

# Airplane: Aerodynamics

(Adapted from: *The Fabric/Flight Connection*. See “More Great Resources for Grab and Go with Science Activities” at the end of this publication for more information, including activities for older youth.)

**Contributor:** Charlotte W. Coffman, Department of Textiles & Apparel, Cornell University

**Main idea:** Some shapes are more aerodynamic than others.

## **Objectives:**

- q Make an airplane
- q Notice the airfoil shape

## **Materials:**

- q 1 strip of paper 1/2 in. x 3 1/2 in. (1.5 cm x 9 cm) long
- q 1 strip of paper 3/4 in. x 4 3/4 in. (2 cm x 12 cm) long
- q 1 plastic straw
- q Cellophane tape

**Motivator:** Ring-wing aircraft are being developed. Because the wingtips are circular, the wing structure is strengthened and uses less material. Lower weight means greater fuel efficiency.

## **Questions:**

Before you start the activity, ask the students:

- q What shape are airplane wings?

q How many wings do airplanes need to fly?

### Activity:

See diagrams that follow, **Airplane 5:Aerodynamics**.

1. Make a loop out of each strip of paper, overlapping ends and taping the inside and outside loop to form a pocket.
2. Put one loop on each end of straw by slipping straw through pockets.
3. Sail straw plane with larger loop pointed forward.
4. Sail it with smaller loop pointed forward.

### Learning checks:

- q Did you expect this plane to fly? Why or why not?
- q Did the straw plane fly best with the small or large loop pointed forward?
- q Where is the center of gravity of this plane?

**Background:** Air moves more rapidly over the curved top than under the flat bottom. This causes lower air pressure on top, resulting in lift.

### Vocabulary:

**Airplane:** Powered flying machine with a fixed plane surface for wings.

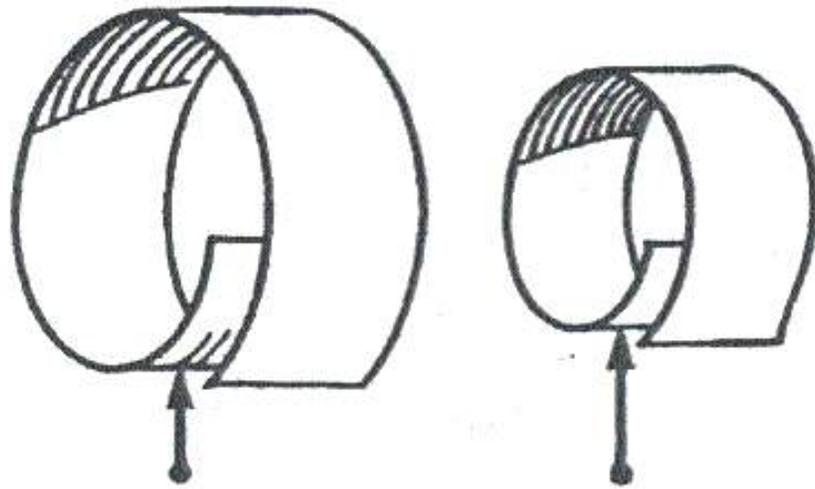
**Airfoil:** Streamlined structure that is flat on the bottom and curved on the top.

**Bernoulli's principle:** Scientific principle published by Daniel Bernoulli in 1738 that states that as the speed of a fluid or gas increases, the barometric pressure of the area it occupies decreases. Low air pressure above the wings and high air pressure below the wings results in lift.

### Extensions:

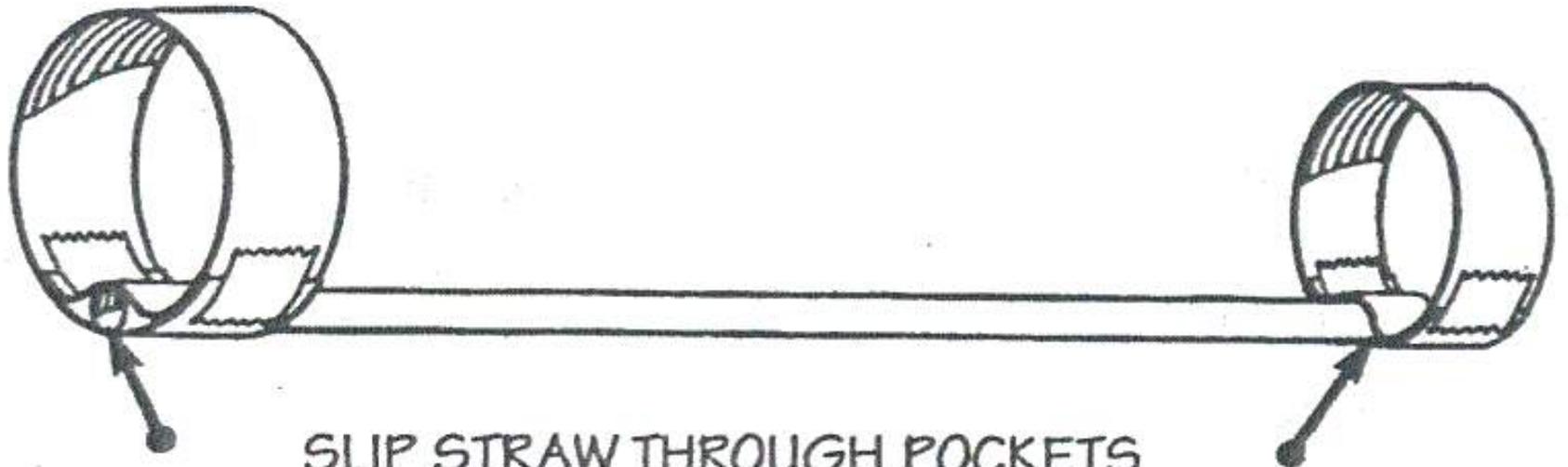
- q Experiment with the loops in different positions along the straw.
- q Try plugging one end of the straw. Does that make a difference in the plane's flight?

1.



OVERLAP LOOPS. TAPE INSIDE AND OUTSIDE TO FORM POCKETS.

2.



SLIP STRAW THROUGH POCKETS