

Exploring Aerodynamics

Grades: 1st - 5th grades

I. Materials

Roto-copter

- Roto-Copter pattern print out
- Pencil
- Scissors
- Paper clips
- Crayons, markers, or color pencils

Spinning Blimp

- Paper
- Ruler
- Scissors
- Crayons, markers, or color pencils

Hoopster

- Scissors
- Ruler
- 3" x 5" index cards
- Clear plastic tape
- Plastic straws (don't bend)

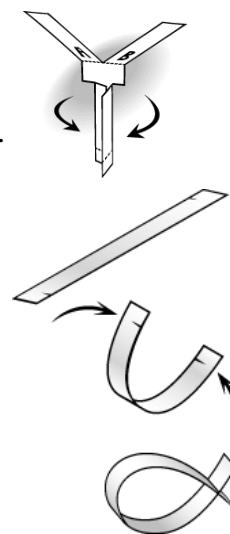
II. Objective

To introduce students to the principles of aerodynamics, by observing the flights of three drastically paper planes.

III. Instructions

A. Roto-Copter

1. Cut out the Roto-Copter pattern (attached). Only cut on the solid lines.
2. Fold the Roto-Copter on the dotted lines.
 - a. Fold A toward you and B away from you.
 - b. Fold C and D over each other so that they overlap.
3. Fold the bottom up and put a paper clip on it.
4. Hold the Roto-Copter by the paper clip. Throw it like a baseball as high and as far as you can. It should spin to the floor.
5. Decorate your Roto-Copter using crayons or markers.



Supplemental Activity

1. Ask students why they think the Rotor-Copter spins.
 - a. Answer: When the Roto-Copter falls, air pushes up against the blades. This bends the blades upward a little bit. When air pushes upward on the slanted blade, some of the thrust becomes a horizontal push.
- 2.
3. Suggested follow-up questions:
 - a. Why doesn't the copter simply move sideways through the air?
 - i. Answer: There are two blades that are exerting equal, yet opposite forces. These opposing thrusts/pushes work together to cause the copter to spin and to move downward vertically.
 - b. What direction does the copter spin? Why?
 - i. Ask students to bend the blades in the opposite directions (blade A away from you, blade B towards you). Drop the copter. What direction does it spin now?

B. Spinning Blimp

1. Cut a strip of paper 6 to 8 inches long and ½ inch wide.
2. Cut halfway across the strip about ½ inch from one end. Turn the strip around and do the same on the other end. See figure on right.
3. Insert the two slits into each other.
4. Now you have a blimp that spins through the air.

Supplemental Activity

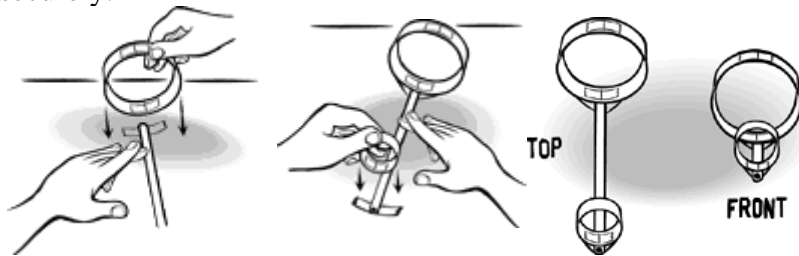
Allow students to find the engineer inside of them. Let students make alterations to the basic design of the Spinning Blimp. Hold competitions to see who can make their blimp spin the fastest or stay up in the air for the longest.

Suggested alterations:

- Change the length or width of the paper strip
- Change the length of the tail.
- Use different kinds of paper.

C. Hoopster

1. Cut the index card long ways into three equal strips.
2. Make a small hoop with one of the strips. Tape it together.
3. Tape the remaining two strips into one large strip.
4. Make a larger hoop out of this long strip. Tape it together.
5. Tape the big hoop onto the end of the straw.
6. Tape the little hop onto the other end of the straw. Make sure that both hoops are taped securely.



7. Hold the Hoopster in the middle, with the little hoop in front. Throw it like a spear and what it fly.

Supplemental Activity

Make alterations to the Hoopster to see if you can make it fly farther, for longer, etc.

Suggestion:

- Change the weight of the Hoopster by adding paper clips.
- Change the length of the Hoopsters.
- Change the size of the hoops.
- Change the number of hoops
- Change the location of the hoops.

D. Post-Activity

- Ask students to make an airplane or an object that flies of their choosing.
- Let students show off their creations. See which ones fly the best.
- Ask students to make observations and draw conclusions based upon the flights of their classmate's airplanes. Are there any similar characteristics about the planes that flew the longest? Any differences?

ROTO-COPTER PATTERN

