

# Wind Tubes

Wind tubes are a playful and inventive way to explore the effect that moving air has on objects, including constructions made from everyday materials. It's fun to make things that fly out of or float in the tubes, and to adjust them to change the way they fly.



*“This was an extremely friendly activity. You don’t have to build something to start; you can just grab an object and test it out.”*

Workshop Participant

PIE Institute shares a playful and inventive approach to teaching science, art, and technology.



## TRY IT!



### What do I need to build the tube?

- an acetate sheet, .0075 inch thick approximately 4 ft x 4 ft (122 cm x 122 cm)
- wood embroidery hoops, 14 in. (36 cm)
- transparent tape
- wooden spacers, three pieces, 2 in x 2 in x 6 in (5 cm x 5 cm x 15 cm)
- a fan, 18 in (46 cm), three speeds, with adjustable tilt head (we like the Honeywell Turbo series)
- scissors, hand drill, and a saw
- three 7" (18 cm) cable ties
- three large binder clips

### What do I need to float in the tube?

- thin (2 mm) and thick (6 mm) foamies [www.craftsuppliesforless.com](http://www.craftsuppliesforless.com)
- strawberry baskets and other plastic containers (Cool Whip containers work well)
- feathers
- skewer sticks
- Wiffle practice golf balls
- cardboard tubes
- pipe cleaners
- masking tape



## GET STARTED



### Prepare the fan

Set the spacers on the fan and place an embroidery hoop on top of the spacers. Trace a line where the hoop meets the spacers.



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.



Drill a hole in the other end of each spacer for a cable tie to pass through.

At this point you may want to install a screen or mesh over the fan grill, to keep smaller items from falling through to the fan blades.

Test a few kinds to make sure they don't block the fan's airflow.



Secure the spacers on the fan with the cable ties. *(you might need to remove the grill of the fan to do this)*

## MAKE THE TUBE

Roll the acetate into the embroidery hoops and tighten the screw on each hoop.



Tape the inside and outside edges of the acetate with transparent tape.



Place the tube into the notches on your spacers.

Secure it with binder clips.



The finished assembly should be quite stable.

*Tip: if you removed the grill of your fan, you will need to replace it before attaching the tube.*

## TRY IT OUT

### Make and test objects in the tube!

Turn on the fan, place objects under the tube, and watch what happens when you let go!

### Things to Try

Test common objects and materials.



Make adjustments to these objects or create new ones using art materials.



Design and build objects that spin, fly, or float in unusual ways.



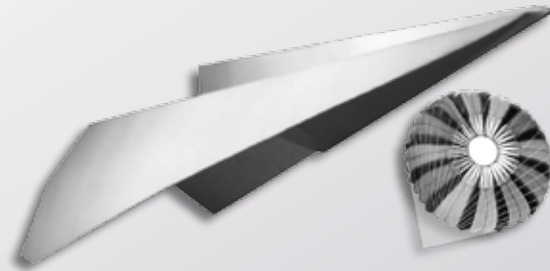
(modified toilet paper tube)



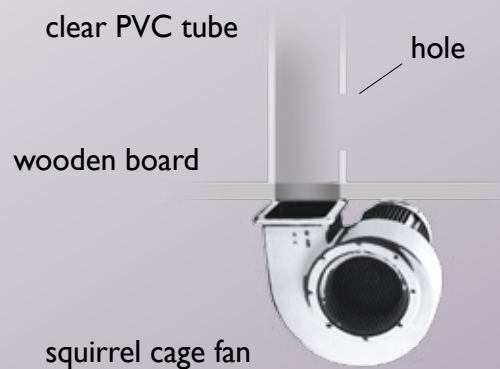


## TAKING IT FURTHER

- How do paper airplanes, helicopters, and parachutes behave in the wind tube?



- Experiment with different-sized tubes and wind sources. We tested squirrel cage fans and clear PVC pipe.



## WHY IS THIS A PLAYFUL AND INVENTIVE EXPLORATION?

### **It's a playful and inventive approach to learning about the effects of moving air**

This is a playful and inventive way of exploring airflow, drag, symmetry, turbulence, air resistance, and gravity.

### **Ideas build on one another**

By making observations about the ways in which an object behaves in the air tube, new designs can be realized, constructed, and immediately tested.

### **New uses for everyday objects**

Seeing common objects such as strawberry baskets, and plastic containers behave in surprising ways leads to unexpected experiments with, and new tests of these things.

### **Participants explore variables**

Although everyone is exploring similar scientific concepts, the experiments vary widely because of all the possible ways of changing the variables. Variables include the weight, shape, and surface area of the objects; fins and other add-ons that allow the objects to spin (or float gently in the wind); the diverse use of art materials to balance the floating creations; and the variety of ways that everyday objects are used.



## RELATED IDEAS

### **Vertical wind tunnels**

While the vast majority of vertical wind tunnels were created for recreational use, some of the earliest were produced for aerodynamic testing.

<http://www.bodyflight.net>



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