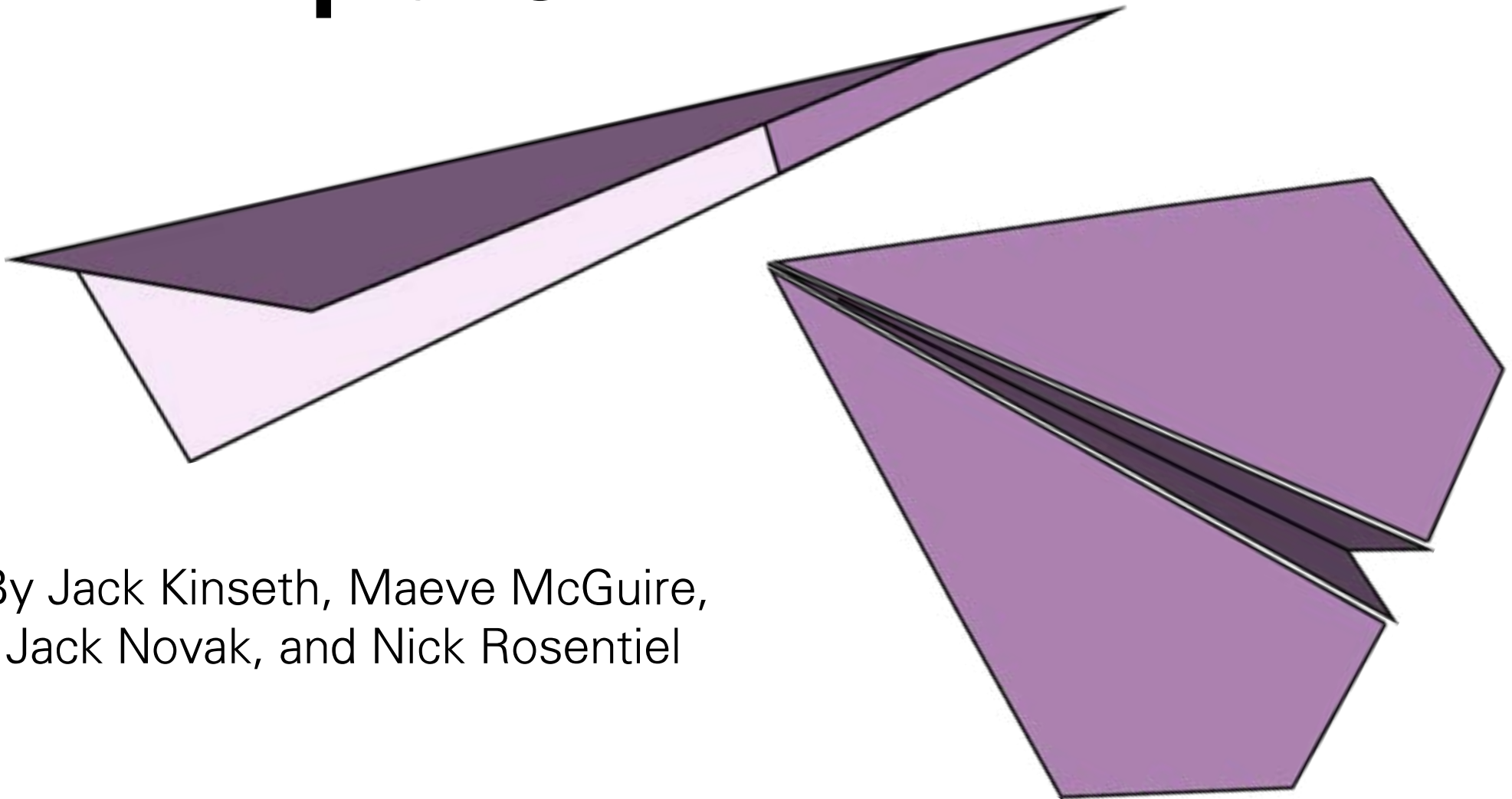


# Constructing a V-Wing Paper Airplane



By Jack Kinseth, Maeve McGuire,  
Jack Novak, and Nick Rosentiel

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## What type of paper airplane creator are you?

**Beginner:** Follow instructions exactly, give yourself time for multiple tries, be patient.

**Intermediate:** Build with friends to promote creativity, try a few Tips and Tricks along the way.

**Professional:** Experiment with different materials, customize your airplane with stickers, markers, or tape, and follow along with the provided Tips and Tricks to test your skill.

# Introduction

Many people have built a paper airplane at some point in their lives, but few can carefully craft one designed for both distance and flight duration. With its aerodynamic design, the V-Wing plane flies quietly and seamlessly through the air.

As a medium-difficulty plane, the V-Wing plane is accessible to a wide range of builders but requires care and precision in its construction. These instructions will facilitate the building process by demonstrating how to cut and fold the plane, as well as how to launch it with an understanding of its aerodynamics.

By following the steps below, you will be able to build an impressive paper airplane that gracefully outflies the competition.

