



# Birds and Bernoulli

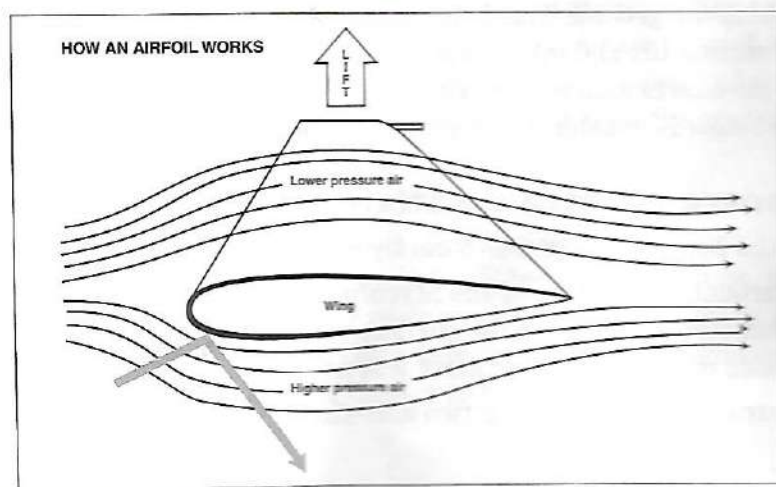
Participants learn how the shape of a bird's wing enables it to fly—by making models and observing the effects of air pressure.

## Need to Know

What do birds, airplanes, and sticking shower curtains all have in common? If you said “their movement and Bernoulli's Principle,” then you have the right answer. Bernoulli's Principle was formed by Daniel Bernoulli, a Swiss scientist who lived in the 18th century. In simple terms, *Bernoulli's Principle* says that when air speeds up, its pressure drops. That is, fast-moving air has less pressure, or force, than slower moving air. So what does this have to do with a shower curtain? When you turn on fast-flowing water, air pressure inside the shower decreases compared to air pressure outside. The outer high-pressure air pushes in—so you're gift-wrapped by a shower curtain!

Based on this principle, the wings of both birds and airplanes are curved. This curve, or airfoil, makes the air flowing above the wing move faster, and the slower-moving air flowing beneath the wing to push harder and force the wing to move upward. When the air beneath the wing exerts greater pressure than the air above the wing—and creates enough force to fly—the process is called *lift*.

Bernoulli's Principle applies to birds' wings that come in many shapes and sizes. Wings vary greatly among species and enable birds to do many things in addition to basic flight. Have you ever noticed a hummingbird hover in mid-air, or a falcon dive at great speeds, or a loon swimming underwater? What do you think the design of an Arctic Tern wing looks like? This bird migrates several thousands of miles each year in its pole-to-pole journey, so it needs a lot of long-term lift!



## NEED TO GET

- ☐ Copy, preferably enlarged, of How an Airfoil Works (included here)
- ☐ Poster board

### PROCEDURE I

- ☐ Sheets of notebook paper or paper from the recycling bin cut into strips

### PROCEDURE II

- ☐ Copies of Flying Eagle Airplane, one for each participant
- ☐ Scissors
- ☐ Stapler

### PROCEDURE III

- ☐ Straws, one for each participant
- ☐ Styrofoam cups
- ☐ Rulers
- ☐ Pieces of paper
- ☐ Scissors
- ☐ Pencil

## TIME

Preparation: 30 minutes  
Activity: 20 minutes

## TERMS TO KNOW

Bernoulli's Principle, lift

