May 2001

SeaWorld/Busch Gardens

Bird Biology

9-12 Classroom Activity

Flying High

OBJECTIVE

Given various paper materials, students will be able to explain and demonstrate the principles of flight by creating a paper airplane that flies.

ACTION

1. Ask students if they know how a heavier-than-air object is able to fly through the air. Give examples of birds, bats, insects, airplanes, helicopters. Give students a concise explanation of the principle of flight. (See background below or access these sites on the Web.)

   http://www.catskill.net/evolution/flight/birdsfly/birdsfly.html
   http://www.geocities.com/CapeCanaveral/1817/paero.html
   http://www.geocities.com/CapeCanaveral/1817/
   http://www.allstar.fiu.edu/aerojava/princ1.htm

2. Give students paper materials and paper clips. Students may work in groups or individually. Ask students to create a paper airplane that will fly. (One simple airplane is illustrated on the next page.)

3. After students have created their airplanes, have a contest to compare flying abilities. Discuss the winning design as a class. What makes one plane fly farther than another? Explain that some birds, such as Arctic terns, fly thousands of miles to and from nesting and winter grounds. If you can access this site *http://tqjunior.thinkquest.org/3500/arctic_tern.html* or get a photo of an Arctic tern, discuss its body design. How does body design help terns stay in the air longer and with less energy (such as low weight, long wings, long flight feathers, very streamlined body).

BACKGROUND

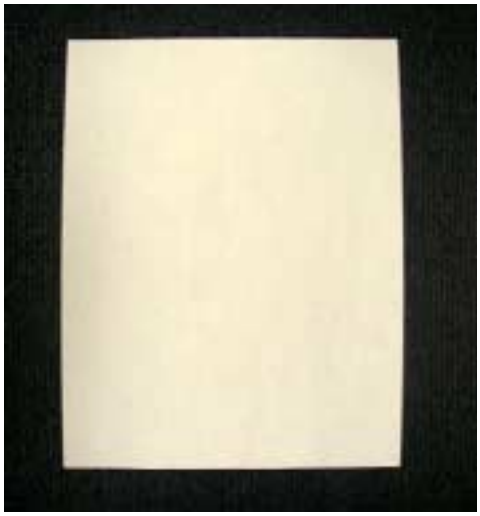
Heavier-than-air objects are able to fly because when an object moves through the air, the air flow above the object travels faster than the air flow beneath the object. Faster moving air (a fluid) has less pressure. Less air pressure above a moving object creates lift. When lift is greater than gravity, the object stays in the air. Lift can be maximized by the object's shape. Streamlined, elongated shapes (like wings), enhance the lifting effect as air travels over the top and under the bottom. Swiss scientist Daniel Bernoulli first described this effect—as the velocity of a fluid increases, its pressure decreases-in the eighteenth century. This principle of flight is as true for small hummingbirds as it is for mighty eagles and massive airplanes.

These Web sites give examples of paper airplanes:
http://koolpaperairplanes.hypermart.net/
http://www.zurqui.co.cr/crinfocus/paper/airplane.html
http://www.paperairplanes.co.uk/planes.html

MATERIALS

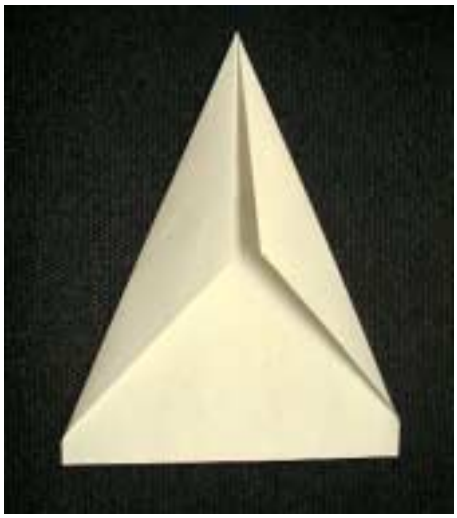
Per student:
- sheets of paper (any size or weight)
- paper clips

Owls have broad, rounded wings with a large surface area. Flying silently at night, they hunt for small rodents.



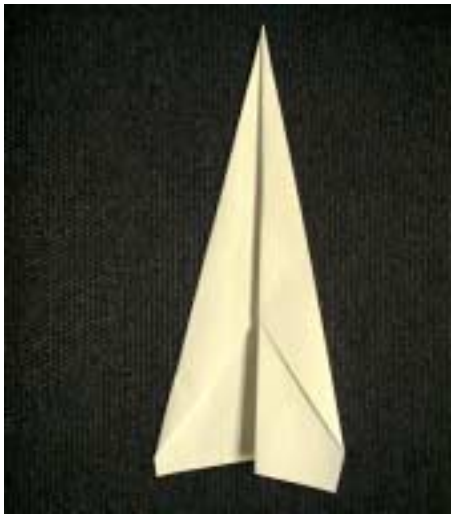
Begin with a 8.5" by 11" paper.

Fold down the top two corners, using the middle of the paper's width as a center point



Make another fold from the top.

Fold airplane in half along the centerline of the paper's length.



Fold back one of the wings.

Fold back the wing on the other side.

Finished paper airplane, rear (left) and front (right) views.