## Materials Needed

- 8.5" x 11" Sheet of Paper
- Straightedge Inch Ruler
- Writing Utensil (pen or pencil is preferred)
- Level Surface for Construction
- Scissors

**TIP:** If you do not have scissors, you can still make a V-Wing. See step one for the unmodified version of this step. Instead of cutting, repeatedly fold the paper back and forth along the 2.5" mark. Once you have folded the paper several times, it should be weak and easy to tear. With one hand firmly pressed against the paper on either side of the crease on a level surface, pull your hands apart so the paper tears neatly along the line. You can then proceed to follow the steps with your square sheet of paper.

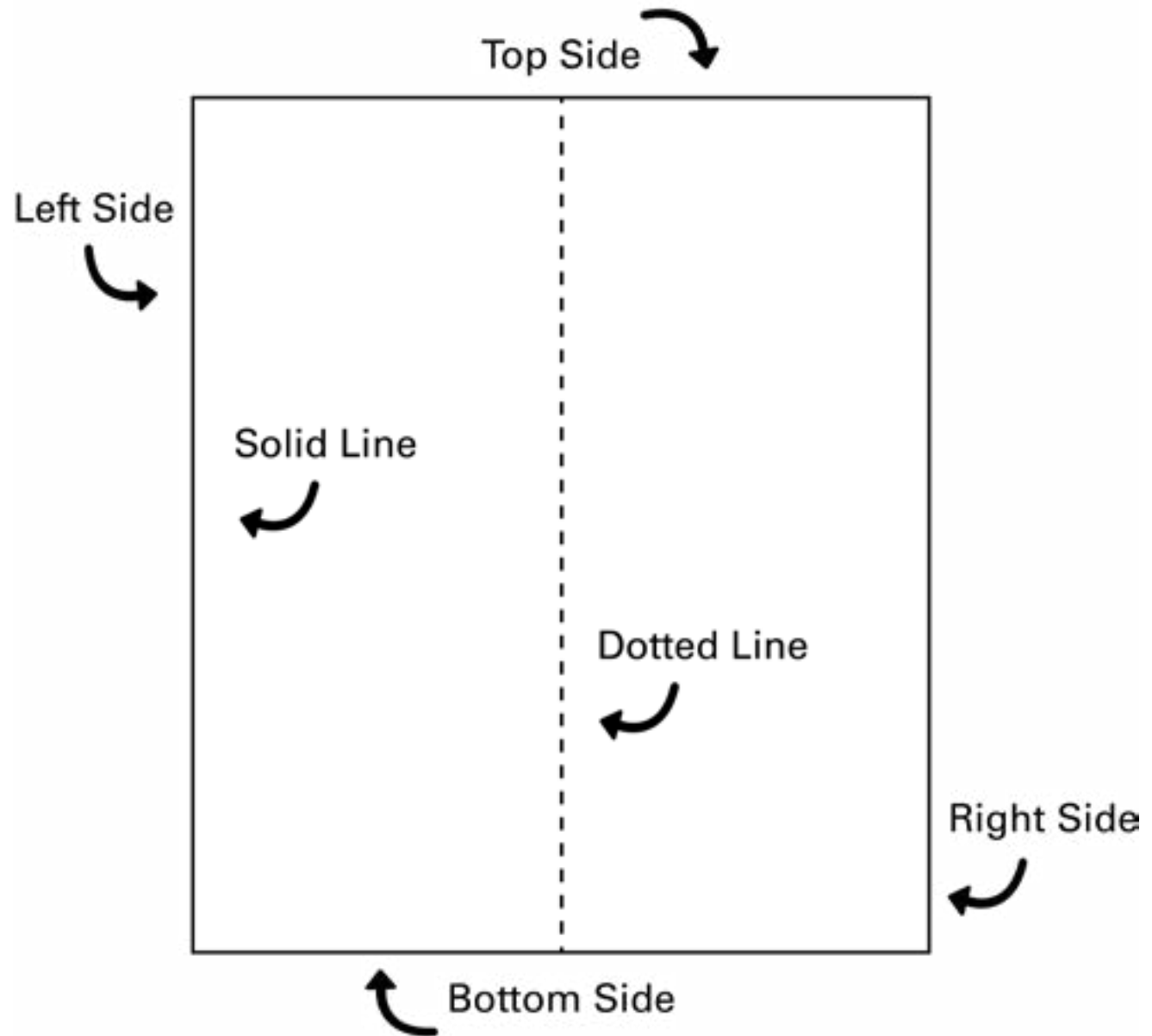
