

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.)

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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.

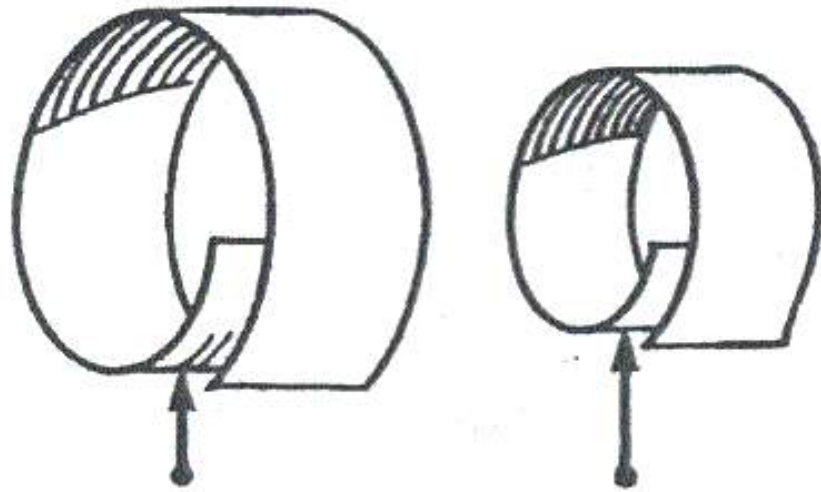
Airfoil: Streamlined structure that is flat on the bottom and curved on the top.

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:

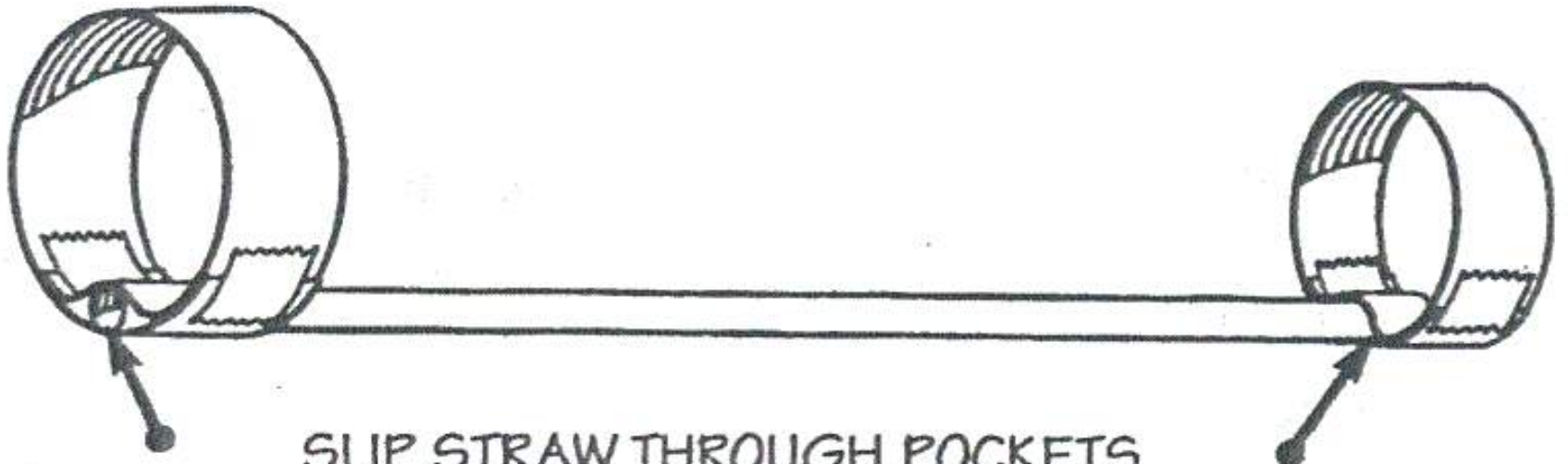
- q Experiment with the loops in different positions along the straw.
- q Try plugging one end of the straw. Does that make a difference in the plane's flight?

1.



OVERLAP LOOPS. TAPE INSIDE AND OUTSIDE TO FORM POCKETS.

2.



SLIP STRAW THROUGH POCKETS