

# Planets In Orbit

## Activity Objectives

- To discover that centrifugal force can overcome gravity
- To show that centrifugal force depends on velocity
- To show that the greater a planet's distance is from the sun, the slower it moves

(For this activity, students should have a basic understanding of graphing and determining velocity.)

## Materials

- ✓ Three chalkboard erasers
- ✓ Paper
- ✓ Crayons
- ✓ Piece of string (32" long)
- ✓ Spool (thread spool with a hole)

## Instructions

1. Fasten one of the erasers to the string and drop the string through the empty spool.
2. Fasten two erasers to the other end of the string.
3. Hold the single eraser out from the spool, parallel to the floor. Let go. What happens? Why?
4. Start as before, but whirl the eraser slowly. What happens? (Centrifugal force, or the force of inertia of motion, is overcoming the pull of gravity.)
5. Increase the speed of the orbiting eraser. What happens? (The two erasers will lift.) Decrease the velocity. What happens? Why? What does the change in velocity produce? How does this relate to the planet in orbit?
6. Have students count revolutions in equal time periods with the eraser at different distances from the spool. Compare the results. What does this say about the effect of a planet's distance on its speed?
7. Have a student add extra erasers to the suspended erasers, one at a time, and whirl the orbiting eraser to bring erasers up to a fixed distance from the floor. Count revolutions.

8. Graph data and compare velocities for different weights. What does the experiment tell the students about the effect of greater weight (greater gravitational pull) on the orbit of an object?

**Extension**

Following this activity, have students note the orbital speeds of the nine planets. Compare with data from the above activity.