# Definitions and Orientations

**Top:** Side of the plane  
farthest from the builder

**Bottom:** Side of the plane  
closest to the builder

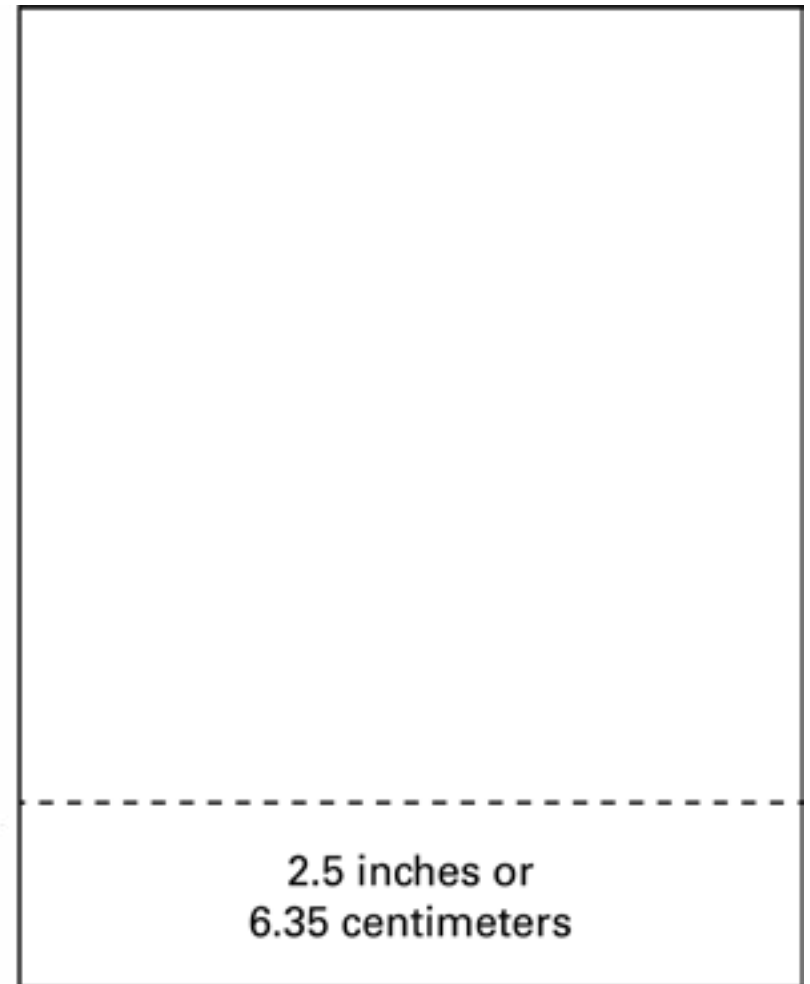
**Dotted Lines:** Where to  
fold

**Solid Lines:** Edges and  
existing creases



# Construction of the V-Wing Paper Airplane

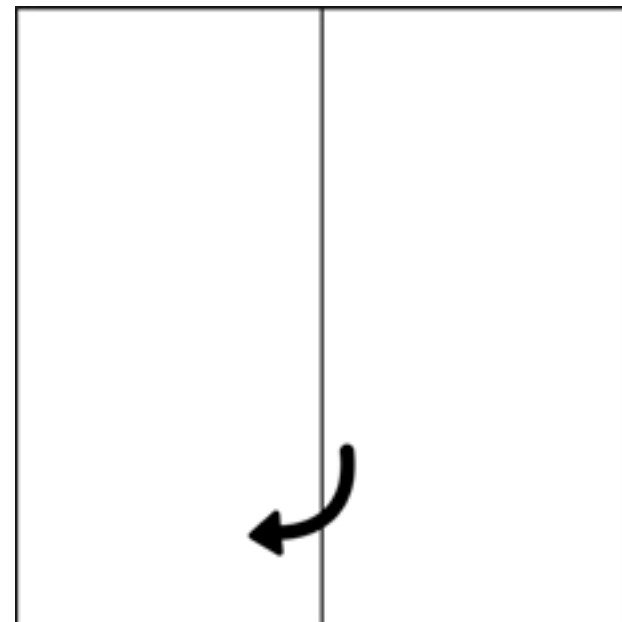
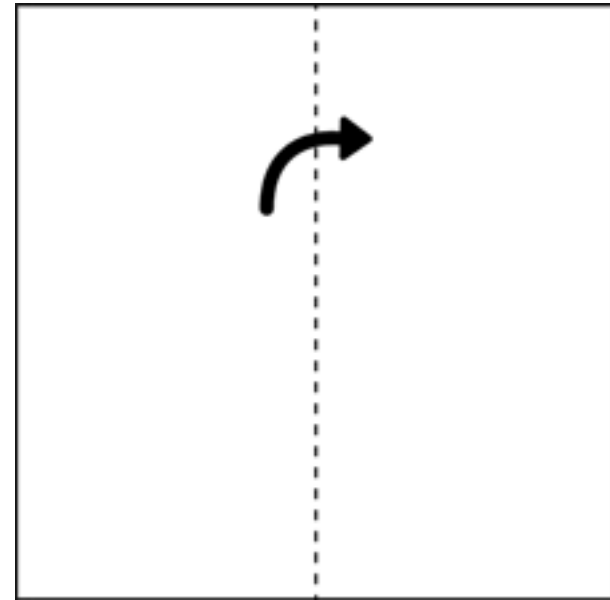
**1.** Before constructing your V-Wing, it is necessary that the bottom 2.5" portion of your sheet of paper be removed to form a square. To do this, lay your paper on a level surface with the shorter side on bottom. Using a straightedge inch ruler, measure 2.5" (6.35 cm) up from the bottom corners. Mark these measurements with your writing utensil.



