooden tube or rod around 45 cm (18") long (such as an I.C. tube)
- ✓ Weight for the end of the tube such as a lump of clay or metal weights attached with masking tape

This Activity can be used to teach:

- Motion (pushes and pulls) (CA Science Standards: Grade 2, 1.c)
- Balanced Forces (CA Science Standards: Grade 8, 2)
- Observation and Science Process Skills (CA Science Standards: Grade K-8, Investigation and Experimentation)

BALANCING ACT

A RAFTy Balancing Stick



Balancing an object takes more than just coordination. The distribution of mass in an object determines its center of gravity and its rotational inertia.

To Do and Notice

1. Fasten a reasonably dense mass at one end of the tube. Several used rubber bands, taped on metal weights, or a lump of clay all work well.
2. After the mass has been secured to the end of the rod, practice vertically balancing the rod on a finger or palm. Balance the rod with the weighted end down, closest to the hand, and also with the weighted end up. Which end is it easier to balance?

The Science Behind the Activity

Students will discover that balancing the stick is easier if the weighted end is up. It is easier to keep the center of gravity over the support area, which is the key to maintaining balance. The balancing stick begins falling (rotating) more slowly when the weighted end of the stick is at the top because it has greater rotational inertia. The amount of rotational inertia an object has depends on how far from the rotation point (axis) the mass is – an amount of mass distributed further from the center increases the rotational inertia of the object. When the weighted end is up, the mass is further from the axis. Thus, there is more rotational inertia in the “weighted-end-up” configuration, and the Balancing Stick takes longer to start falling (rotating), allowing more time for the person to adjust and maintain balance of the stick.

Taking it Further

Students can measure balancing time for each end, collect data and find averages. The class can have a contest... who can balance the stick the longest?

Web Resources (Visit www.raft.net/more for how-to videos and more ideas!)
For more information on the science behind this activity, go to the Exploratorium website at: http://www.exploratorium.edu/snacks/balancing_stick.html