Exploring the Power of Air

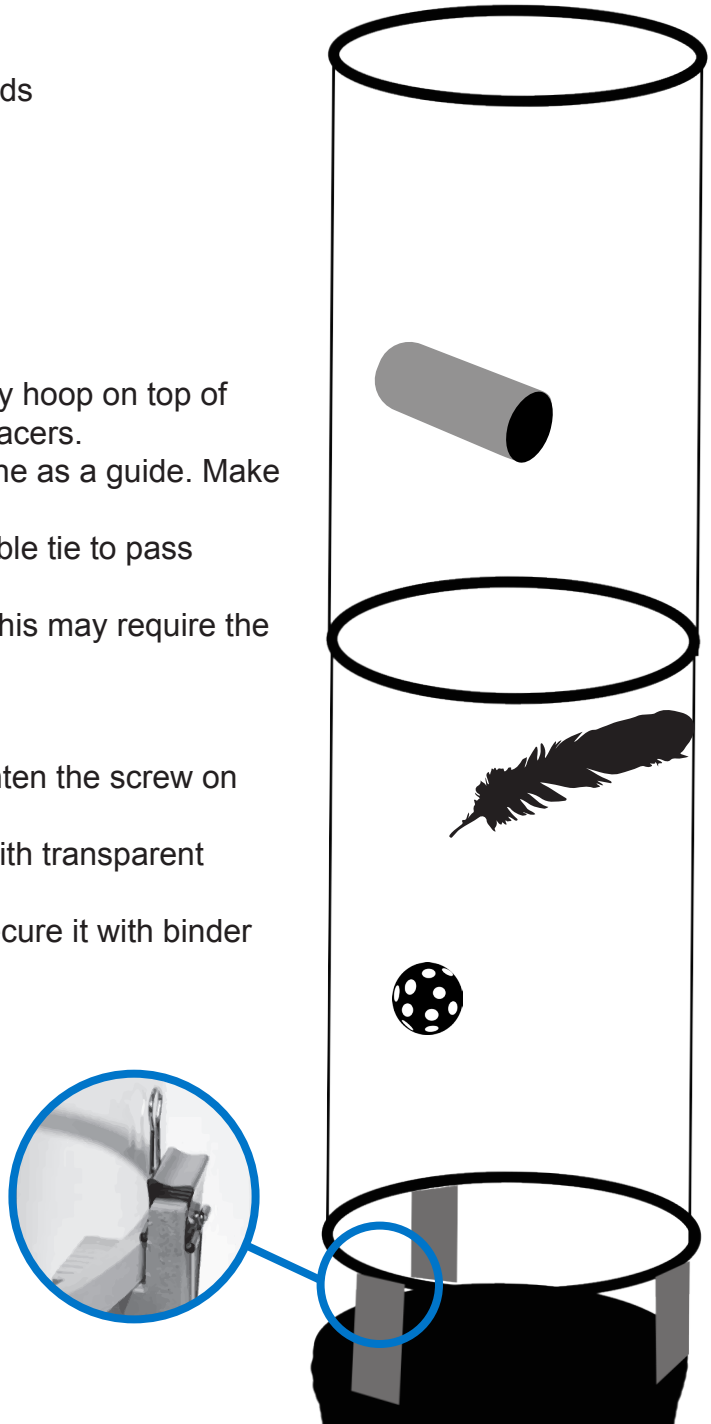
Building a Wind Tube

Introduction

Wind tubes are a fun tool to help participants explore the movement of air and how weight and construction affect flight. It provides an opportunity to improve flight performance on a small scale.

Materials Needed

- (1) acetate sheet, .0075 inch thick, approximately 4’ x 4’
- (3) wooden embroidery hoops, 14”
- transparent packing tape
- wooden spacers, three pieces, 2” x 2” x 6”
- (1) 18” fan, with adjustable tilt head and three speeds
- scissors
- hand drill
- saw
- (3) 7” cable ties
- (3) large binder clips



Step One: Preparing the Fan

1. Set the spacers on the fan and place an embroidery hoop on top of spacers. Trace a line where the hoop meets the spacers.
2. Cut an “L” shaped notch in the spacers using the line as a guide. Make sure your notch is twice as deep as your ring.
3. Drill a hole in the other end of each spacer for a cable tie to pass through.
4. Secure the spacers on the fan with the cable ties (this may require the removal of the grill of the fan).

Step Two: Make the Tube

1. Roll the acetate into the embroidery hoops and tighten the screw on each hoop.
2. Tape the inside and outside edges of the acetate with transparent packing tape.
3. Place the tube into the notches in your spacers. Secure it with binder clips by creating opposing tension.
4. Make things fly!

What should I float? Here are some suggestions:

- plastic containers
- feathers
- skewer sticks
- Wiffle golf balls
- cardboard tubes
- pipe cleaners

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Sample Lesson: Opposing Forces

Objective

Participants will acquire introductory information about two forces, weight and lift, by building models and testing them in a wind tube.

Key Ideas

- A model is a representation of an object, system or event in the real world.
- Free flight models are tools used to test ideas and solve problems to improve flight performance.
- A wind tube is a model used by scientists, including those at NASA, to test aircraft models.
- Air is matter.
- Forces always act in pairs.
- Weight and lift are opposing forces (i.e. act in opposite directions).
- Lift is a force that elevates and object in the air and results from the movement of air over the object's surface.
- Weight is the force an object exerts due to gravity.

Anticipated Developer Outcome

- Design an experience in which participants build a model and use it in a wind tube to collect data that compares the opposing forces of weight and lift.
- Facilitate a discussion where participants use the data they collected to conclude that air is matter and that opposing forces of lift and weight affects how objects move in air.