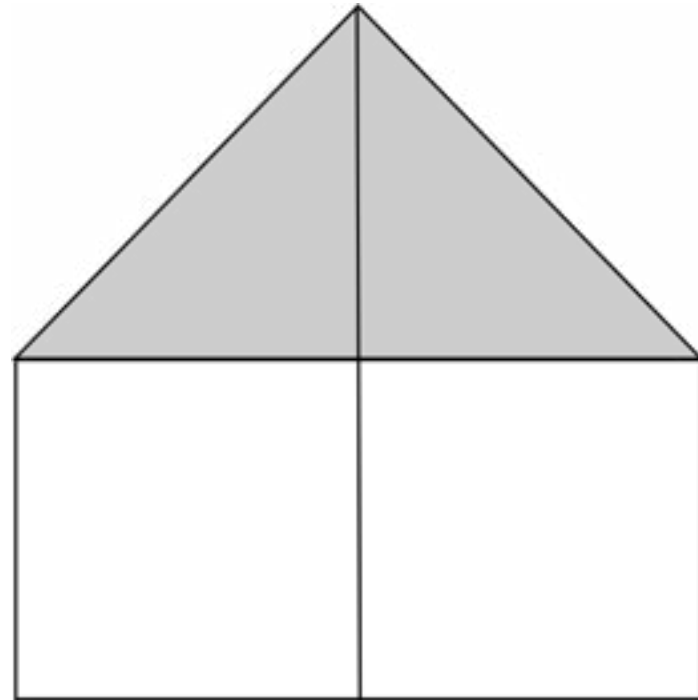
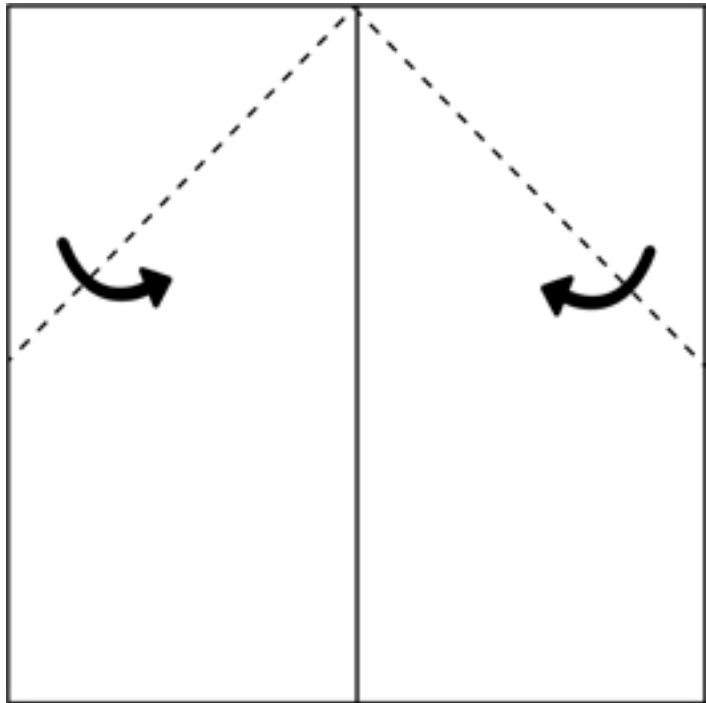
After marking these two points, connect them by using your writing utensil with your ruler as a guide. Cut along this line with your pair of scissors, leaving behind a square sheet with side lengths of 8.5" (21.59 cm) each.

**2.** Fold your square sheet in half by lifting the left side with your left hand and folding it over to the right side, ensuring that the two opposite edges line up exactly. Once you are confident in your division, use the palm of your hand to flatten the sheet against a level surface. This step should form a vertical crease evenly dividing your sheet.

Before moving to the next step, unfold your sheet.



