Traveling Science Shows

THE FRANKLIN INSTITUTE

Pre-Show

FLIGHT

About the Show

Every culture has myths of flying human (or human-like) beings. Although people have never flown as the ancient myths tell it, myths inspired many great inventors. Your students may already be familiar with inventing their own flying machines: the paper airplane! Before the show, encourage students to create and test a paper airplane. Compare the designs, and brainstorm the variables that affect how a plane flies. After the show, use your new knowledge to make improvements to your fleet.

Our own Traveling Scientists will trace the history of human flight. Your students will be amazed as they witness the bird-like flight of an ornithopter and a spectacular hot air balloon launch. We will also explore some of the science that makes gliders, airplanes, and jets possible. This will bring us to air pressure, Bernoulli's principle, and Newton's third law of motion. Finally, students will learn about space flight… and see a blast-off they'll remember for years to come. Students are usually so full of enthusiasm after seeing our Flight show that ideas for the next one hundred years of flight come pouring out of them!

We have provided the following activities to help students preview some of the major concepts covered in our show. Please remember to use appropriate safety measures for all activities. Adults should always supervise students during experiments.

Thank you for scheduling a Franklin Institute Traveling Science Show.
We are excited to visit you soon!

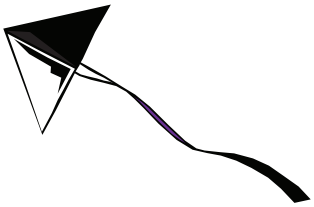
LET'S GO FLY A KITE!

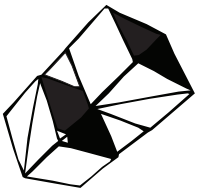
FOR GRADES 1-6

In this activity, students design and build their own kites. While having fun, they will discover many of the variables and forces involved in flight, which we will discuss further during the Flight show.

EQUIPMENT

Kite
Various types of paper (i.e. newspaper, tissue paper, etc.)
Thin dowel rods or craft sticks
Scissors
Tape
String
Fan





