

Bored—Nothing To Do!

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Program Description: On a commercial airline flight, LeVar finds out that airline employees do everything—from stocking up on meals and stowing luggage to flying the plane and caring for the passengers. He also flies a remote control model airplane, explores the history of flight through film clips, and gets a chance to pilot a plane himself.

The Plane Truth

Key Words: airplanes, wings, lift, airfoil, air pressure, Bernoulli’s principle

Concept: Airplanes have wings shaped like airfoils—which give them lift and help them fly.

When LeVar flew the plane, he seemed very excited and a little nervous. The idea of getting a heavy plane off the ground and keeping it in the air seems magical, but it can all be explained through the study of aerodynamics. An important concept of air flight is lift. Lift is the upward force caused by the motion of airplane wings through the air. Lift is what holds an airplane up while gravity is pulling down on it.

Materials: Typing paper, scissors, tape, pencils.

1. Have each student cut a 2” x 6” strip of paper.
2. Ask students to fold their strip in half so it becomes a 2” x 3” strip. Have them push back the top edge about 1/2” and tape it there. This shape, which is flat on the bottom and rounded on the top, is called an airfoil. It is the shape of airplane wings.
3. Have students place a pencil through their airfoil so that the taped end is hanging down with the flat side of the airfoil toward them. Tell them to hold it about 1” from their mouth and blow out and over the curved part of the airfoil. As they blow steadily across the top of the airfoil, it will pivot up. They might need to try this several times before it works. (The upward force produced by the moving air over the airfoil is called lift. Lift is what holds an airplane up against the force of gravity. When students blow across the top of the airfoil, the air pressure on the top of the airfoil becomes less than the air pressure underneath it. The airfoil is actually pushed up by the greater air pressure underneath it.)
4. To demonstrate that they aren’t just blowing the airfoil up, have students try it again with the curved side of the airfoil toward them. They will see that, no matter how they blow, they aren’t able to get the airfoil to rise.

The Wright Way To Fly



Key Words: airplanes, air resistance, drag, ailerons

Concept: Air resistance, or drag, can change the way an airplane flies.

Early flyers, like those seen in this episode, knew a bit about lift and how to get an aircraft into the air. What they really struggled with, and what the famous Wright brothers finally began to understand, was how to control an aircraft once it was in the air. One of the forces they learned to control was air resistance, or drag. Build a paper glider and learn how drag can change its flight.

Materials: Copies of the glider pattern, sheets of oak tag, pencils, scissors, paper clips, a gym or other large open area free from wind

1. Give students a glider pattern and have them follow these steps to make a practice glider:

- Cut along the double lines of the glider pattern including the wing flaps—but do not fold them
- Fold the glider in half along the center dotted line
- Create the wings by folding down the dotted lines on both sides of the centerline.
- Fold up on the dotted line near the end of each wing to create the wing tips.

2. Now that they are familiar with the process, have students make gliders by unfolding the practice glider and tracing around it on oak tag. Have them follow the same directions they used to create their practice gliders. Because the dotted fold lines are not marked, they will need to estimate the placement. When they have completed the glider have them place three paper clips on the nose of the glider and put another one about half way between the nose and the rear of the glider.

3. In a large open area have them try flying their gliders (aiming them away from other people). If they throw their glider with a smooth, even, slightly upward push, it should fly in a fairly straight path.

4. Discuss air resistance. Ask students to think of a time when they were walking against a strong wind and they could feel the wind pushing against them. This pushing is called air resistance. Right now their gliders have very little air resistance because there are few places for the air to push against.

5. Have students turn up one of the wing flaps, called an aileron. (LeVar and the flight instructor checked these on their airplane during their pre-flight inspection.) Explain that the air will push on the upturned aileron creating some air resistance or drag. Have students predict how this will change the flight path of their gliders. (It will cause them to turn to the left or the right, towards whichever side has the aileron turned up.)
6. Have students test their predictions by flying the gliders and discussing any changes that they observe. Then have them fold the aileron back flat and fold the other one up. Again ask them to predict what will happen, then try flying it.

7. Finally have students fly them with both ailerons turned up. (The gliders will tend to fly up, stall, and then fall down.) Have them try turning both down. (The gliders will dive towards the ground.) Each time have students make predictions and then discuss their observations. (Students shouldn't be discouraged if their glider doesn't fly as expected every time. Just as the Wright brothers learned, it's very difficult to control all the factors involved in flight.)