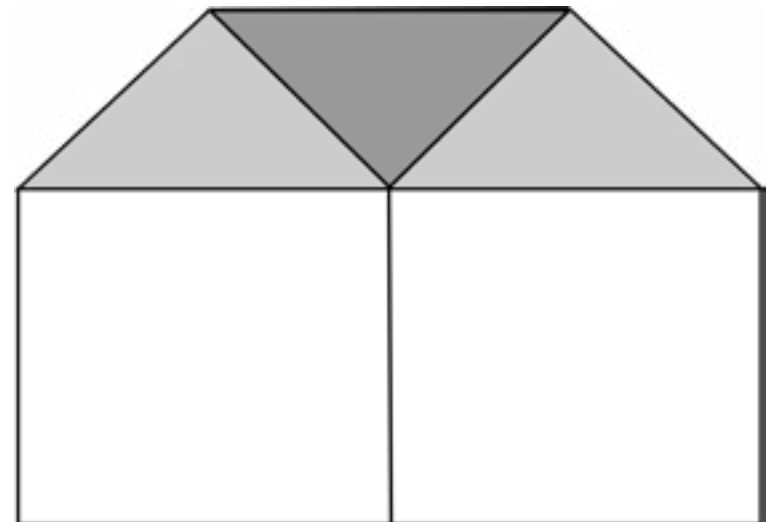
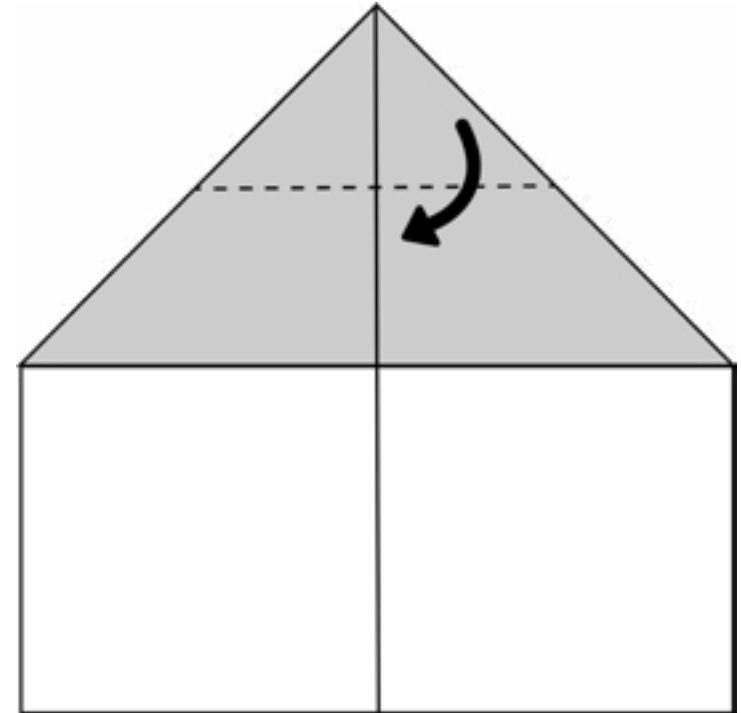
**3.** Next, take the top corners and individually bring them to the crease you made in the previous step. Doing this will form symmetric right triangles that meet at the top of your sheet.



4.

Now, take the top point or “peak” of your sheet and bring it to the where the bases of the two right triangles meet. Call this point the “center.” This step should produce three distinct triangles at the top of your sheet in the shape of a trapezoid.

Be sure to use the palm of your hand or straightedge ruler against a level surface to form a tight crease with this fold. Folding paper multiple times tends to get progressively more difficult.

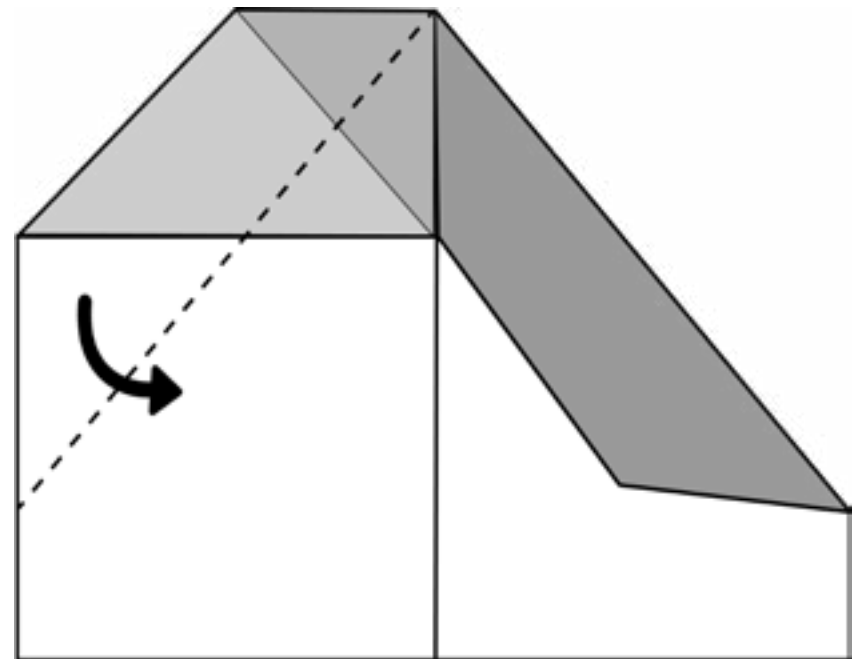
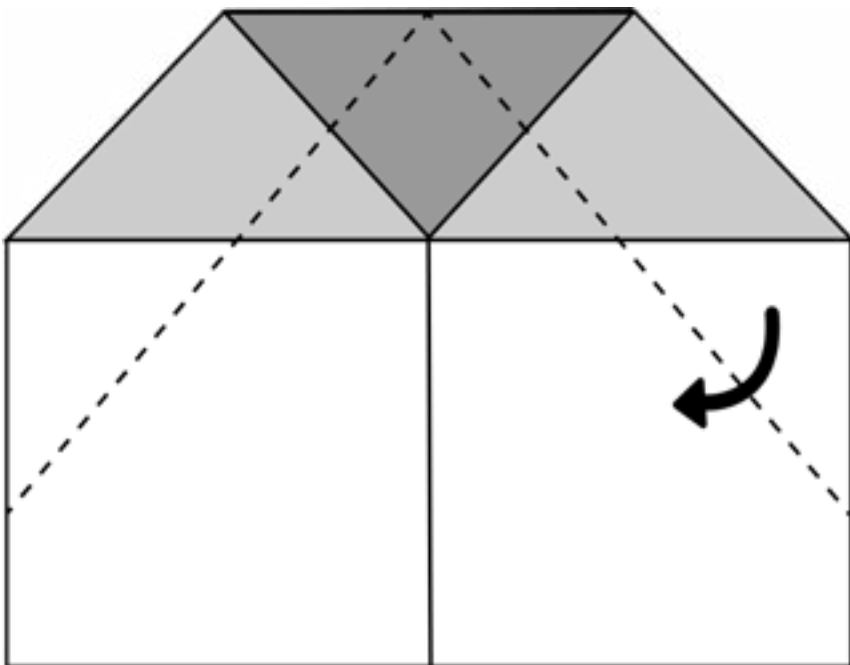




