



Project Exploration creates transformative learning opportunities for youth underrepresented in the sciences –particularly students of color and girls – by equipping them with the skills, practices, and mindset needed for a lifelong pursuit of learning. STEM@Home makes activities around science, technology, engineering, and math accessible and fun to do at home. This STEMbook activity, resources, and more are available at [www.projectexploration.org/stemathome](http://www.projectexploration.org/stemathome).

## In this activity, you will:

build a paper plane and observe what happens if you change the design.



## Supplies Required:

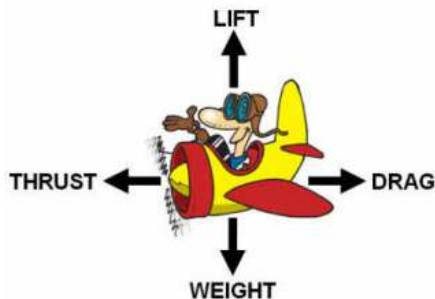
- Sheet of paper
- Ruler
- Scissors
- Large open space, such as a long hallway
- Something to make a one foot line (tape, another ruler, a stick, rocks)

## Video

Watch this video for steps to folding your own paper airplane: <https://tinyurl.com/y78wzopb>

## Overview

The forces that allow a paper plane to fly are the same ones that apply to real airplanes. A force is something that pushes or pulls on something else. When you throw a paper plane in the air, you are giving the plane a push to move forward. That push is a type of force called thrust. While the plane is flying forward, air moving over and under the wings is providing an upward lift force on the plane. At the same time, air pushing back against the plane is slowing it down, creating a drag force. The weight of the paper plane also affects its flight, as gravity pulls it down toward Earth. All of these forces (thrust, lift, drag and gravity) affect how well a given paper plane's voyage goes. In this activity you will increase how much drag a paper plane experiences and see if this changes how far the plane flies.



## Instructions

1. Get your sheet of paper and follow the video step by step to make your paper airplane.
2. Go to a large open area, and using string, a ruler, rocks or sticks make a line at least one foot long going from left to right. This is where you start when flying your airplane.
3. Put your feet at the line and make your plane go. Use the same force each time you throw your plane.
4. Fly your plane at least four times. Make sure your plane is still in good condition before each try.
5. Make a change to your plane, you can adjust the wings, and try to fly the plane again, at least four more times.

## Additional Resources

**Think About It!** did your plane go the same distance each time? What was the farthest it flew? Did the first four trials allow your plane to go very far? What did you change about your design? What do you think is the best design for the farthest flight?

1. How do airplanes fly? <https://tinyurl.com/y9dlct9x>
2. What is a force? <https://tinyurl.com/o44uvhb>

## Share It Out

**Share on social media:** Take a video of your airplane in flight! Tag Boeing and show them your aerospace engineering skills! Share your video on social media using the hashtags:

#PaperAirplane  
#ProjectExploration  
#StemAtHome

**Share via PE's website:** Students who complete STEM@home activities and share what they learned with the PE team via our website will earn points which can be traded in for cash prizes at the Explore Store. Your project number is 213. Learn more at [www.projectexploration.org/explore-store](http://www.projectexploration.org/explore-store)

### Join PE's character contest!

Design a STEM character who will lead kids through activities and be featured on our website and in our STEMbooks. Cash prizes will be awarded to the top 3 finalists. Learn more at: [www.projectexploration.org/character-contest](http://www.projectexploration.org/character-contest).