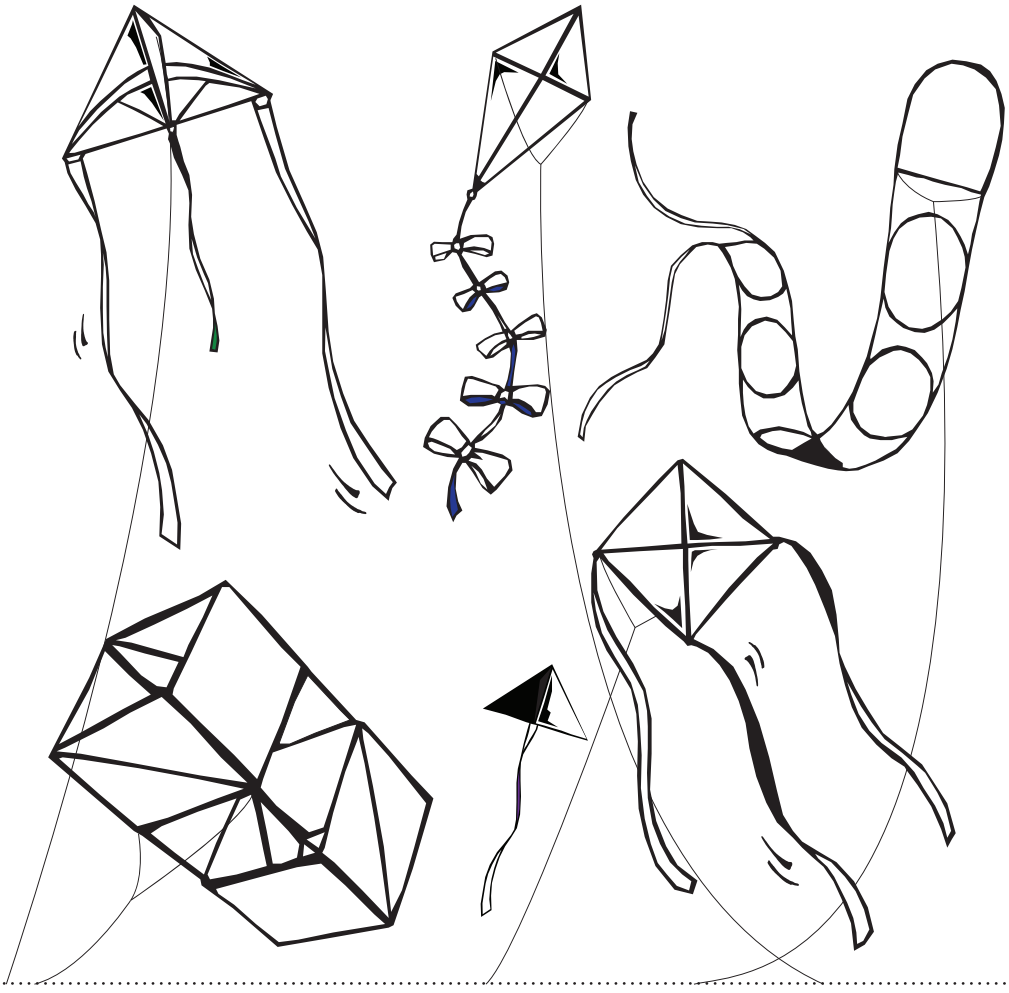
PROCEDURE

1. Examine a kite. What are the main features? What variables might influence how it flies?

2. Design your own kite. Test various types of paper to determine which makes the best body. Use dowels or craft sticks to make a light but sturdy frame that supports the body.

3. Use a fan to create a "wind tunnel" and test the components of your kite. Which materials work best? Which shapes work best? Does a tail help it fly better?

4. After your assembly is complete, fly your kite on a windy day. How does the wind help it fly?



RUSHING AIR

FOR GRADES 3-6

These activities introduce Bernoulli's principle, which states that fast-moving air creates lower air pressure. The following experiments and discussion questions will give students experience with the effects of Bernoulli's principle. During the Flight show, we will explain how Bernoulli's principle helps us design airplane wings and helicopter blades.

EQUIPMENT

Paper
Scissors
Drinking straw
Empty 20-oz. soda bottle

PROCEDURE

1. Cut two strips of paper, each about 11 inches long by 3 inches wide. Hold one paper in each hand at the narrow ends. Let them both hang in front of your mouth, about 2 inches apart. Blow steadily between the two strips of paper. What happens? Is this what you expected?

2. Cut a square of paper, about 8 inches by 8 inches. Make a 1-inch fold along one side, and another 1-inch fold along the opposite side. Place the paper on a flat surface, using the folds as legs to prop up the paper. Put the end of the drinking straw underneath the paper, in the middle. Blow a stream of air under the paper. How did the paper move? Why?

3. Wad a small piece of paper so it is about the size of a pea. Lay the bottle on its side on a flat surface. Place the wad in the bottle, just inside the opening. Bend down so you are level with the bottle, and blow across the opening in front of the bottle. What happens to the wad of paper? Why is the wad forced to do that?

NO BONES ABOUT IT

FOR GRADES 3-6

Humans have always been fascinated by flight. During the Flight show, students will learn how our studies of birds, bats, and bugs informed the design of man-made flying machines. In this activity, students will examine bird bones to discover some of the structural characteristics that allow birds to fly.

EQUIPMENT

Sharp knife (for adult use only)
Beef bones
Chicken bones
Chicken wing bone
Magnifying glasses

PROCEDURE

1. Cut a chicken bone and a beef bone crosswise (perpendicular to the length of the bone).

2. Use the magnifying glass to observe the centers of the two bones. Sketch or describe the structure of each bone.

3. Compare the two bones. What advantages do the bones of birds and mammals have for them? What are some other structural differences between flying birds and non-flying animals?

4. Examine the chicken wing bone. How does it compare to the arm bones of a person?