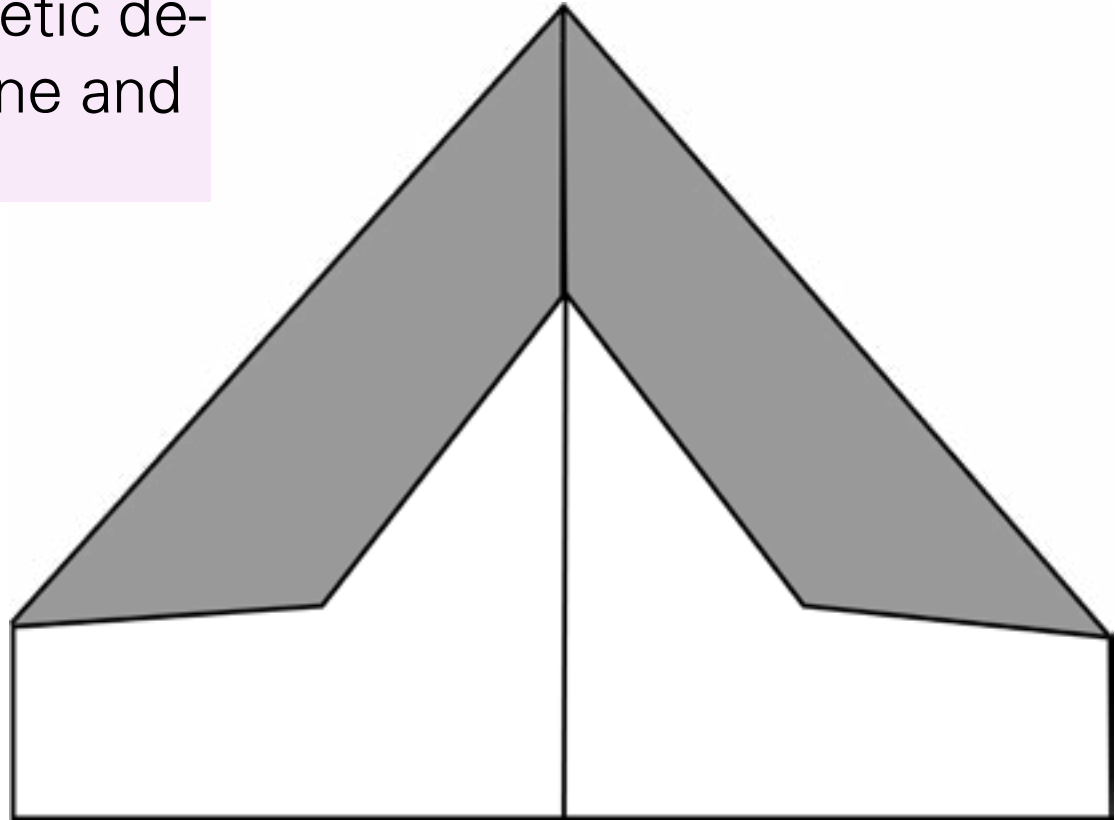
# 5.

Next, fold the top right corner of the trapezoid to the center. In doing so, another trapezoid on the right side of your sheet should form in line with the original vertical crease. In addition, the peak and top right corner you folded should meet precisely at the center.

