Curiosity Guide #508
Paper Airplanes

Accompanies Curious Crew, Season 5, Episode 8 (#508)

Distance Glider

Investigation #2

Description

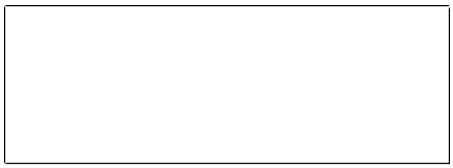
Learn how to make a paper airplane that flies a long way.

Materials

- 8 ½ by 11-inch piece of paper
- Scissors
- Ruler

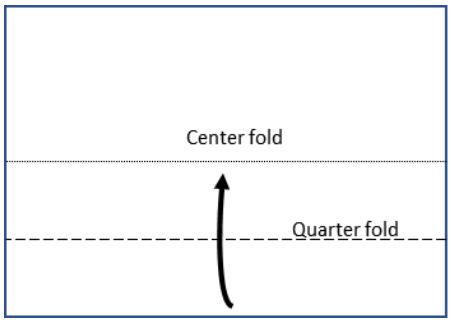
Procedure

1) Fold the paper in half lengthwise.

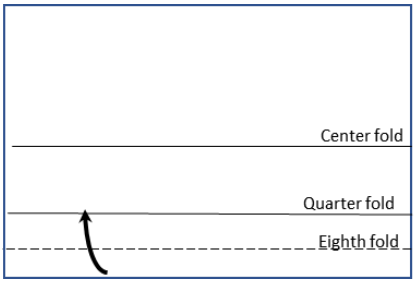


Center fold

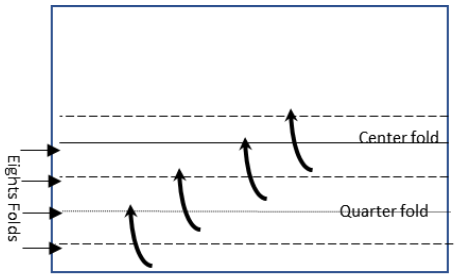
2) Unfold the paper. Fold one side into quarters, meeting the crease in the middle of the paper.



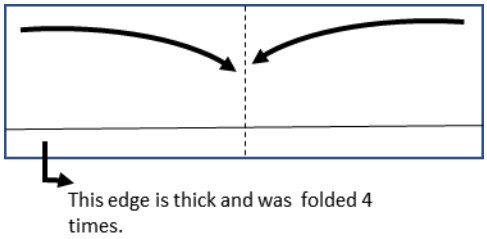
3) Unfold the paper. Now fold the same side into an eighth, meeting the quarter line that was just created.



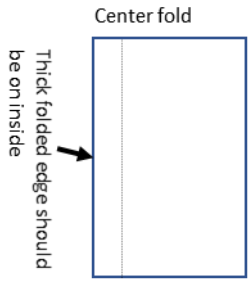
4) Continue to fold that eighth three more times. Crease the folds well.



5) Fold the entire thing in half so that the strip of folded eighths is inside, folded on itself.

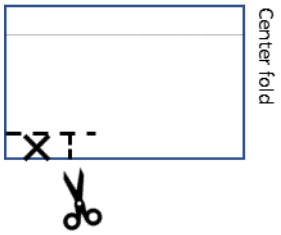


6) Position the paper so that the crease is at the top and the folded strip is in your left hand.

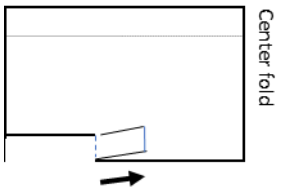


7) Cut a strip 4 inches long in the thin, open side of the paper by holding the scissors at the bottom and one inch in from the right edge. Cut through both layers.

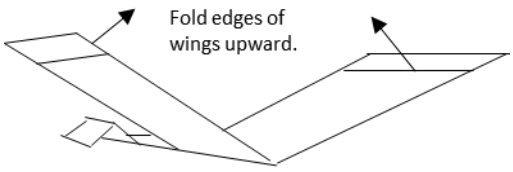
8) Turn the paper a quarter turn to the right. Cut off 2 and $\frac{3}{4}$ inches of the strip through both layers. Discard this part of the strip.



9) Fold the remaining 1 and $\frac{1}{4}$ inches back on itself. Repeat on the other side.



10) Open the plane. Fold a one-inch flap pointing up on the edge of each wing.



11) Place your index finger on the top of the plane, gently holding the underside with your thumb and middle finger.
12) Gently push the plane and let go.
13) Could you get your plane to travel a long distance?

My Results

Explanation

Planes experience opposite forces when they fly. Gravity pulls down on the plane while lift pushes it up. Thrust is the forward push, and drag is a result of air resistance and particles colliding with the plane. For an object to stay in the air longer, these forces must be in balance. When making a dart airplane, its sleek design doesn't have a lot of drag or lift, so the person throwing usually applies a lot of thrust with a hard throw to overcome gravity. The distance glider's design includes a heavy nose for gravity to pull on, which causes air particles to provide lift under the wing. Pushing the plane gently causes little thrust, and the thin angles of the flaps have little drag, so the large wings catch a lot of air. This enables the plane to travel great distances. With practice, this plane will travel 30 or more feet.

Let's review! Did you ever wonder how paper airplanes fly? To understand it, we need to explore different forces that act on the plane. The first is thrust, that forward force created when someone throws a paper airplane. But the opposite force of thrust is drag, which comes from the collision of all those tiny air particles hitting the moving plane. There is also the force of gravity that pulls down on the airplane as it falls toward the earth. Finally, there is the force of lift from air particles pushing up on the plane harder than the air particles pushing down. A good paper airplane flight will have these forces closer to balanced. Great flight!

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