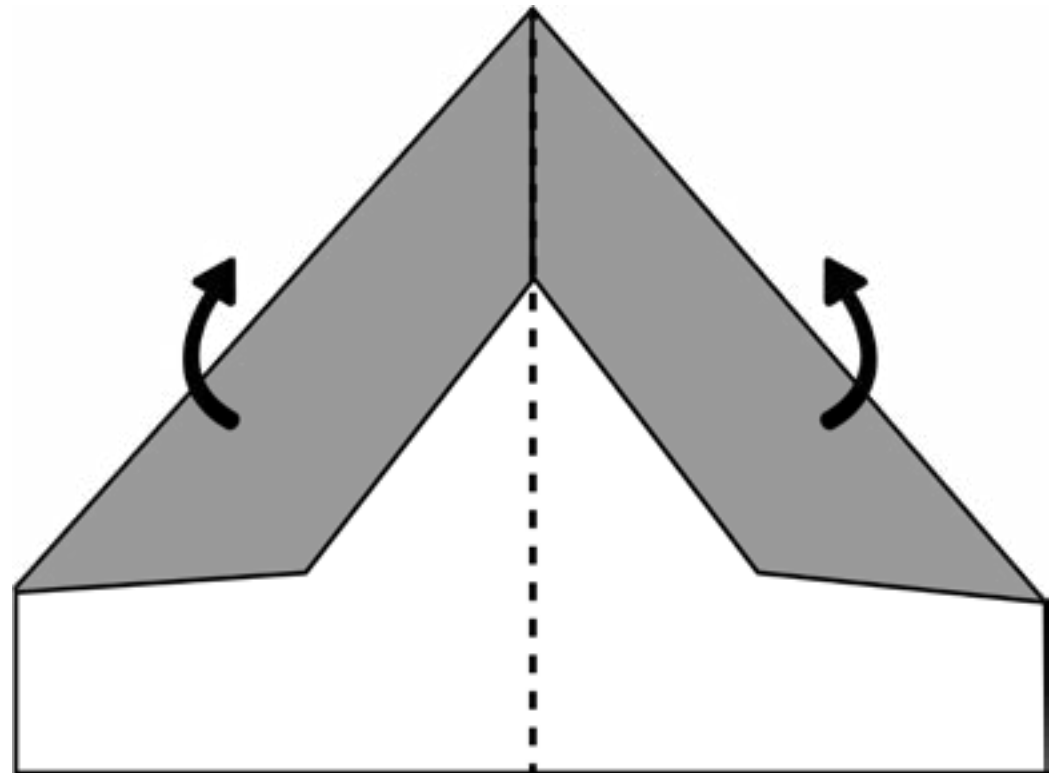
Repeat the previous step, this time folding the top left corner to the center. A vertically-symmetric trapezoid on the left side of your sheet should also form in line with the original vertical crease, as well as meeting the peak and former top right corner precisely at the center.



**TIP:** It is helpful to use your straightedge ruler as opposed to your palm to ensure all of the creases are as tight as possible. This will drastically improve both the aesthetic design of your V-Wing plane and flight performance.



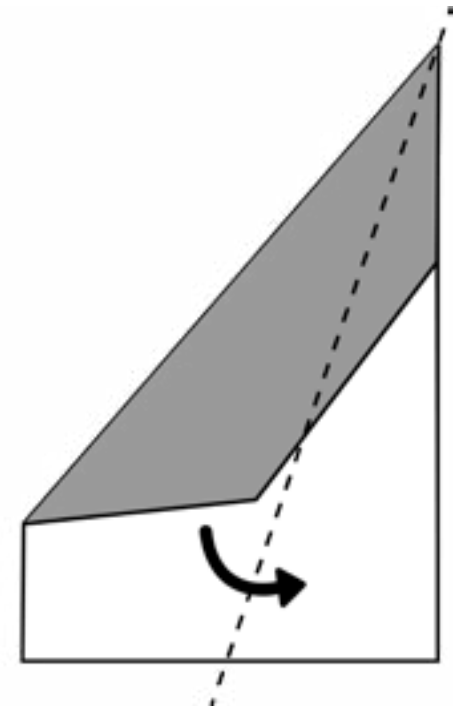
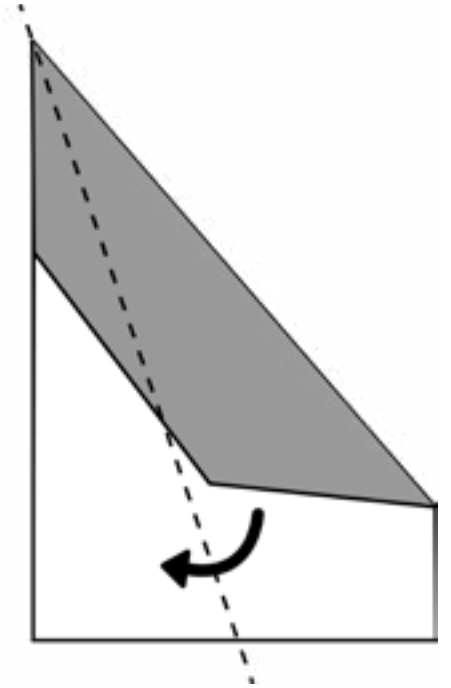
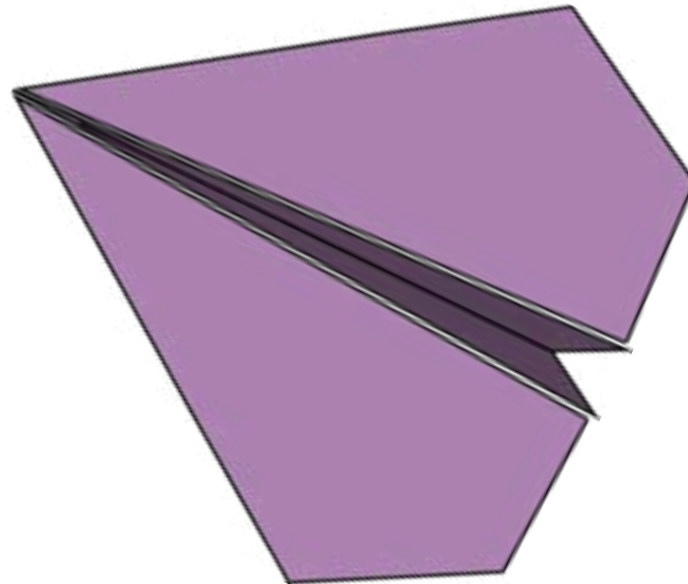
**6.** Once you are confident in the alignment of your trapezoids, outwardly fold your V-Wing plane in half along the vertical crease. In this step, the two trapezoids should lie neatly on one another such that they are superimposed.



# 7.

Laying your folded sheet on a level surface with the longest side on your left, take the top right corner and fold it to precisely meet the bottom left corner. As the angle of this fold is nontrivial, use your straightedge ruler to ensure you form the wing with a tight crease.

You are almost finished constructing the wings of your V-Wing plane. Get ready to fly! In the last step, form the second wing by repeating the previous fold such that the two wings are once again superimposed. This can be done without the use of your straightedge ruler by flipping your V-Wing over and folding the second wing over the first such that the edges and points match.



# V-Wing Aerodynamics

The time has come to retire your ruler and scissors and to put on your pilot's hat. Maximize your distance traveled by reading about your new V-Wing's aerodynamics.

**Thrust:** Plane propellant

- Force that overcomes drag; used to launch the V-Wing
- The V-Wing should be thrown with a gentle thrust because of its smooth design

**Drag:** Opposes thrust

- Force caused by air friction and pressure

**Lift:** Holds plane up

- The main force in keeping the V-Wing aloft
- Angle the V-Wing with a slight upward tilt upon launch so it can gain enough lift to fly a long distance

**Weight:** Opposes lift

- Caused by gravity
- Because the V-Wing does not use fuel to generate thrust, it must return to Earth

# Launch

## Instructions

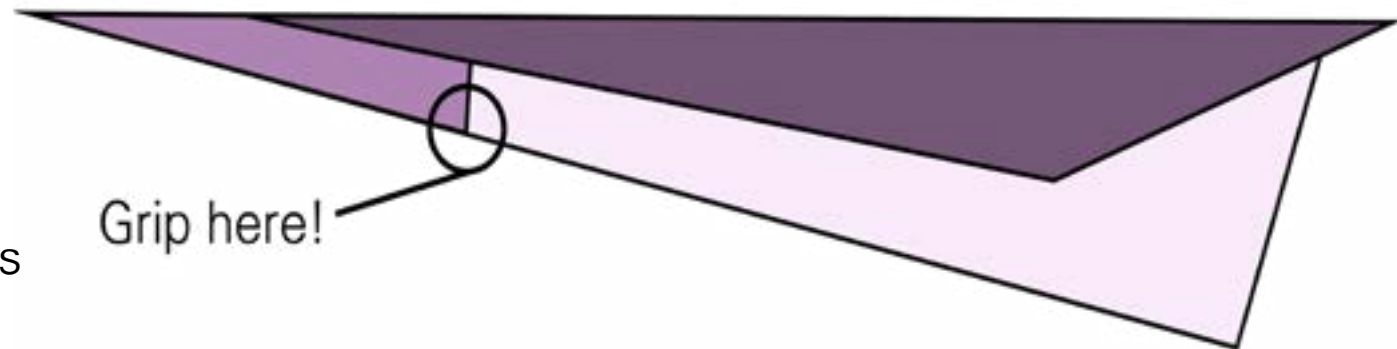
Now that your plane is built, it is important to know how to properly throw it. First, you should pick the ideal location to launch your V-Wing with ample space and limited interference from wind.

Once you have found the right setting, grip the plane near its nose, with your thumb and pointer finger pinching the creased edge along the bottom of the plane. Bend your arm such that the rear of the plane lies above the shoulder of your dominant arm.

Without moving your elbow, extend your forearm away from your body, releasing the plane once the top of the plane is roughly level with the ground.

**TIP:** Watch for surrounding people and ensure they will not be hit when you throw your V-Wing plane. Serious injury can result from a collision with the eye.

Now, watch it soar!



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